

**WHAT EXPLAINS OBSERVED  
RELUCTANCE TO TRADE?  
A COMPREHENSIVE LITERATURE  
REVIEW**

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# What Explains Observed Reluctance to Trade? A Comprehensive Literature Review

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## ABSTRACT

Valuation gaps and exchange asymmetries are among the most widely studied phenomena in the field of behavioral economics. The purpose of this chapter is to present the current state of the social science literature related to observed reluctance to trade. Numerous theories have been proposed and only a few might be safe to rule out based on the evidence to date. The chapter begins by describing the standard model of preferences, which generally assumes that valuation is independent of ownership status, and then catalogs early findings that seem to suggest that ownership status influences valuation. Early research tested various potential explanations for observed reluctance to trade, and the results did not point to any one theory. Despite this, the literature gravitated toward a single theory—endowment theory, which assumes that preferences are reference-dependent and that individuals are averse to losses. With endowment theory on the rise, some went to work to investigate the conditions that might trigger loss aversion and those that might reduce its effects. Since the early 1990s, a number of alternative theories have been developed and tested by both economists and psychologists including substitution theory, expectation theory, preference uncertainty, mere-ownership theory, enhancement theory, subject misconceptions, and regret avoidance. The chapter walks through each proposed theory, cataloging the evidence for and against. While some theories have garnered more support from the data than others, no single theory yet deserves the title of leading theory. In addition, the phenomenon itself has proved too unstable to warrant general claims that valuations depend on ownership (or expectations over ownership) or that individuals are generally reluctant to trade. Given the current state of the literature, to make such claims is to misrepresent the full set of results. As this chapter makes clear, much more work is required to develop a theory or set of theories worthy of designation as the leading theory.

**Keywords:** valuation gaps, exchange asymmetries, endowment effect, experimental economics, behavioral economics

**JEL Classifications:** A12, C91, D03, K00

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## 1. INTRODUCTION

Valuation gaps and exchange asymmetries are among the most widely studied phenomena in the field of behavioral economics. They are also among the most widely applied in the law literature (Klass and Zeiler 2013). A valuation gap exists when the most a person is willing to pay for an item (WTP) is less than the least amount that same person is willing to accept to give up the same item if endowed with it (WTA). Asymmetric exchange behavior is observed when a person is reluctant to give up an endowed item in exchange for another item of comparable value.<sup>1</sup> Early observations of such reluctance to trade were noted as evidence against standard utility theory, which assumes that one's valuation of an item is independent of whether one is endowed with the item (Thaler 1980; Kelman 1979). Since then, researchers have attempted to develop and test numerous theories designed to explain observed reluctance to trade. In the meantime, legal scholars have been busy spinning out hundreds of applications of this finding in every conceivable area of law—from adverse possession in property law to default rules in contract law to beneficiary's rights in trust law to right to discoveries in intellectual property law, and on and on and on (Klass and Zeiler 2013; Korobkin 2014).

The purpose of this chapter is to present the current state of the social science literature related to observed reluctance to trade. Georgantzis and Navarro-Martínez (2010) summarize the state of the literature best: “[D]espite the overwhelming volume of evidence on the WTA–WTP gap accumulated to date, researchers are still far from agreement on the nature of the disparity and even on its very existence.”<sup>2</sup> Numerous theories have been proposed and only a few might be safe to rule out based on the evidence to date. While reluctance to trade has been observed in many laboratory settings, such behavior does not seem to be robust. From a scientific perspective, we are compelled to place the most weight on theories that are able to organize the largest swaths of reported data. When a theory's predictions fail to garner robust support, the theory is either discarded or updated. As existing theories are revised and tested, new theories arise and are often supported by initial data, bolstered by replications and checks on robustness, and sometimes fail to stand up to on-going robustness checks. The social

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<sup>1</sup> Valuation gaps and exchange asymmetries are often referred to as “endowment effects.” The name is confusing when it comes to the cause of gaps and asymmetries because it implies that endowment is the cause. For this reason, some have adopted less theory-suggestive names for the observed phenomena (e.g., Plott and Zeiler 2005; Plott and Zeiler 2007). I use “valuation gap” and “exchange asymmetry” throughout depending on the context in which the phenomenon is observed. I use “reluctance to trade” to refer to the general phenomenon.

<sup>2</sup> See also, Biel et al. (2011) (“At present, there is no sign of an approaching consensus...”) and Lunn and Lunn (2014) (“There remains no agreed explanation for the finding that experimental subjects and survey respondents generally set a minimum selling price for an item that is two or more times higher than the maximum those without the same item will pay to acquire it.”).

science literature on the topic, mostly in the fields of economics and psychology, is an on-going conversation between theory and empirical verification, and, at present, several theories stand as possible “winners,” but none predicts all of the published findings.

Despite the uncertainty that exists about the drivers of observed reluctance to trade and the continual evolution of the social science knowledge base on the phenomenon,<sup>3</sup> legal scholarship has not kept pace.<sup>4</sup> The social science literature on reluctance to trade has thoroughly saturated legal scholarship. Legal scholars regularly make claims that are not supported by the existing literature. Oftentimes legal scholars rely on decades-old sources or other legal scholars’ descriptions of the literature, which are often outdated, incorrect or incomplete. Given the rapid pace of discovery, a firm understanding of the drivers of observed reluctance to trade cannot be gained by plucking one study or even a large handful of studies from the now vast literature. Understanding what we know and what remains unknown requires a survey and a synthesis of the entire literature. And, because the literature is continually developing, snap shots at particular points in time quickly become outdated. Useful importation of knowledge from the social sciences requires a full understanding of the state of the literature at the moment of importation, including what we know and what we’re uncertain about.<sup>5</sup>

Understanding social science literatures is not a matter of simply understanding each individual study that makes up the literature. Each study is connected to the larger literature in some way, and understanding its import requires an analysis of how it advances what we already know and what new questions it gives rise to. When new findings are published, our understanding of best explanations shifts. We get answers to some questions, and, often, new questions arise. Experimenters work on separating theories by designing clever environments that produce divergent predictions from competing theories. Those efforts teach us not only about the relative predictive value of the theories but also about the influences of experiment design choices meant to control for alternative explanations or measure variables of interest (e.g., valuations of goods as owner and non-owner).

The purpose of this chapter is three-fold. First, it presents one viewpoint on the state of the literature. The bottom line is that reported data lend support to several theories, and more work is required to better understand the causes of reluctance to trade. A number of open questions remain. Second, the chapter provides an example of how we might

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<sup>3</sup> Just in the last decade, at least 73 studies have been published in journals or posted as working papers: 8 in 2006, 9 in 2007, 3 in 2008, 4 in 2009, 6 in 2010, 11 in 2011, 9 in 2012, 5 in 2013, 13 in 2014 and 5 in 2015.

<sup>4</sup> See Klass and Zeiler (2013) for a discussion of the problems with importation of the reluctance to trade literature into legal scholarship and ideas for mitigating them. Zeiler (2010) makes the more general case.

<sup>5</sup> To assist in this endeavor, I regularly update this review. Readers can find the most recent version at <http://sites.bu.edu/kzeiler/research-2/>. A link to a glossary of terms also appears there.

analyze individual experimental studies to determine how they fit into a literature. This sort of analysis is necessary to properly update our beliefs about the causes of observed phenomena. Third, the chapter offers examples of methods of critique of individual studies. To this end, studies are not merely summarized but are evaluated along many dimensions including the soundness of the experiment design, the connection between tested theories and the design, and the strength of inferences drawn from results. Best practices, for example, require the design to incorporate all necessary features of the tested theory and to control for alternative explanations.

This is not the first review of the literature. Others have both summarized it and attempted to draw conclusions from it about what drives observed reluctance to trade. A few meta-analyses examine how various features of experimental environments impact subject choices (Horowitz and McConnell 2002; Sayman and Öncüler 2005; Tuncel and Hammit 2014). These studies reveal wide variation in experiment design and help in the endeavor to develop a set of controls for alternative explanations—many of which relate to the difficulties that arise when we ask individuals to do something they usually resist: reveal the most they would be willing to pay for something and the least they would be willing to accept to give something up. Ericson and Fuster (2014) walk us through what they classify as three waves of research in the field: early experiments and theory, challenges to the existence and interpretation of valuation gaps, and expectations-based reference points.<sup>6</sup> This chapter differs from their review in two main ways. First, I include (for better or worse) a larger number of studies. Second, and more importantly, we reach different conclusions. While Ericson and Fuster claim that “[l]oss aversion...is...still the leading paradigm for understanding the endowment effect,” this chapter concludes that the data support other theories just as well and possibly better. Morewedge and Giblin (2015) step through several posited theories from the literature and provide a quick snapshot of evidence for and against each. They conclude that an extension of one theory, which they refer to as “attribute sampling bias,” can account for a wide set of the reported evidence. While they do not explain their conclusions (they cover 125 studies in eight journal pages), the review organizes the literature through a helpful lens. This review, which is substantially longer, provides a thicker analysis and offers methodological critiques. Finally, some literature reviews, unfortunately, are misleading and possibly at least partly responsible for the confused legal scholarship.<sup>7</sup>

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<sup>6</sup> They also describe a number of alternative theories and point to evidence in support of and against each. This chapter discusses expectations-based reference points and all other terms used by not defined in this Section.

<sup>7</sup> See e.g., Kahneman, et al. (2008). They claim that “[t]here is...little or no empirical support for the empirical assertion of people’s symmetrical valuations of gains and losses and the presumed economic choices and behavior that results from them. Instead, tests consistently indicate that people value the loss of an entitlement more, and usually far more, than a fully commensurate gain and make choices accordingly.” This chapter’s summary of the literature makes clear that by the mid-2000s several published studies called into question the assumption that losses are more painful than gains of the same size. While their review was published in 2008, the most recent study it cites was

The chapter begins by describing the standard model of preferences, which generally assumes that valuation is independent of ownership status, and then catalogs early findings published in the 1980s that seem to suggest that ownership status influences valuation. This decade of research was characterized by a number of studies designed to test various potential explanations for observed reluctance to trade, and the results did not point to any one theory. Despite this, the literature gravitated toward a single theory—endowment theory, which assumes that preferences are reference-dependent and that individuals are averse to losses. With endowment theory on the rise, some went to work to investigate the conditions that might trigger loss aversion and those that might reduce its effects. Evidence suggested that we might be especially reluctant to trade goods that trigger moral commitments (e.g., objects with intrinsic value like pine trees), goods that signal something about our characteristics (e.g., earned goods), goods that we consider when we're in particular emotional states, and goods that we intend to consume rather than ones that we're in the business of trading in markets or that don't belong to us but to firms that employ us. While some pointed to these sorts of findings as evidence of the context-dependent nature of loss aversion, others leveraged them to develop competing theories in an attempt to better unify the data. Since the early 1990s, a number of theories have been developed and tested by both economists and psychologists including substitution theory, expectation theory, preference uncertainty, mere-ownership theory, enhancement theory, subject misconceptions, and regret avoidance. The chapter walks through each proposed theory, cataloging the evidence for and against. While some theories have garnered more support from the data than others, no single theory yet deserves the title of leading theory. In addition, the phenomenon itself has proved too unstable to warrant general claims that valuations depend on ownership (or expectations over ownership) or that individuals are generally reluctant to trade. Given the current state of the literature, to make such claims is to misrepresent the full set of results. As this chapter makes clear, much more work is required to develop a theory or set of theories worthy of designation as the leading theory.

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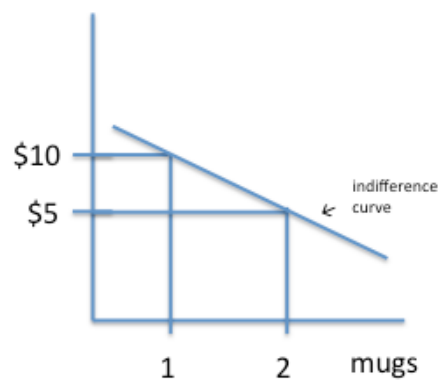
published in 1998. Between 1998 and 2008, tens of published studies had reshaped the landscape.

Korobkin (2014) draws conclusions from a relatively small subset of published studies. His review covers roughly 40 studies by my count. As a point of reference, this chapter catalogs over 150 published studies, roughly 20 of which were published after his chapter was printed. Caution should be used when considering conclusions drawn from roughly a third of all relevant studies. One omitted study (e.g., Plott and Zeiler 2011) was published in the same issue of a journal that contained an included and highly influential study (e.g., Isoni et al. 2011) that posed a serious challenge to previous work. Korobkin's readers, unfortunately, are getting not only an incomplete view but also a biased view of the literature. In addition to the lack of comprehension and the apparent cherry picking of included studies, Korobkin confuses alternative theories for explanations of loss aversion. For example, he argues that attachment to endowed goods drives loss aversion, but the authors of attachment theory offer it as an alternative to loss aversion.

## 2. NEOCLASSICAL THEORY ASSUMES WTA EQUALS WTP

Neoclassical microeconomic theory assumes that, ignoring wealth effects,<sup>8</sup> one's valuation for a good (with many available substitutes<sup>9</sup>) is independent of whether one is endowed with the good. That is, standard utility theory assumes that the most one is willing to pay to obtain a good is the same as the minimum amount one is willing to accept to give up that same good if endowed with it (Willig 1976; Randall and Stoll 1980). This implies that indifference curves are reversible. An indifference curve, as illustrated in Figure 1, indicates the rate of substitution between two commodities. The individual characterized by the indifference curve in the figure is equally happy with 1 mug and \$10 as he is with 2 mugs and \$5. If endowed with 1 mug and \$10, he is indifferent between his endowment and giving up \$5 to obtain another mug. In the reverse, if endowed with 2 mugs and \$5, he is indifferent between his endowment and giving up a mug in exchange for \$5. Regardless of the starting point, his valuation for the mug (the amount that makes him indifferent between the money and a mug) is the same—\$5.

Figure 1: A Reversible Indifference Curve



That assumption was called into question by various researchers who observed disparities in WTP and WTA in the 1970s. Hammack and Brown (1974) reported one of the first observations of reluctance to trade. A hypothetical survey of duck hunters revealed a gap

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<sup>8</sup> A wealth effect (or income effect) can occur when purchasing power changes as a result of a change in wealth (or income). In laboratory experiments, we might worry about wealth effects caused by endowing owners with a good and giving nothing to non-owners. The non-owners are less wealthy, on average, than owners and so might be willing to pay less to obtain the good relative to the amount owners are willing to forgo to keep the good. One way to avoid wealth effects is to ensure that potential buyers and potential sellers begin on the same indifference curve by endowing potential buyers with an amount of cash that is equivalent to the average value of the good given to potential sellers. For example, some experimenters endow potential buyers with cash in an amount equal to the average reported WTA (e.g., Morrison 1997b).

<sup>9</sup> See more on the impact of substitutes, *infra*.

in valuations of the right to duck hunt on wetlands. On average, those with a hypothetical right to hunt were willing to accept on average \$1,044 to give it up while those without the right were willing hypothetically to pay an average of only \$247 to get it. This, and similar observations,<sup>10</sup> motivated a long line of laboratory investigations to measure valuations in controlled conditions in an effort to determine the cause of observed gaps.

### **3. GAPS IN THE LAB: AN EARLY EXPLORATION OF VALUATION ELICITATION PROCEDURES**

One of the first tested hypotheses was that observed valuation gaps were caused by the hypothetical nature of the valuation elicitation device used in earlier studies reporting gaps.<sup>11</sup> Knetsch and Sinden (1984) hypothesized that the gap was the result of the hypothetical nature of such contingent valuation studies. They were among the first to estimate reluctance to trade in the laboratory under non-hypothetical conditions. They endowed half their subjects with lottery tickets, which gave the ticket holders a chance to win a choice between \$70 bookstore gift certificate and \$50 in cash. The second group was given an opportunity to purchase a lottery ticket for \$2 and had access to credit if

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<sup>10</sup> For example, Bishop and Heberlein (1979) elicited valuations for non-hypothetical WTP, hypothetical WTA and hypothetical WTP for a goose-hunting permit. Hypothetical WTA exceeded non-hypothetical WTP, which exceeded hypothetical WTP. Despite the implicit assumption of all theories that choices have actual consequences, many others have elicited valuations under hypothetical conditions. For example, Gerking et al. (1988) reported a WTP-WTA gap in hypothetical valuations for job safety. Johnson et al. (1993) reported hypothetical gaps in insurance deductibles, Hartman et al. (1991) for residential electrical services, Korobkin (1998) for contract terms, Hoorens et al. (1999) for time (i.e., purchase and sale of hypothetical labor), Cook and Wu (2001) for lottery tickets and Nash and Rosenthal (2014) for position in a line to choose a dorm room. Chilton et al. (2012), after training subjects to report their true valuations, reported mixed results for valuations of hypothetical health conditions. Some have studied why average hypothetical WTA tends to be higher than average non-hypothetical WTA. Li et al. (2002) for example suggest that individuals are uncertain about their preferences and they “do not search for their true preferences in a hypothetical situation as intensively as in real transactions.” In addition, they posited that risk aversion and preference uncertainty pushes individuals who are uncertain about the welfare effects of proposed changes to report higher WTA values relative to WTA values reported by individuals who are more certain about their preferences. It should be noted that Horowitz and McConnell’s (2002) meta-analysis of gap studies reported no difference in results from studies using “incentive-compatible” elicitation devices and those that do not, although they (oddly) count some hypothetical studies as incentive-compatible. In more recent meta-analyses, Sayman and Öncüler (2005) and Tuncel and Hammitt (2014) reported significantly smaller disparities in studies that use truly incentive-compatible mechanisms.

<sup>11</sup> For example, see Jones-Lee et al. (1985) and Viscusi et al. (1987). For a dated and yet still relevant intellectual exchange on the pros and cons of employing the contingent valuation method to elicit valuations for non-market goods, see Cummings et al. (1986).



short on cash. Those endowed with lottery tickets were given a chance to sell their tickets for \$2. Exchanges were performed individually and privately to control for “information influences and information flows” (p. 510). To control transaction costs, all subjects were required to stop at a cash desk to discuss options. If the hypothetical nature of previous experiments caused the observed gap, then removing this feature would remove the gap. It did not. A smaller proportion of owners chose to sell their lottery tickets relative to the proportion of non-owners who chose to buy a ticket, suggesting that owners’ valuations for the tickets were, on average, higher than non-owners’. The authors conducted additional tests to check the impact of lowering the value of the prizes available and the cash trade amount to test the influence of familiarity with the task, and to test robustness across different subject pools (e.g., employed people v. students). The results were robust to these variations. Only one treatment produced no exchange asymmetry. In this treatment, non-endowed subjects were given cash and very little time passed between the moment of endowment and choices. The authors proposed two possible explanations for the lack of reluctance to trade: the expressed desire by subjects to participate in the group activity and a possible lack of belief that the cash and tickets were in fact owned given the short period of time between endowment and trade decisions.<sup>12</sup> Generally, though, while valuation gaps decreased relative to those estimated using hypothetical elicitation devices, statistically significant gaps remained.<sup>13</sup> Knetsch and Sinden attributed these gaps to asymmetric evaluation of realized income and opportunity income.<sup>14</sup> They pointed to several potential sources of this asymmetric valuation, including cognitive biases, regret avoidance, and reference-dependent loss aversion, a feature of preferences posited by Kahneman and Tversky (1979) that assumes individuals experience a greater subjective effect of a loss from some reference point relative to an equivalent gain from that same point. Loss aversion is one feature of a theory some refer to as “endowment

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<sup>12</sup> A large literature has developed to investigate the relevance of the strength of reference states and what exactly sets reference points. See *infra* for details.

<sup>13</sup> Bishop et al. (1983) also explored the hypothetical nature of contingent valuation studies and hypothesized that “contingent markets are too artificial to provide a sufficient context for developing accurate values.” (p. 620) While the authors did not estimate gaps, substantial differences in valuations were observed depending on whether outcomes were hypothetical or non-hypothetical and whether subjects were asked to report WTP or WTA. Hypothetical elicitation devices were found to result in higher WTA and lower WTP relative to non-hypothetical elicitation devices.

<sup>14</sup> It’s possible that income (or wealth) effects explain observed reluctance to trade. Specifically, non-owners might offer to pay less than the amount owners are willing to accept because non-owners, on average, have less wealth than owners, who were endowed with some item at the start of the experiment. Given the size of observed gaps and the low value of goods used in experiments, however, this explanation generally has been ruled out, at least as the dominant explanation (see e.g. Bishop et al. 1983). Other experimenters attempt to control wealth effects by endowing non-owners with cash (e.g., Plott and Zeiler 2005) or by asking subjects, all of whom were endowed with goods, whether they want to trade the endowment for a different good with similar market value (e.g. Kahneman et al. 1990).

theory” (Klass and Zeiler 2013), an application of prospect theory (Kahneman and Tversky 1979) to contexts of riskless choice (see Tversky and Kahneman 1991).<sup>15</sup>

Coursey et al. (1987) explored the possibility that flaws in the methods Knetsch and Sinden (1984) used to elicit choices might explain their results. They noted that the use of lottery tickets, and the uncertainty they introduce, might have confounded the results. In addition, they point to the lack of a demand-revealing, market-like elicitation mechanism<sup>16</sup> and of opportunities for subjects to understand that reporting their true valuations would serve their best interests. When they elicited valuations in the context of hypothetically buying and selling the right to avoid holding a bitter tasting liquid in their mouths for a few seconds,<sup>17</sup> they observed a valuation gap. In contrast, when the authors employed a demand-revealing Vickery (1961) auction mechanism to elicit valuations, ran four non-binding trials to encourage learning<sup>18</sup> and endowed potential buyers with \$10, the gap disappeared due to a substantial decrease in reported owner valuations. The

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<sup>15</sup> This theory is explained in more detail *infra*.

<sup>16</sup> Demand-revealing mechanisms are designed to encourage the reporting of true valuations (i.e., the most one would be willing to pay to obtain an item or the least one would accept to give up an item). These amounts are sometimes referred to as “non-strategic valuations.” If subjects report valuations that deviate from their true valuations because they think they will be better off doing so, these reported valuations cannot be used to test theories that predict a disparity in true valuations of owners and non-owners.

<sup>17</sup> The researchers chose to use an unfamiliar good to avoid preconceived notions of value.

<sup>18</sup> The clearing price was announced to all subjects after each round. Note that controversy exists around the influence of repeated trials. See e.g., Morrison (2000). While they might be necessary for learning one’s preferences and how best to engage with an unfamiliar elicitation device, they might be unnecessary (and not worth the added cost) if reported valuations do not change across rounds. In addition, even if reported valuations do change across rounds, the changes might not necessarily reflect learning. Finally, they might bias reported valuations, especially if preferences are imprecise, clearing prices are announced between rounds, and announced prices influence reported valuations. Morrison (2000) reported results from experiments that employed multiple rounds. Subjects were told how much they would have to pay to purchase the goods at a nearby store. The randomly chosen clearing prices were announced between each round. She observed no change over five rounds when subjects reported valuations for a chocolate bar, for which no gap was observed in any round, and an increase in the gap over the first couple rounds when subjects reported valuations for mugs over five rounds. A slight decrease in the mug valuation gap occurred over the final three rounds, but the gap in the final round was larger than the gap in the first round. She found some evidence that subjects learn their true valuations when they participate in multiple rounds and that owners need more rounds than non-owners to “locate” their true valuations. She found no statistically significant evidence that reported valuations depend on the clearing price announced in the previous round, but this might be due to her small sample size (n = 10).

authors concluded that reluctance to trade should be expected only when decisions are made outside markets or when individuals lack experience with the elicitation device.<sup>19</sup>

Follow up studies designed to test the effects of elicitation methods report mixed results. Knez et al. (1985) estimated valuation gaps using bids and asks for lotteries in a repeated market setting. They found that subjects were willing to deviate from reported valuations once engaged in the market. While some had suggested that valuation gaps could lead to market inefficiencies, the authors pointed to their results as evidence that gaps observed in single-shot, non-market settings do not imply “that...individuals are incompetent or markets are inefficient” (p. 401). Similarly, Brookshire and Coursey (1987) estimated gaps using three methods: the contingent valuation method,<sup>20</sup> a single-shot hypothetical (but otherwise) demand-revealing auction, and repeated and binding demand-revealing auctions. In the non-hypothetical treatment, potential buyers were endowed with cash and potential sellers were endowed with the right to have a particular number of trees planted in their neighborhood (all subjects lived in the same neighborhood). The demand-revealing auction was explained to the subjects. In contrast with Knez et al. (1985), Brookshire and Coursey (1987) observed statistically significant gaps in each treatment. The gap, however, decreased across each of the three treatments (again, as a result of reduced owner valuations). The authors concluded that, while reference-dependent loss

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<sup>19</sup> Gregory and Furby (1987) questioned whether subjects understood the elicitation device used by Coursey et al., whether the rounds meant to help subjects learn their valuations for the good actually performed as intended, whether the fact that not all rounds were binding with certainty moved reported valuations away from actual valuations, whether the presence of extreme outliers skewed the results, whether the instructions might have signaled to non-owners an upper bound on their valuations, whether endowing potential buyers but not potential sellers with cash impacted reported valuations and whether announcing the clearing price between rounds triggered a lack of independence of one subject’s reported valuations from others’, especially given subjects’ unfamiliarity with the good. A reanalysis of the data demonstrates a lack of robustness to elimination of outliers. While Coursey (1987) convincingly responded, the multi-faceted critique highlights difficulties experimenters face when they attempt to elicit true valuations in the lab.

In a second critique, Knetsch and Sinden (1987) suggested a number of reasons why the elicitation mechanism used by Coursey et al. might not be demand revealing. They also argued that giving cash to potential buyers, a design feature that attempts to control for wealth effects, might lead to a house-money effect, the possibility that subjects are more willing to spend cash received as a windfall during an experiment relative to money from their own pockets. The authors also worry about other confounding impacts caused by the cash endowment.

<sup>20</sup> The contingent valuation method entails simply asking subjects to state their valuations either as hypothetical owners or hypothetical non-owners. Subjects’ reports do not result in consequences of any sort.

aversion seems to be present under all conditions, market settings have disciplinary effects that move reported valuations closer to true valuations.<sup>21</sup>

Harless (1989) contributed to the gap literature in two ways. First, he refined the valuation elicitation device by explaining to subjects through examples the optimal strategy of the demand-revealing auction. He hypothesized that subjects likely were unfamiliar with the auctions used to elicit valuations and that explaining the optimal strategy to the subjects would help eliminate any noise caused by strategic considerations. Second, rather than using a between-subject design, in which each subject acts only as a potential seller or a potential buyer, he employed a within-subject design, measuring the gap by averaging individual differences between valuations as owner and as non-owner.<sup>22</sup> He observed no gap in valuations for lotteries, which implies that previously observed gaps were due to subject misconceptions of the elicitation device and the way in which gaps were estimated, and not loss aversion.

To summarize, by the end of the 1980s evidence reported in the literature supported a number of theories including reference-dependent loss aversion, uncertain or imprecise preferences, the lack of market discipline (which acts to drive inflated WTA down to values more reflective of actual values), and a lack of familiarity with the valuation elicitation device. Despite the mixed evidence, the next steps in the literature veer towards the adoption of endowment theory as the dominant explanation.

#### **4. THE DEVELOPMENT OF ENDOWMENT THEORY**

Knetsch (1989) was the first to report observed exchange asymmetries in the context of trading one good for another good (as opposed to some amount of money). He motivated the design change by framing it as a more direct test of the assumption of reversible

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<sup>21</sup> Ortona and Scacciati (1992) observed no disparity in valuations when subjects faced real payoffs after announcing valuations for necessary goods of substantial value (i.e., half day's net wages). They concluded that, although endowments can impact valuations in some cases, if the payoffs are real and the goods are necessary and expensive, rational behaviors might swamp reference-dependent loss aversion (or any other drivers of valuation gaps).

<sup>22</sup> Relative to between-subject designs, within-subject designs often increase the power of statistical tests, increasing the likelihood of detecting treatment effects if they exist. They also controlled for any unobservable differences between control and treatment groups that remain after randomized assignment. The downside to within-subject designs is potential carryover effects—participation in the control group might impact subjects' subsequent choices once the treatment is applied. For example, subjects might feel a need to be consistent across rounds. In this context, a subject might wonder whether it would seem odd to report different valuations as a potential buyer and a potential seller. This change in the experiment design might explain, as least in part, Harless' null result. Schmidt and Traub (2009) reported evidence supporting the claim that between-subject and within-subject measures might produce different results.

indifference curves. Subjects were endowed with coffee mugs, which they kept in their possession while answering a short questionnaire.<sup>23</sup> Subjects were then told they could either keep the mug they owned or exchange the mug for a candy bar. The subjects were told to signal their desire to trade by holding up a piece of paper with the word “trade” written on it. To reduce the possibility of transaction costs related to trading, the experimenter immediately made all desired trades by walking the candy bar to the subject and exchanging it for the mug. Another group participated in the same experiment except that they were endowed with candy bars and offered mugs in exchange. A third group was simply offered a choice between the two goods with neither being endowed. The simple design eliminated income effects and any opportunity for strategic bidding. The design also nicely separates the theories Knetsch tests. If indifference curves were reversible, we would expect no difference in the proportions of subjects in each group favoring one good over the other. If individuals are averse to losses, however, we would expect willingness to trade to depend on endowment status. The results were consistent with the behavior predicted by loss aversion. While 56% of those given a choice chose the mug, 89% of mug owners kept their mugs and only 10% of candy bar owners traded for a mug.<sup>24</sup> Two additional treatments using different designs produced similar results.<sup>25</sup>

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<sup>23</sup> In most experiments, subjects possess the endowed good for a short time before making choices about whether to keep it or give it up. This reduces the likelihood that the value of the good changes due to experience with it or some sort of psychological attachment that often comes with owning a good for some longer period of time. When reluctance to trade results after a short possession period, some refer to observed reluctance to trade as an “instant endowment effect” (Tversky and Kahneman 1991). Korobkin (2003) argued that theories based on attachment cannot explain instant valuation gaps. Others, however, suggest that such instant effects result from “generalized response tendencies in relation to possessions, even when such consumption capital may not have been built up yet” (Ariely et al. 2005). Reb and Connolly (2007) reported evidence suggesting that possession alone might drive reluctance to trade. They also review the then-existing literature on subjective ownership—feelings of ownership that are induced by control over a good even when it’s not owned. Bischoff and Meckl (2008) reported evidence of valuation gaps in rights to publically provided goods even when no one individual has exclusive property rights over the good. Coren (2007, chapter 4) developed a theory of “cognitive investment” to explain instant valuation gaps but fails to find evidence supporting the theory in data collected using a survey instrument.

<sup>24</sup> Harbaugh et al. (2001) replicated this result for cohorts of different ages ranging from 5-year-olds to college undergraduates. The authors interpreted these results as evidence of loss aversion. If market experience was at work to correct mistakes in valuation, the argument goes, we would not see gaps in valuations reported by undergraduate students who have higher levels of market experience relative to younger subjects. The authors concluded that “[t]he endowment effect appears to be a ‘real’ part of preferences, rather than a mistake that diminishes with experience and learning” (p. 181).

<sup>25</sup> Chapman (1998) reported data suggesting that not all trades are perceived as losses. Her results support the conjecture that the relation between the endowed good and the alternative good matters. For example, subjects seem not to be reluctant to give up an endowed good for an *identical* alternative good, suggesting that the mere giving up of an

Knetsch interprets his results as additional evidence of endowment theory, but he does not attempt to square the theory with published evidence that works against it.

Kahneman et al. (1990) similarly reported the results of several experiments designed to test alternative theories of gaps but failed to explain why gaps are not observed in other contexts. They provided a “summary [table] of past tests of evaluation disparities.” Surprisingly, the table did not report confidence intervals for the estimates, and it excluded null results.<sup>26</sup> They did, however, acknowledge potential explanations beyond endowment theory, including perceived illegitimacy of the transaction,<sup>27</sup> standard bargaining habits (i.e., sellers’ instinct to ask high and buyers’ instinct to bid low), subject misunderstandings, presumably of the valuation elicitation device, and transaction costs. They also began to refine endowment theory. The theory assumes that endowments set individuals’ reference points, which frame perceptions of the giving up of endowments as losses and the getting of endowments as gains. Loss aversion assumes that individuals are hurt by losses more than they are helped by gains of the same size, thus endowment theory predicts a reluctance to trade away endowments. The authors refined the theory to exclude some types of endowments. They asserted that reluctance to trade should not be expected for goods that are purchased for resale rather than consumption. In addition, it should not be expected “if a perfect substitute is readily available at a lower price” (p. 1344).

Kahneman et al. designed an environment to test theories related to transaction costs, misunderstandings and strategic bargaining behavior. They posited that if gaps are not observed when subjects trade induced-value tokens,<sup>28</sup> we can rule out these theories as

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item does not trigger a perceived loss. She drew a line between “trade-loss aversion,” the notion that loss aversion is a characteristic of the exchange, and “attribute-loss aversion,” that loss aversion is a characteristic of a single item or attribute of that item. This distinction can be thought of as a modification to assumptions about what exactly constitutes a loss.

<sup>26</sup> Table 1 (p. 1327) does not report whether observed gaps were statistically significantly different from zero: e.g., Coursey et al. (1987) concludes that the gap observed in Part III—the only treatment with non-hypothetical choices and design features intended to train subjects on the valuation elicitation procedure—was not statistically significant; Test 4 of Knetsch and Sinden (1984) produced no statistically significant gap). The table also failed to include some studies reporting null results (e.g., Harless 1989). Unfortunately, readers likely have misinterpreted this table as a signal of robustness of gaps when, in fact, the evidence was mixed at the time. Kahneman et al. did, however, mention some previously reported null results later in the text.

<sup>27</sup> This theory might explain results in experiments, for example, where the endowed good is a public good such as neighborhood tree density. See, e.g., Brookshire and Coursey (1987).

<sup>28</sup> Induced-value tokens are items that subjects who end up owning them at the end of the experiment can trade for cash in an amount equal to the value assigned to them by the experimenter before the start of the experiment.

explanations for gaps observed when subjects trade goods (using the same methods as those used in the induced-value token rounds) for which endowment theory would predict gaps. Kahneman et al. ran several treatments,<sup>29</sup> one of the most controlled<sup>30</sup> of which elicited valuations for mugs using the Becker, DeGroot, Marschak (BDM) mechanism (Becker et al. 1964). Each potential seller is asked to report the least amount she is willing to accept to give up her endowment and that reported value is compared to a randomly generated number. If the reported valuation is higher than the random number, the owner keeps her endowment. If the reported valuation is less than the random number, she gives up her item in exchange for an amount of cash equal to the random number. This device encourages reports of true (i.e., non-strategic) valuations. If a seller decides to report a valuation that is higher than her true valuation, she risks forgoing an opportunity to trade her item for an amount higher than her true valuation. If she decides to report a valuation that is lower than her true valuation, she risks trading her item for an amount that is lower than her true valuation. The incentives are similar for buyers, who report a valuation and then buy at a price equal to the random number only if the random number is lower than the reported valuation.

Each of 59 subjects was randomly assigned to the buyer role or the seller role and remained in the same role throughout the experiment. Subjects participated in two hypothetical induced-value token rounds.<sup>31</sup> In all rounds subjects were told that it was in their best interest to answer the questions truthfully and that reported valuations would have no effect on the price at which the items were traded. Potential buyers did not receive cash to spend during the experiment,<sup>32</sup> and they did not physically possess the mugs while bidding on them, although they were shown the mugs prior to reporting valuations. Valuations were elicited using the multiple price list format: each subject was asked whether he would sell (or buy) at a specific price across a set of prices ranging

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<sup>29</sup> In a pair of treatments, Kahneman et al. investigated whether non-owners are reluctant to buy or owners are reluctant to sell by asking a third group of subjects to simply choose between the good and different amounts of cash. They found that choosers' valuations were more in line with potential buyers' valuations than potential sellers' valuations and concluded that the gap was driven by reluctance to sell. Franciosi et al. (1996) wondered whether the terms "buying," "selling," and "choosing" suggested particular strategies to the subjects—i.e., "buyers are motivated to buy low and sellers to sell high" (p. 216)—that might have nudged subjects away from their true valuations. Franciosi et al. tested the impact of language by stripping out these terms. While the WTA-WTP gap narrowed, it remained statistically significant.

<sup>30</sup> By "most controlled," I mean the treatment that attempts to eliminate the greatest number of alternative explanations.

<sup>31</sup> Note that the hypothetical nature of the token rounds negates the demand-revealing nature of the elicitation device. Had gaps been observed in these rounds, this feature might have accounted for them, but gaps were not observed.

<sup>32</sup> Subjects were told to bring cash to the experiment and that credit and change would be available. The authors reported that some subjects borrowed money from other subjects.

from \$0 to \$9.50 in increments of 50 cents.<sup>33</sup> Reluctance to trade was estimated in an unconventional way by comparing the actual numbers of trades to the predicted number of trades assuming that the distribution of values in the two groups is the same barring sample variation.<sup>34</sup> That is, the authors concluded that sellers were reluctant to trade if the ratio of the number of observed trades to the number of expected trades is less than 1.

The results support the existence of valuation disparities driven by endowments. The ratios of observed trades to expected trades in the induced-value token rounds were both roughly 1 (no tests of significance were mentioned). From this result, Kahneman et al. concluded that subjects understood the valuation elicitation procedure and that they understood that strategic bidding was not advantageous. On the other hand, the ratio of observed to expected number of trades in the mug round was 0.41 (no tests of significance mentioned). The median selling price was over twice the median buying price. A number of alternative designs were employed to control for various alternative explanations, and reluctance to trade proved robust.<sup>35</sup>

Note that while Knetsch (1989) and Kahneman et al. (1990) both produced results in support of endowment theory and robust to various design changes to control for alternative explanations, the body of evidence in the literature at the time Kahneman et al. was published did not universally support this explanation, and neither Knetsch nor Kahneman et al. attempted to explain the published null results. Despite this, legal scholars tend to cite to these studies as proof (and not just evidence) of endowment theory without mentioning the results that call the explanation into question (Klass and Zeiler 2013). When applying any economic theory in law and policy, disclosing the

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<sup>33</sup> Kahneman et al. (1990) are cited as the first to use multiple price lists to elicit commodity valuations (Anderson et al. 2006). The demand-revealing properties of this method have been questioned (e.g., Anderson et al. 2006), but Kahneman et al. obtained the same results in a separate treatment that asked subjects to simply report their valuations. Anderson et al. (2007) reported evidence supporting the multiple price list method as a valid way to elicit non-strategic (i.e., true) valuations. Others have employed this mechanism (see *infra* for examples).

<sup>34</sup> Franciosi et al. (1996) explored the impact of using a different auction mechanism that avoids possible incentives related to uncertainty over the clearing price inherent in the mechanism Kahneman et al. use to elicit valuations in some of their treatments. Franciosi et al. employed a demand-revealing elicitation device that informed subjects of the clearing price as the market ran. While fewer trades occurred relative to the predicted number of trades, trading volume increased. In addition, Franciosi et al. demonstrated that trading volume might decrease even when no significant difference between WTP and WTA exists. Thus, they interpreted Kahneman et al.'s results as supporting a prediction of under-trading but not a WTP-WTA disparity, per se.

<sup>35</sup> Borges and Knetsch (1998) ran simulations to estimate the impact of valuation gaps on number of trades. They concluded from the collected valuations data and simulations that competitive markets will not produce efficient outcomes and that final allocations depend on initial endowments, a direct challenge to the predictions of Coase (1960).



evidence both for and against the theory is necessary to determine how confident we should be when we contemplate generating legal rules and policies based on a particular theory. The bottom line is that, in 1990, the explanation for observed reluctance to trade remained elusive despite claims to the contrary (Klass and Zeiler 2013).

Despite the literature's mixed evidence, the findings from Knetsch and Sinden (1984), Knetsch (1989), and Kahneman et al. (1990), along with more general evidence of status quo bias, prompted Tversky and Kahneman (1991) to adapt prospect theory (Kahneman and Tversky 1979) to contexts of riskless choice.<sup>36</sup> The theory, which I will refer to as "endowment theory,"<sup>37</sup> assumes that individual preference relations depend on one's reference state (i.e., reference dependent preferences). In riskless choice contexts, "the reference state usually corresponds to the decision maker's current position, [but] it can also be influenced by aspirations, expectations, norms, and social comparisons" (pp. 1046-1047). Endowment theory assumes that a potential seller's reference point is set when a good becomes part of her endowment (Kahneman et al. 1990, p. 1326).<sup>38</sup> In this sense, reference points are assumed to be exogenous. In addition, the theory assumes that changes from one's current position affect the decision maker differently. That is, losses lead to more disutility than the utility enjoyed by gains of the same size. It also assumes diminishing marginal sensitivity, which implies that marginal value decreases with the

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<sup>36</sup> Tversky and Kahneman claim that "[a]lthough isolated findings may be subject to alternative interpretations, the entire body of evidence provides strong support for the phenomenon of loss aversion." (p. 1041) Such incomplete summaries of empirical results highlight the importance of developing a first-hand knowledge of empirical literatures before importing theories designed to explain observed phenomena reported in the literatures (Zeiler 2010). Those who chose not to rely on Tversky and Kahneman's literature description would have discovered Knez et al. (1985) and Harless (1989), both of which are absent from Tversky and Kahneman's (1991) reference list and discussion, and both of which fail to provide support for endowment theory.

<sup>37</sup> The revised name is meant to distinguish the explanation from the observed phenomenon (Plott and Zeiler 2005). Others noted the importance of this earlier on (Mandel 2002, p. 746) ("It is important to clearly distinguish the behavioral definition of the endowment effect from its possible explanations.").

<sup>38</sup> Sen and Johnson (1997) reported data suggesting that "mere possession of only a coupon for one of the choice options leads to an instantaneous increase in subjects' preference for that option." Strahilevitz and Loewenstein (1998) investigated the impacts of past ownership, duration of ownership, possession and attractiveness of the item on the setting of reference points. Others refer to this phenomenon as an increase in the subjective value of a good caused by psychological attachment. See, e.g., Ariely and Simonson (2003), who suggested that attachment can occur even in the absence of ownership. They refer to this as a "pseudoendowment effect." Shu and Peck (2011; study 2) find that duration of ownership increases both feelings of psychological ownership and seller valuations.

distance from the reference point.<sup>39</sup> The authors predicted no aversion to losses of money (and tokens that could be exchanged for money) and losses of goods held for sale in

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<sup>39</sup> A separate strand of the literature attempts to explain why preferences might be characterized by loss aversion and reference dependence. A growing body of research (a small fraction of which is cited here) suggests an evolutionary biological explanation for valuation gaps. For example, Jones (2001) argued that valuation gaps are explained by an evolutionary adaptation that arises from the “widespread phenomenon in territorial systems that residents of a territory almost invariably defeat challengers” (p. 1185). Thus, those with a predisposition for holding on to what they have were more likely to survive, and humans are now genetically programmed to place relatively high values on endowed items. See also Freidman (2004) and Gintis (2007), who offered similar theories based on selection for territorial behavior. Flemming et al. (2012) suggested that the preference features assumed by endowment theory might be the consequence of “earlier evolutionary pressures on human cognitive abilities.” For example, we might exhibit a tendency to keep what we have because humans (and primates) evolved during a time when promises were difficult to enforce. One might promise to give one thing in exchange for giving up something else, but the promisee might be reluctant to do so if the promisor can slip away with the promisee’s good before he’s able to secure receipt of the other thing. They reported experimental findings suggesting that apes are reluctant to trade goods that increase genetic fitness (e.g., food). This finding supports the evolutionary biological explanation for loss aversion. Huck et al. (2005) formalized the idea in game-theoretic terms. They found relatively strong effects for evolutionarily salient items (e.g., food).

Several studies have explored reluctance to trade in isolated African tribes and in non-human primates. In an experiment using capuchin monkeys as subjects, Chen et al. (2006) and Lakshminarayanan et al. (2008) reported data they interpret as supporting innate reference dependence and loss aversion. In an experiment using chimpanzees as subjects, Brosnan et al. (2007) reported data they interpret as support for evolutionary explanations for valuation gaps. They observed reluctance to trade food items but not toys. Kanngiesser et al. (2011) observed a reluctance to trade food items in great apes but no effect for tool items. Orangutans, on the other hand, did not seem reluctant to trade food. Brosnan et al. (2012) reported additional data purported to support the assumption that gaps are context-specific. In a set of chimpanzee experiments, reluctance to trade was observed for tools that are assumed to be immediately useful (e.g., food sources) but not for tools with no immediate value. Apicella et al. (2014) found that an isolated tribe of bushman in Tanzania exhibited no reluctance to trade, but a subset of the tribe living in less isolated conditions with more opportunities for regular trading exhibited a tendency to resist giving up endowed goods.

Demonstrating the (perhaps troublesome) flexibility of evolutionary explanations, Heifetz and Segev (2004) developed an alternative to endowment theory that is grounded in a different set of evolutionary assumptions. Rather than assuming selection for territorial behavior, the authors assumed that toughness in bargaining serves as an evolutionary explanation for observed valuation gaps. The authors argued that this explanation is better at organizing existing data than endowment theory grounded in loss aversion.

routine commercial transactions.<sup>40</sup> Munro and Sugden (2003) reformulate endowment theory to fit the existing data and to deviate as little as possible from conventional consumer theory.<sup>41</sup> They also extend the theory to build in an assumption of endogenous reference points, which can accommodate experimental findings that suggest that reference points adjust rapidly to changes in endowments. While these theories seemed consistent with some published evidence, it's important to note that they failed to explain the null results that also appeared in the literature at the time.

Before moving on to the literature that explores factors that either enhance or disrupt the formation of valuation gaps, I address some apparent confusion around the normative implications of endowment theory as an explanation for observed gaps. Specifically, some claim that the characteristics of preferences upon which endowment theory is built are “irrational” (see e.g., Arlen et al. 2002, p. 3) or “inconsistent” (Jones 2001, p. 1148). Apicella et al. (2014) described the endowment effect as a “well-known departure from rational choice.” The theory’s authors, however, are explicitly agnostic about the normative status of their model’s assumptions about the features of individual preferences.<sup>42</sup> This is important when it comes to drawing policy implications from the economics literature. If the best-supported theories suggest that we tend to act irrationally or err in the face of losses, then we might find it worthwhile to structure law in a way that helps us overcome this irrational tendency.<sup>43</sup> On the other hand, if loss aversion is

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See Jones (2017) in this volume for an illuminating discussion of the study of explanations for observed phenomenon using an evolutionary biology approach.

<sup>40</sup> Some have challenged the claim that individuals are not averse to losses of goods held for sale. For example, van Dijk and van Knippenberg (1996) reported evidence suggesting that gaps might appear in exchange good markets if traders are uncertain about future exchange prices. This uncertainty, the theory goes, might “elicit a motivation to avoid regret” (p. 522). The authors posited that individuals focus on the net monetary result from trading goods meant for exchange rather than the mere loss. Other researchers have explored similar theories (see section below on Uncertain Preferences, *infra*). In a follow-up study, van Dijk and van Knippenberg (1998) reported data supporting a related theory that suggests gaps might arise in exchange goods markets if individuals are unable to compare endowed goods with alternative goods offered for a trade, making it impossible to focus on the net monetary result from the trade, which shifts focus instead to the mere loss. Others have explored the role of exchange value curiosity in reluctance to trade (van de Ven et al. 2005).

<sup>41</sup> For example, Munro and Sugden’s revised endowment theory does not assume that preferences are additively separable, an assumption of endowment theory that they argue is implicit but unnecessary.

<sup>42</sup> “Is loss aversion irrational? ...We conclude that there is no general answer to the question about the normative status of loss aversion or of other reference effects....” (Tversky and Kahneman 1991, p. 1057-58).

<sup>43</sup> For example, Kermer et al. (2006) reported evidence supporting an alternative theory that assumes that loss avoidance is the result of overestimation of the hedonic effect of

thought to be a feature of preferences, just as risk aversion is, then we might aim to use law to structure markets in a way to help individuals reduce the disutility that losses cause.

First, though, we need to determine whether losses trigger disutility in excess of the disutility that arises from the lost consumption value. After describing the literature that explores environmental features that might enhance or diminish reluctance to trade, the chapter will describe the vast literature that explores alternatives to endowment theory and that has all but left endowment theory behind in the search for theories with better predictive value.

## 5. GAP ENHANCERS AND DISRUPTORS

As the literature started taking a turn towards endowment theory as the leading explanation for observed reluctance to trade, some attempted to map out conditions under which endowment theory might apply. While the purpose of these studies was to determine a set of conditions that trigger loss aversion, some viewed it as the beginning of the end of endowment theory. Rather than interpreting mixed results as teaching us something about the context-dependent nature of endowment theory, some argued that the results suggested that something other than reference dependence and loss aversion might better explain observed reluctance to trade. Before stepping through the alternative theories, this section walks through the studies exploring gap enhancers and disruptors.

### 5.1. Moral Commitments

Boyce et al. (1992) set out to study gaps in valuations of public goods. While valuation gaps for these sorts of goods might be caused by loss aversion given the lack of perfect substitutes, Boyce et al. suggested an alternative explanation—the desire to “preserve a natural resource for moral or other motives” even if one might never receive direct consumption benefits from it (p. 1366). The authors argued that intrinsic value might be relevant only for those assigned the property right because ownership of the right triggers moral responsibility for preserving the commodity, a responsibility not felt by those considering whether to contribute to preservation efforts. The authors elicited valuations for Small Norfolk Island pine trees and employed two treatments to separate consumption value from intrinsic or moral value.<sup>44</sup> To estimate consumption value, subjects were

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losses. This explanation posits that loss aversion is a mistake rather than a feature of human preferences.

<sup>44</sup> Other researchers have explored whether the *magnitude* of the gap depends on the moral aspects of the traded goods (e.g., Irwin 1994). Caution is necessary, however, when contingent valuation methods are used to elicit hypothetical valuations for goods with highly moral aspects, such as the right to a clean beach. The theories that provide the predictions experimenters set out to test assume that choices have actual consequences. When this is not the case, features other than individual values for the goods might

asked to report their WTP to obtain a tree to take home or WTA to give up a tree they were given at the beginning of the experiment. To estimate intrinsic value, different subjects in a separate treatment were told that any trees sold to the experimenter, or not purchased, would be destroyed.<sup>45</sup> The intrinsic value conjecture predicts that the gap in the “kill” treatment is greater than the gap in the “no kill” treatment.

Boyce et al. structured the experiment to control for alternative explanations. They employed the BDM mechanism to elicit non-strategic valuations. They endowed potential buyers with \$40 and potential sellers with a tree (with retail value of \$6) and \$30 to minimize income effects. Subjects participated in ten hypothetical practice rounds to gain familiarity with the elicitation device. To avoid decisions based on perceptions of other subjects (e.g., subjects might worry that others will harass them or think badly of them if they sell trees that get destroyed) or the possible inconvenience of getting the tree home after the experiment, subjects were instructed to pick up their trees at a later time from a different location. This ensured that subjects did not learn the choices of other subjects. Valuation gaps appeared in both the no-kill and kill treatments, with the gap in the kill treatment exceeding the gap in the no-kill treatment due to a substantial increase in WTA. The authors, however, noted variation in the kill-WTA reports, with some subjects reporting valuations similar to those reported in the no-kill treatment and others reporting valuation substantially higher. The authors concluded that for goods with intrinsic value (as opposed to consumption value), some element of moral responsibility might explain why reported WTA is higher than reported WTP. Importantly, while these results are often lumped in with other gap results to demonstrate support for endowment theory, they actually support a more nuanced theory based on notions of mortality.<sup>46</sup>

Walker et al. (1999) designed an experiment to study whether human versus natural causes of losses influence the magnitude of valuation gaps. In one experiment, the authors elicited valuations for neighborhood trees provided by the city. Some subjects were asked to value the saving of trees threatened by naturally occurring disease. Others were asked to value the saving of trees from damage caused by a street-widening project.

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influence reported valuations and those influences might impact “seller” valuations differently than they impact “buyer” valuations.

<sup>45</sup> Subjects did not witness the destruction, but a witness verified it.

<sup>46</sup> In a study testing a similar theory, Biel et al. (2011) told one group of subjects (the donation owners) that they would receive SEK 50 for participating and that an additional SEK 100 would be donated to the World Wide Fund to protect the Swedish otter. They told another group (the donation non-owners) that they would receive SEK 150 for participating. During the experiment, the donation owners were given an opportunity to get an additional SEK100 in lieu of the donation, and the donation non-owners were given an opportunity to donate SEK 100 to the same Fund. Subjects made anonymous choices. Forty-five percent of donation owners opted to remain donors, and 19% of donation non-owners decided to donate. Based on subject responses to surveys meant to measure feelings each choice would provoke, the authors attributed the difference to affective influences and moral reactions.

All subjects were told to assume they owned a house with a tree in the yard in danger of being lost. Some were asked to report how much they would need to be compensated to give up the opportunity to save the tree. Others were asked how much they would be willing to pay to save the tree. The authors report a hypothetical valuation disparity in the human destruction treatment but not in the natural cause treatment. While the elicitation device employed was not designed to measure actual valuations, and so should be interpreted with caution, the results suggest that further study is necessary to determine whether features other than the gain or loss of the consumption value of a good drive reported valuations. The authors interpret the results as support for the hypothesis that valuations are mediated by feelings of moral responsibility.

## 5.2. Frames, Attitudes and Emotions

Loewenstein and Issacharoff (1994) suggested additional nuance by positing an increase in valuation of items that are added to one's endowment as a result of successful performance of a task and a decrease in valuation of those added as a result of failure (e.g., consolation prizes). This theory calls into question the standard economic assumption of source independence—the notion that valuation of an item does not depend on how the item was obtained.<sup>47</sup> The authors also framed source dependence as a moderator of endowment theory, suggesting that “positive source effects enhance the impact of endowment and negative source effects weaken it”<sup>48</sup> (p. 158). Valuations were elicited using the BDM mechanism and a multiple price list after subjects were told that it was in their best interest to report true valuations. The results support the conjecture that people become differentially “attached” to objects as a function of how the objects are obtained (p. 165). Thus, the study offers evidence of another force beyond reference-dependent loss aversion that drives WTA higher than WTP. The authors pointed to the concept of “associationism” as the most straightforward explanation for source

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<sup>47</sup> Plott and Zeiler (2007) include the impact of the acquisition source as a component of a broader theory they refer to as enhancement theory. See *infra* for details.

<sup>48</sup> Psychologists have tested related factors that might moderate valuation gaps. Saqib et al. (2010) posited that levels of consumer involvement in trading decisions can impact loss aversion levels. Specifically, they suggested that high involvement and higher stakes can increase the perceived importance of gains and losses, which can impact the magnitude of the asymmetric impact of losses relative to gains. Subjects who provided marketing assistance to the seller of a good (e.g., providing information about preferred highlighter colors) in exchange for the good, a highlighter set, reported higher valuations than owners who received a good after reading about a different good, causing a larger valuation gap (valuations by those given a choice between the good and money did not differ by level of involvement). The results were robust to other methods of inducing perceptions of involvement. Aggarwal and Zhang (2006) reported evidence suggesting that salient relationship norms impact levels of loss aversion. Subjects who were, prior to reporting valuations, asked to put themselves into the shoes of a person with a communal outlook towards his friends reported higher WTA relative to those in a control group (no priming) and those who were asked to put themselves into the shoes of a person with an exchange outlook (i.e., quid pro quo relationship view).

dependence. The idea is that the positive affect caused by good feelings that come from association with an object obtained through successful performance increase one's valuation for the object.<sup>49</sup> Of course associationism cannot explain results from experiments in which subjects received endowments in the absence of successful performance, but it suggests an alternative (or supplementary) explanation in the presence of such performance. Simple versions of endowment theory do not predict varying outcomes conditional on endowment source.

In a similar vein, Liberman et al. (1999) examined how interventions that focus an individual on either promotion (making oneself better off) or prevention (avoiding making oneself worse off) impact reluctance to trade. They hypothesize that if a person is prompted to consider promotion, he is more likely to be open to change (and less reluctant to trade). Alternatively, if a person is prompted to consider prevention, concerns over safety and security give rise to reluctance to change (and therefore to trade). In one experiment, subjects who were asked to describe their current hopes and goals and how they differed from their hopes and goals in the past, and then asked to decide whether they would be willing to accept a hypothetical pen given to them as a gift from a friend in exchange for a hypothetical mug given to their roommate as a gift from the same friend. Subjects displayed no reluctance to trade. Another group of subjects who were asked to describe their current sense of duty and obligation before deciding whether they would be willing to hypothetically trade were reluctant to trade. In another experiment, participants engaged in actual trades. In this experiment, the authors used subjects' answers to a series of questions to measure promotion focus and prevention focus. Those with high levels of promotion focus were less reluctant to trade relative to those with low levels. The opposite was true for those with high levels of prevention focus. This result suggests that framing can influence reluctance to trade.

Lerner et al. (2004) studied whether specific emotions affect the likelihood and magnitude of valuation gaps. They designed an experiment to test appraisal-tendency theory, which posits that emotions experienced during an irrelevant situation can carry over to subsequent economic decisions. For example, the experience of anger during an unrelated situation might compel risky economic choices in subsequent unrelated situations. On the other hand, the theory posits we might not expect carryover effects in situations that involve actual monetary risks. During the experiment, the negative emotions of disgust and sadness were invoked using film clips. The authors hypothesized that feelings of disgust would cause owners to place lower values on endowed goods. Potential buyers would react less strongly to disgust because seller "proximity" to the good is expected to augment contamination. On the other hand, the authors predicted, in

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<sup>49</sup> Others have constructed theories that stand as alternatives to endowment theory and hinge on the psychological relationship between individuals and their possessions. Coren (2007) summarized the literature that develops and tests these sorts of theories. Evidence exists to support these theories, which are built on assumptions such as emotional attachment to possessions as alternatives to loss aversion. These theories assume that losses loom larger than gains not because we're generally averse to losses but because we perceive endowments as somehow different from identical items that we do not own.

line with previous results, that sadness would trigger a desire for change, leading potential sellers to reduce their values and potential buyers to increase their values, both in an effort to trade. The multiple price list method was employed to elicit valuations, and one round was randomly chosen for payment. Non-owners received a cash payment, and owners received a set of highlighters. The findings support the theory. Owners exposed to the disgust prompt reported lower values for their highlighters relative to owners exposed to a neutral film clip. Exposure to a sad film clip was followed by relatively low owner valuations and relatively high non-owner valuations, resulting in a reverse gap (i.e.,  $WTP > WTA$ ).<sup>50</sup>

Shu and Peck (2011) test two potential moderators of loss aversion that relate to attitudes and emotions. The first, psychological ownership, assumes that legal ownership is unnecessary to trigger loss aversion. Mere psychological ownership, the simple feeling that something is “mine,” might be sufficient. The authors estimated feelings of psychological ownership by eliciting responses to three questions using a seven-point scale from strongly disagree to strongly agree.<sup>51</sup> The second, affective reaction, predicts that emotional reactions towards an object can mediate loss aversion. To test this prediction, the authors elicited subject self-reports related to positive emotions and negative emotions.<sup>52</sup> Subjects were randomly assigned to two treatments, seller and chooser, and the multiple list price format was used to elicit pen valuations. After reporting valuations, the authors measured levels of psychological ownership and affective reaction to the good. The average seller valuation exceeded the average chooser

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<sup>50</sup> In a similar study, Lin et al. (2006) asked whether valuations gaps are mediated by happy and sad emotional states. They hypothesized that gaps will be smaller if valuations are reported when individuals are in a negative emotional state (e.g., sad) relative to a positive emotional state (e.g., happy). The authors induced emotional states in two ways: by asking subjects to recount happy or sad experiences and by exposing subjects to audiovisual clips intended to invoke particular emotional responses. Unlike Lerner et al. (2004), however, it seems that subjects did not make binding choices nor were valuations elicited using demand-revealing mechanisms. So, while the results suggest sadness reduces valuation gaps, the experiment design is not a valid test of the theory; thus, we should use caution when interpreting the results. Shu and Peck (2011; study 6) found mixed results when they measured correlations between induced sadness and disgust and affective reaction towards the good.

Martinez et al. (2011) induced feelings of regret and disappointment that were unrelated to the good and found that both emotional states influence valuations of lotteries, but in different ways. Standard procedures were used to replicate a valuation gap. Inducing feelings of regret eliminated the gap, and inducing feelings of disappointment reversed it.

<sup>51</sup> The questions included: “I have a very high degree of personal ownership of my item,” “I feel like I own the item” and “I feel like this is my item.”

<sup>52</sup> Participants were told, “Here is a list of emotional reactions you may have experienced while evaluating the product. Please indicate how much you felt each of these emotional reactions.” Subjects reported their emotional reactions on separate five-point scales ranging from “a lot” to “not at all.”



valuation, and sellers reported greater psychological ownership and positive affective reactions (but not negative affective reactions) than did choosers.<sup>53</sup> The authors concluded that psychological ownership and affective reaction to the good act to mediate the effects of loss aversion.<sup>54</sup> While the results are potentially useful, we are unable to draw any causal connections between psychological ownership, affective reaction and valuations given potential endogeneity. In other words, the authors did not randomly assign subjects to varying levels of psychological ownership and affective reaction, so it might be that some third variable is driving both attitudes or emotions and valuations. For example, sellers might have announced relatively high valuations based on basic market instincts to sell high and then those who bid the highest reported the strongest ownership feelings in an effort to appear consistent with their reported valuations. This is mere conjecture, but we can't rule it out given the experiment design.

### **5.3. Market Experience**

A separate line of research explores the possibility that while gaps and exchange asymmetries are regularly observed in the lab, we should not expect them to arise in markets comprised of traders with long-run experience. List (2003) estimated the impact of market experience by taking experimental methods to the field, where experienced traders of goods are plentiful. He predicted that experienced traders of goods (in this case sport cards and collector pins) are less likely to exhibit reluctance to trade an unfamiliar but related good. All subjects were drawn from attenders of sport card and pin shows. The inexperienced traders were nondealers attending the show. Experienced traders of sports cards were drawn from the population of dealers selling and buying goods at the shows. In one treatment, each subject was given one card (in exchange for completing a survey) and asked whether he would like to trade the card for a different card of equal value.<sup>55</sup> List presented evidence that, following the experiment, the subjects planned to consume the goods (hold them in their collections) rather than trade them. The pooled data revealed reluctance to trade the endowed card, consistent with endowment theory. A disaggregation of the data, however, revealed that experienced sports card dealers

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<sup>53</sup> Note that gap results were generated using parametric tests, which assume normal distributions, and regressions (presumably using ordinary least squares estimators), which assume that error terms are normally distributed. The authors did not provide results of checks of these assumptions, and they likely are not satisfied. The standard in the literature given the nature of the data is to use non-parametric tests, which do not rely on distributional assumptions. This reduces the weight we can place on the reported results.

<sup>54</sup> In a similar set-up, the authors found that owners of an unpleasant object (a ball point pen covered in an adhesive and rolled in fine black sand) valued the good equally to choosers, had stronger feelings of ownership towards the good and strong negative affective reactions towards it relative to choosers. Seller valuations were positively correlated with feelings of ownership and negatively correlated with negative affective reaction.

<sup>55</sup> List estimated general preferences by giving a different group of subjects a choice between the two goods. Roughly half the group chose one good, and half chose the other.

exhibited no reluctance to trade.<sup>56</sup> In a second treatment, List checked the robustness of the result to good type. He again found that more experienced traders were not reluctant to trade while inexperienced consumers tended to hold on to their endowments. He also presented some evidence that rejects reverse causality—experience seems to reduce reluctance to trade, as opposed to willingness to trade causing an increase in trading experience.<sup>57</sup> Finally, to test robustness to other goods and different levels of experience, he ran conventional lab experiments, bringing the same group of subjects into the lab once per week for four weeks. During each session, subjects were given an everyday good (e.g., a mug, a pen, a can of soda, a highlighter) and asked if they want to trade the endowed good for some other everyday good of roughly equal value. Different goods were used each week. Although he found reluctance to trade even after four sessions, the likelihood of trading increased over the sessions. The results, taken together, support the conjecture that trading experience reduces one’s reluctance to trade.

While List (2003) provided preliminary evidence that experience attenuates reluctance to trade, questions remain. First, does attenuation extend to situations beyond those previously encountered, and second, did List (2003) effectively separate endowment theory and neoclassical theory given that refinements of endowment theory assume that goods acquired for trade do not trigger reluctance to trade (e.g., Kahneman et al., 1990). Is it possible that List’s experienced traders might have planned to resell the goods acquired during the experiment, despite their reports to the contrary? List (2004) attempted to provide answers to these questions by estimating differences in the reluctance to trade of sport card dealers and non-dealers when endowed with everyday goods of roughly equal value (mugs and chocolate bars). In exchange for completing a survey, dealers and non-dealers were given either a mug or a candy bar or both or neither. Each mug owner was asked whether she wanted to exchange her mug for a candy bar (and vice versa for candy bar owners). Those receiving both were forced to exchange both for either a mug or a candy bar. Those receiving neither chose one. Consistent with List (2003), non-dealers exhibited a reluctance to trade while dealer did not. Those receiving both and neither chose the mug roughly half the time, confirming the assumption of roughly equal value. These results support the claim that experience trading one type of good can diminish reluctance to trade other types of goods. So, while the results do not allow us to draw inferences about what causes gaps, they do suggest that gaps might be unstable.

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<sup>56</sup> Shu and Peck (2011; study 5) replicated List’s results using a hypothetical survey instrument and found a correlation between induced experience—subjects asked to imagine that they had experience trading cards—and feelings of ownership.

<sup>57</sup> List (2003) also estimated reluctance to trade using an n-th price auction to elicit valuations for sport cards. Dealers’ WTA was statistically identical to their WTP. For non-dealers, valuations of owners exceeded those of non-owners. In these rounds, however, cash was not given to non-owners so wealth effects are not controlled, which opens the door to an alternative explanation.

It's important to note that the designs of both List (2003) and List (2004) make it impossible to draw causal inferences about the impact of experience on reluctance to trade. The problem is that subjects were not randomly assigned to treatment and control groups characterized by experience and no experience. Therefore, we can't be sure if experience or some other variable correlated with experience caused this group's no-gap result. To mitigate this concern, List (2011) randomly assigned a group of subjects who reported that they made zero trades in a typical month (inexperienced traders) to two different treatments: experience and no experience. Subjects in the experience treatment gained market experience in the sports card market over a six-month period. A second group gained no experience over the same period. To induce experience, subjects in the experience treatment were given a lottery ticket for every trade they executed during the study period. To mitigate attrition, subjects were required to sign affidavits promising they would return. They were also given lottery tickets for showing up for subsequent sessions. The results suggest a causal relationship between experience and reduced reluctance to trade. Using a simple exchange design similar to Knetsch (1989), List found a similar baseline of reluctance to trade (13% and 10% of subjects assigned to the no-experience and experience treatments respectively opted to trade their endowed good for the alternative good).<sup>58</sup> After three months of experience trading, 35% of subjects traded relative to 11% of those who had not gained experience. After six months, 55% of experienced subjects traded relative to 21% of those without experience. Both differences were statistically significant at a 95% confidence level. List (2011) acknowledged the possibility that the results might be due to experimenter-demand effects—subjects who were encouraged to trade during the six-month period might have believed that the experimenter wanted them to trade in the mug/pen rounds. In any event, the results stand as at least some evidence of a causal connection between trading experience and a lack of reluctance to trade.

Using a different method to investigate the impact of market experience on reluctance to trade, Apicella et al. (2014) ran experiments on two groups of Hadza Bushmen of Northern Tanzania, hunter-gatherers who rely on neither herding nor agriculture for food. One group lives in an isolated region, and its members interact rarely with outsiders. Food is consumed immediately and is shared equally among all members of the tribe. Possessions are few, and the tribe remedies unequal distributions by taking from those that have excess supply and giving to those with fewer resources. This group has little to no experience with trading. The second group is located near safari parks and has been exposed to tourists. Tour guides regularly compensate members of the group to take tourists on hunts. The group also produces bows and arrows for sale to the tourists. Members of this group sometimes venture to a nearby village to purchase food and other products. Using a Knetsch (1989)-style simple exchange design,<sup>59</sup> the authors observed

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<sup>58</sup> Some subjects were endowed with mugs and asked whether they wanted to trade for pens. Others were endowed with pens and had an opportunity to trade for a mug.

<sup>59</sup> The experimenter randomly chose which good to endow and, in one treatment, subjects were not allowed to touch the goods prior to making a choice. See Plott and Zeiler (2007), discussed *infra*, for a discussion of design choices in simple exchange experiments.

reluctance to trade in the second group (those with experience trading) but not the first (those with little experience trading). One obvious problem with the study's design is that the experimenters did not randomly assign Hudza members to the treatment and control groups. Thus, some variable other than trading experience might be driving observed differences. To address this concern, the authors pointed to some evidence that casts doubt on the possibility that Hudza members with particular traits or preferences selected themselves into the group with trading experience. They also claimed that varying levels of familiarity with the goods used in the experiment likely do not drive the results. In the end, however, the lack of random assignment leaves open the possibility that something other than differences in trading experience might drive the differences in reluctance to trade. Despite this limitation, the results suggest a complicated (and unclear) relationship between market experience and reluctance to trade.

#### **5.4. Agency**

Some have explored whether agents anticipate their principals' valuation gaps when making decisions on their behalf. Marshall et al. (1986) used a design similar to Knetsch and Sinden's (1984) simple design (i.e., would you trade a lottery ticket for \$2) except that subjects were told that they could not participate in the lottery. Instead they were asked to advise someone who owned the lottery ticket or someone contemplating buying a lottery ticket. No valuation gaps were observed in the choices of agents in both hypothetical treatments and treatments involving actual payoffs. The authors suggested that agents' lack of appreciation for principals' valuation disparities might give rise to agency costs that go beyond moral hazard and other previously identified frictions.

Some have explored a different question about the relevance of agency for valuations gaps: do valuation gaps hold up when an individual-agent is transacting with his employer-principal. Arlen et al. (2002) explored whether managers of firms are reluctant to trade when transacting with their firms. Specifically, they tested two conjectures. The "exchange-value" hypothesis suggests that transactions between principals and agents involve entitlements held primarily for exchange purposes, and so loss aversion is not triggered by the loss of these sorts of goods (Kahneman et al., 1990). The alternative "shared-entitlement" hypothesis posits that an agent's sense of loyalty to the firm reduces her sense of entitlement in cases where the agent feels the firm is entitled to the asset. The authors first successfully replicated the gap result using a basic design in line with Kahneman et al. (1990). The law student subjects then pretended to play the role of agent to a hypothetical firm. Subjects were told that they would need to choose between keeping (or obtaining) a good, potentially a factor of production for the firm, and receiving a higher wage. Those not endowed with the asset were given an opportunity to "take" the asset.<sup>60</sup> Subjects were told that the firm would enjoy higher profits if it used the asset in production. Coffee mugs were used to represent the firm "asset." Each subject participated in eight rounds and was told that one round would be chosen at random for

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<sup>60</sup> The authors ran an additional experiment to test whether unendowed subjects were morally opposed (or at least reluctant) to take the firm's asset. They found no evidence that morality motivated choices.

payment. Reported choices suggest no valuation gap. The authors also reported findings that suggest that the disappearance of the gap is driven by lower owner valuations. To test whether the no-gap result was driven by the perception of the asset as an exchange good or by a sense of loyalty to the firm, the authors conducted yet another experiment to separate the competing theories. The goal of the design was to remove the possibility of shared entitlement (i.e., a sense of loyalty). In this experiment, subjects were not playing the role of an employee of the firm but rather an applicant for a job at the firm. The subjects were told nothing regarding how their choice would impact the firm's profit. Given this design, an observed gap would support the shared-entitlement hypothesis, while the exchange-value hypothesis would be supported by the absence of an observed gap. No gap was observed. This result adds support to the exchange-value hypothesis, in line with the qualification suggested by Kahneman et al. (1990).

\* \* \*

The studies described in this section suggest that levels of loss aversion might be impacted by many factors such as the moral valence of the good, emotions at the time of choice, feelings the good invokes, whether we regularly trade the good (or other goods) and who our trading partners are. The findings were important for refining endowment theory. In addition, however, they also inspired researchers to posit and explore alternative theories, theories suggesting that reluctance to trade is not driven by loss aversion but by some other force or set of forces. Each proposed theory has given rise to a sub-literature. The purpose of the next section is to describe the alternatives, review the evidence generated to test the theories and illustrate how individual studies fit into larger literatures. While the literature has not converged on any one of the new theories, endowment theory clearly is no longer the leading explanation (if it ever was or should have been). The theory has been replaced by expectation theory, which retains the assumptions of reference dependence and loss aversion but makes different assumptions about what sets reference points. While some data supports this new theory, some call into question its predictive value. The same is true of the alternatives. Several theories stand as top-dog contenders. More work is required to test the theories against each other, to abandon the ones that fall short and to refine, and possibly combine, the remaining in a way that maximizes the theory's ability to predict choices.

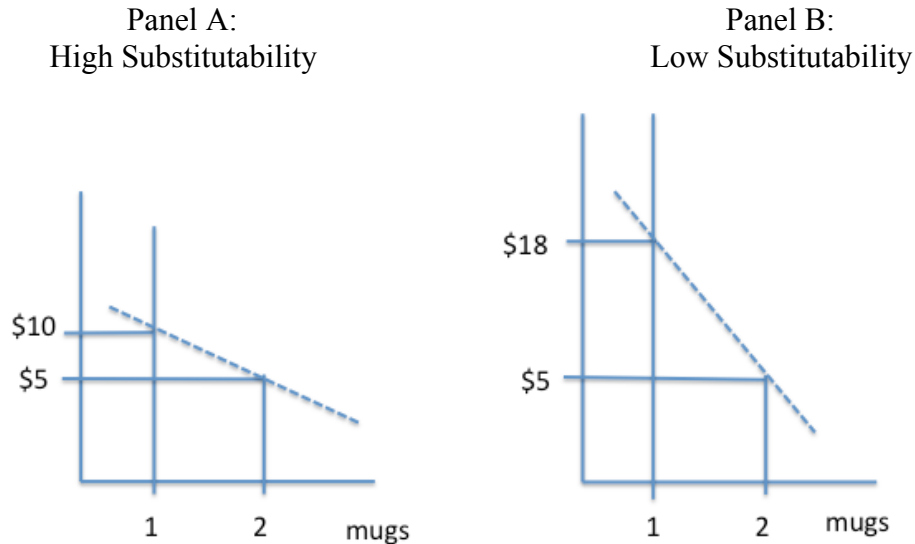
## **6. ALTERNATIVE THEORY DEVELOPMENT**

### **6. 1. Hanemann's Substitution Theory**

Hanemann's (1991) theory of gaps differs radically from endowment theory. The theory relies on two key assumptions from standard economic theory—that the availability of substitutes impacts price elasticity and that potential buyers face budget constraints. Specifically, one's WTA to give up a good in the absence of substitutes might be higher than one's WTP if budget constraints bind so that a potential buyer whose valuation is at least as high as the market price possesses inadequate funds to buy at the market price. When substitutes for a good do not exist (e.g., one's health or neighborhood tree density or the life of a Norfolk pine tree), the theory predicts that an individual endowed with the

good requires more in compensation to give it up (in the extreme, an infinite amount) relative to the amount she would pay to acquire it (in the extreme, her entire, but limited, wealth). When substitutes exist, however, WTA will be lower given the ability of a potential seller to obtain a substitute. Figure 2 demonstrates the basic concept.

Figure 2: The Impact of Substitutability on WTA



Note: the dotted lines represent indifference curves, which indicate various combinations of mugs and money that make an individual indifferent between the combinations. For example, the indifference curve in Panel A suggests that the individual is indifferent between one mug plus \$10 and two mugs plus \$5. From this we can infer that the individual would require a transfer of \$5 to make him indifferent between keeping both mugs and giving up a mug. In other words, his valuation of one mug conditional on owning two mugs (i.e., his WTA) is \$5.

A reduction in substitutability (a move from Panel A to Panel B) results in an increase in valuation of the good. That is, potential sellers require more money (\$13 as opposed to \$5) to remain on the indifference curve if they give up one mug. Buyers are also willing to pay more to obtain the good, but they face budget constraints. Thus, Hanemann's theory attempted to explain observed gaps by positing that the lack of substitutes pushes WTA up, and budget constraints preclude WTP from increasing to the same extent.<sup>61</sup>

<sup>61</sup> Others have expanded Hanemann's substitution theory. Amiran and Hagen (2003), for example, worked out conditions under which WTA and WTP can infinitely diverge for public goods even where the elasticity of substitution between market goods and the public good is strictly positive. Hanemann (2003) agreed with Amiran and Hagen's analysis and framed their results in relation to his earlier work.

Shogren et al. (1994) designed an experiment to test whether the degree of substitution between goods (rather than endowment theory) might explain observed valuation gaps.<sup>62</sup> The authors used an auction mechanism designed to elicit true valuations for a brand-name candy bar (a good with substitutes) and a reduction in the risk of food-borne illness (a good without substitutes).<sup>63</sup> Valuations were measured after subjects participated in repeated auction rounds, each followed by an announcement of the market-clearing price, which was a function of the subjects' reported valuations. Repeated rounds were employed to help the subjects understand the auction mechanism, which leads to confidence that the reported valuations are the subjects' non-strategic valuations. Subjects acted either as sellers or buyers, and all subjects reported valuations for both the candy bar and the reduction in risk of illness. All outcomes were potentially binding. One round was selected randomly to be the binding round.<sup>64</sup> Potential buyers were endowed with cash that they could spend during the experiment and either a small piece of candy (or a food product with normal risk of contamination) that they could exchange for a brand-name candy bar (or a strictly screened food product with a lower risk of contamination) if their bids exceeded the clearing price determined by the auction. Sellers received the same amount of cash as buyers plus either a brand-name candy bar or a strictly screened food product,<sup>65</sup> and they were given an opportunity to downgrade their

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<sup>62</sup> Adamowicz et al. (1993) published an experiment to test whether substitution effects explain observed gaps prior to Shogren et al. (1994). The experiment, however, did not employ a demand-revealing mechanism to elicit valuations. Subjects simply completed questionnaires that prompted them to report hypothetical maximum amounts they would be willing to pay to buy (and minimum amounts they would be willing to accept to sell) goods with varying substitute availability. While the experiment design is not a perfect fit in relation to the tested theory's assumptions because subject choices are not followed by consequences, the study provides some evidence that availability of substitutes explains at least part of observed gaps. While the availability of substitutes reduced the magnitude of the observed (hypothetical) gap, a statistically significant (hypothetical) gap remained.

<sup>63</sup> The auction mechanism employed was designed to elicit non-strategic valuations, but it is not the familiar first-price auction that allocates the good to the highest bidder. The subjects (all university students) were not told that they could optimize their payouts by reporting the most they would be willing to pay as non-owners and the least amount they would be willing to accept as owners. The authors simply described the auction mechanism and tested the subjects' understanding of it. See *infra* for details on theories related to subjects' lack of familiarity with the elicitation device.

<sup>64</sup> To leave the experiment with take-home cash, subjects were required to eat a food product that had either the usual chance of being contaminated with a food-borne pathogen or a lower probability of contamination due to strict screening for pathogens. The chances of contamination of both food products were explained to the subjects prior to eliciting valuations.

<sup>65</sup> Note that owners were endowed with more than non-owners, which might cause a wealth effect. While the size of the differential is small, theoretically it might account for observed gaps. Morrison (1997b), *infra*, ruled out this potential explanation by giving non-owners the same amount of cash as owners plus cash equivalent to the average

endowment in exchange for cash if their reported valuation did not exceed the market clearing price.

Given this design, Hanemann's substitution hypothesis would be supported if no gaps were observed in the candy bar rounds and gaps appeared in the food rounds. On the other hand, if gaps were robust across the type of good, the data would support endowment theory. The data support Hanemann's hypothesis. Candy bar WTA did not exceed WTP after multiple rounds of bidding, and WTA converged to the average candy bar market price, but food product WTA exceeded WTP even after multiple auction rounds and subjects were provided full information about the probability and severity of health risks.<sup>66</sup> To test whether gaps might persist in environments with available substitutes but uncertain value and cost, an additional treatment was conducted to elicit valuations for mugs with the university's emblem. Subjects were told they would be able to purchase as many mugs as they wanted right outside the door after the experiment. No valuation gap was observed. Shogren and co-authors noted that their results contradict the results obtained by Kahneman et al. (1990) in similar experiments that elicit valuations for goods with substitutes (e.g., pens and mugs). They pointed to numerous differences in the experiment design including the auction used to elicit valuations, but drew no conclusions about the impact of procedures on reported valuations. They rightly highlighted the need for further research to better understand the impact of elicitation methods on reported valuations in experimental markets.<sup>67</sup>

Morrison (1997a) challenged the conclusions drawn by Shogren et al. (1994). She started by revising endowment theory to assume that one's level of loss aversion depends on the degree of substitutability. More specifically, she posited that, if reference dependence causes a kink in the indifferent curve, loss aversion might be detectable only when the degree of substitutability is relatively low (i.e., no close substitutes). If the degree of substitutability is high (i.e., close substitutes are available), then the valuation disparity, while present, might simply be more difficult to detect in the lab.

Figure 3 illustrates the basic idea. When substitutes exist (see Panel A) and an individual is endowed with two mugs and asked to report the minimum amount she is willing to accept to give up one mug, in the absence of loss aversion, she asks \$5 (i.e., she is indifferent between \$5 + two mugs and \$10 + one mug, so her valuation for the mug is \$5). When substitutes do not exist (Panel B), she requires \$13 to give up her endowment

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reported WTA. In other words, Morrison began by placing owners and non-owners on the same indifference curve.

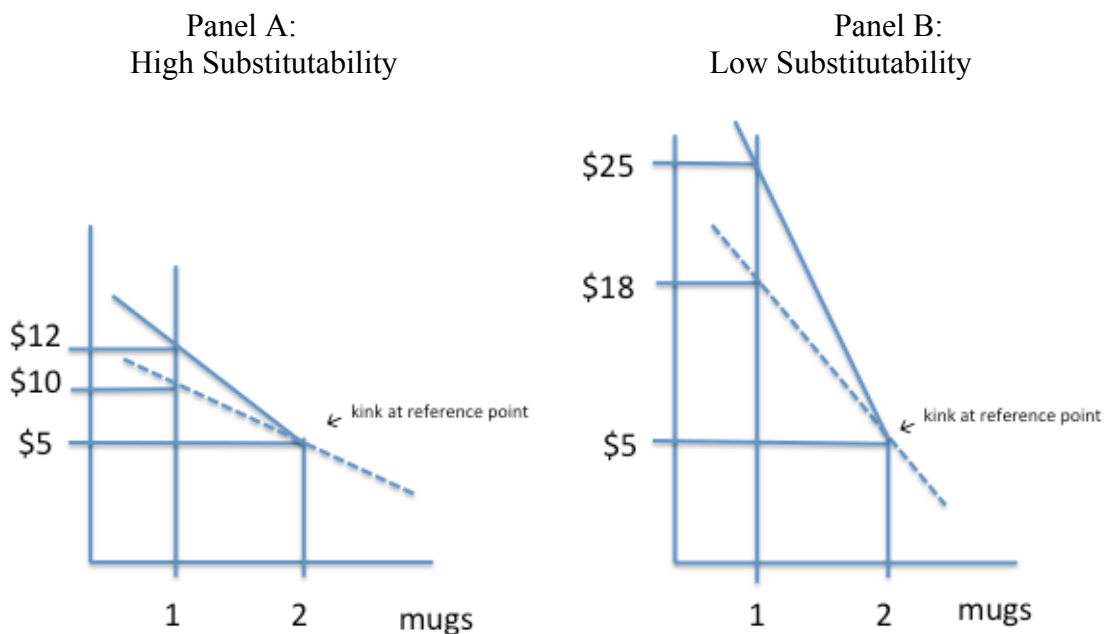
<sup>66</sup> Sugden (1999) called this interpretation into question by arguing that Hanemann's theory predicts only small gaps in the food product market given that observed buyer valuations are low relative to subject wealth (i.e., buyers seem not to face budget constraints). Thus, Sugden argued, the large observed gap is inconsistent with Hanemann's theory. This sort of critique highlights the danger of drawing conclusions from only a subset of the data's features.

<sup>67</sup> This line of research has been taken up and is summarized *infra*.



(\$18 minus \$5). If potential buyers are equally income-constrained under both market conditions, a valuation gap is likely to appear only under low substitutability. As noted earlier, Hanemann argued that observed gaps have been misinterpreted as resulting from loss aversion when they are actually caused by low substitutability. Morrison's critique noted that loss aversion, if it exists, has a different impact on a seller's reported valuation depending on the degree of substitutability. If loss aversion causes a kink in the indifference curve at the reference point (\$5 and two mugs), in markets with high substitutability loss aversion would push WTA up much more modestly than in markets with low substitutability (up to \$7 in Panel A versus \$20 in Panel B). Morrison's main point is that the lack of a valuation gap in markets with high substitutability does not necessarily demonstrate the lack of loss aversion. It could be that loss aversion is simply more difficult to detect because of its relatively small impact on seller valuations in markets with high substitutability.

Figure 3: The Impact of Loss Aversion on WTA as a Function of Substitutability



Morrison (1997b) performed the tests suggested in her previous work. Specifically, she designed an experiment based on Shogren et al.'s (1994) design to test endowment theory against the substitutability hypothesis and to determine whether both theories might be at work when valuation gaps are observed. One basic design difference between Morrison and Shogren et al. is that subjects in some of Morrison's treatments were placed on the same indifference curves before valuations are elicited. In her first treatment, to replicate Shogren et al., Morrison endowed both owners and non-owners with the same amount of cash. Potential buyers were told that they could spend their own money during the experiment, and they were encouraged to bring money to the experiment when they signed up to participate. In a second treatment, non-owners were endowed with cash equal to the cash given to owners plus cash equal to the average owner WTA response. In both treatments, subjects were told the price of the good and that it was offered for sale at

a nearby shop; therefore, substitutability is assumed to be relatively high in both treatments. Under this design, Hanemann's theory predicts a gap in the first treatment due to the higher potential for budget constraints, but not the second. Endowment theory predicts gaps in both. Morrison found neither; rather, she observed no gap in the first treatment and a statistically significant gap in the second. The results from treatment 2, which ruled out substitutability as a possible explanation, compelled her to conclude that endowment theory plays a significant role in gap creation, despite the fact that the theory cannot explain the result in the first treatment.

Shogren and Hayes (1997), in a short comment on Morrison (1997a), raised concerns with her theory. They claimed that the theory's assumptions are arbitrary and argue that she failed to propose "a more sensitive way to detect [the] elusive effect." They noted, however, that the literature does contain evidence in support of endowment theory. They hypothesize that the mixed results might be attributable to the differing auction mechanisms used to elicit valuations (e.g., BDM as employed by Kahneman et al. (1990) and Vickery auctions used in Shogren et al. (1994)). They worried that repeated signals in the form of between-round announcements of market clearing prices in Vickery auctions might move reported valuations away from subjects' true valuations.

Bateman et al. (1997) used a different experimental design to test endowment theory against Hanemann's substitution effect conjecture. They noted that while Shogren et al. (1994) provided some evidence for substitution effects as an explanation for observed gaps, they did not directly measure the elasticities of substitution (i.e., the steepness of indifference curves), thus the interpretation of their data was merely speculative. Bateman et al. designed an experiment that purported to eliminate substitution and income effects as a possible explanation for observed gaps. They did this by asking subjects to rank order the same two bundles of goods from various endowment points. They then compared the preference orderings across different reference points.

The authors established endowments by giving subjects differing bundles of two goods: {a little of x, a little of y}, {a little of x, a lot of y}, {a lot of x, a little of y} or {a lot of x, a lot of y}.<sup>68</sup> Subjects were then asked indirectly to rank order two of the bundles (i.e., {a little x, a lot of y} and {a lot of x, a little y}) conditional on being endowed with one of the four bundles (the reference point).<sup>69</sup> The demand-revealing BDM mechanism was

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<sup>68</sup> E.g., bundle a = {2 cans of Coke, £3.00}, bundle b = {6 cans of Coke, £3.00}, bundle c = {2 cans of Coke, £2.20}, and bundle d = {6 cans of Coke, £2.20}.

<sup>69</sup> Rank ordering was elicited by asking subjects to state an amount of a good that would make one option just better than the other. To illustrate, assume a subject is endowed with {2 cans of Coke, £3.00}. The subject is presented with two options, one of which he must choose. For example, two options might be (1) we give you 4 cans of Coke and you give us \$X, and (2) nothing (no change from initial endowment). The subject is asked to state the highest value of X such that he would still prefer option (2) to option (1). In this case, X is equivalent to the subject's WTP for 4 cans of Coke conditional on having 2 cans of Coke and £3.00. The authors used pilot studies to determine the combinations of goods so that one bundle would not always be preferred to the other bundle.

used to determine preference orderings after subjects were trained and tested on the device. Under these conditions, the standard theory of consumer value predicts that a subject's rank ordering of the two bundles will not depend on the subject's endowment (Hicks and Allen 1934). Endowment theory, on the other hand, predicts that rank orderings will depend on one's starting point because subjects will account for potential losses differently than assumed under the standard theory. The authors found that the data supported endowment theory, both in the Coke and the luxury chocolate treatments. They also found that the effect was stronger for luxury chocolates than it was for Coke, suggesting that familiarity might diminish the effect but not completely eliminate it.<sup>70</sup> They concluded that their "results [were] consistent with those of a large number of other experiments and field surveys," and that "[i]n light of this evidence, it seem[ed] that the influence of loss aversion [was] a robust effect"<sup>71</sup> (p. 503). Interestingly, Bateman et al. (1997) reported evidence suggesting loss aversion in money. This result, along with others, such as no-gap results for induced-value tokens and the equivalence between chooser and potential buyer valuations, leads to the question: what sets reference points?

## 6.2. Expectation Theory as a Replacement for Endowment Theory

The theory Bateman et al. (1997) tested and the theory Kahneman et al. (1990) posited are different in important ways. Bateman et al. (1997) assumed that reference points are set by one's current endowment, no matter what that endowment is, including money. The results Kahneman et al. (1990) reported, however, suggest that valuations of choosers and potential buyers are the same, implying that buyers do not experience the

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<sup>70</sup> Bateman et al. (1997) used luxury chocolates to test conjectures related to the impact of good familiarity on gaps. Specifically, they noted that the potential loss of a familiar good might not trigger loss aversion because (1) one's preference for familiar goods is more certain, reducing the likelihood of stochastic variation and error in valuation determinations, (2) one might use known market prices as an anchor when thinking about one's valuation, and (3) if the product is regularly consumed, one might view gains of the good in the experiment as saved money rather than increased consumption. Again, it's important to note that hypotheses such as these substantially refine endowment theory, but applicators of the theory often overlook them (Klass and Zeiler 2013). Landesberg (2007) also reported a gap in valuations for an unfamiliar good (albeit smaller than the usual 2 to 1 ratio of WTA to WTP—between 1.27 and 1.40) and a smaller gap for a familiar good (estimated WTA/WTP ratio of 1.12 – 1.23). For subjects who confirmed that the familiar good was in fact familiar, no gap was observed. We might question the power of the test to identify an effect, however, given the small sample size—12 owners and 8 non-owners.

<sup>71</sup> Bateman et al. (2000) measured hypothetical valuations in the field for public goods such as traffic calming methods to test Hanemann's substitution effect conjecture against endowment theory. Their data supported neither theory, but the hypothetical nature of the questions posed to subjects calls into question whether the study's design is a good test of either theory, both of which assume that actual consequences follow choices.

giving up of money as a loss that triggers a disutility, at least under certain conditions.<sup>72</sup> To resolve this issue, Bateman and Kahneman joined forces with a number of other authors to conduct an adversarial collaboration (Bateman et al. 2005).<sup>73</sup> Using a demand-revealing mechanism, the authors elicited WTP, WTA, and equivalent gain (EG), a measure of the smallest amount of money that the individual would be willing to accept in place of a gain of some amount of a good (in this case, high quality chocolates<sup>74</sup>). A number of hypotheses were formulated by developing predictions from the competing theories given the experiment design. For example, if individuals experience the giving up of money as a loss, then the smallest amount of a *good* an individual is willing to accept in return for a loss of some amount of endowed *money* will exceed the smallest amount of a good an individual is willing to accept in place of a gain of some amount of money. Both measures ask subjects to report the amount of money that would make them indifferent between the money and the good, but in the former condition, the subject loses the money and gains the good while in the latter condition, the subject gains the money or the good and nothing is lost. If money given up is experienced as a loss, individuals averse to losses will demand extra compensation in the form of a larger amount of the good received in exchange for the money. On the other hand, if individuals do not experience giving up money as a loss, then the two reported valuations would be equal. The data turned out not to support either theory particularly well. The authors noted that they “...cannot reject [Kahneman’s no-loss-aversion-in-buying hypothesis] with 95 percent confidence; but there is no positive support for that hypothesis” (p. 32). Other results reported in the study support the claim that individuals are averse to money losses. According to the authors, the most striking feature of the results was the relative weakness of loss aversion in all comparisons in which both theories predict such effects.<sup>75</sup> Although the results were mixed, both parties agreed that the results favor loss

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<sup>72</sup> For example, if a potential buyer has extra money to spend on an unexpected purchase opportunity, then no feeling of loss might arise from the giving up of the money. On the other hand, if the potential buyer must give up some planned purchase to spend the money on an unexpected purchase opportunity, the loss of the money might be experienced as a loss of the planned purchase. By designing an experiment such that the potential transactions offered are sufficiently small to avoid the latter scenario, we can rule out the latter alternative explanation.

Others have examined experiment design features that might strengthen or weaken reference states. See, e.g., Knetsch and Wong (2009), discussed *infra*.

<sup>73</sup> Co-authors positing competing theories conduct such studies to test one theory against the other using an experiment designed to separate them. Typically, all participants agree to co-author the study regardless of which theory the data support.

<sup>74</sup> In initial treatments, the authors used vouchers that could be exchanged by the subjects for high quality chocolates at a local shop. Surprisingly, given previously published results (e.g., Sen and Johnson 1997), the data suggested no loss aversion for the vouchers. For this reason, actual chocolates were used in subsequent treatments.

<sup>75</sup> The authors did find the typical 2-to-1 ratio between WTA and WTP in the classic WTA/WTP comparison, however, which lends some support to endowment theory. But, the theory is not able to unify the results reported in the study.

aversion in money, although only weakly. This implies that endowment theory might be quite general—the nature of the endowment is potentially irrelevant despite earlier caveats. Overall, however, this study might be viewed more generally as a reason to question the explanatory power of endowment theory.

A few years later, Kahneman teamed up with Novemsky to continue the exploration of the same question: are individuals averse to money losses? (Novemsky and Kahneman 2005). The authors elicited valuations in three treatments: (1) **buyers** reported the highest amount they would pay for a good (WTP), (2) **choosers** reported the lowest amount of money that would trigger a choice to take the money over taking the good (CE), and (3) **sellers** reported the lowest amount of money that would compel them to give up an endowed good (WTA). If individuals are not loss averse in money but are loss averse in goods, then the ratio of WTA to CE should be greater than 1 and the ratio of CE to WTP should equal 1. The list method was used to elicit all valuations. One choice on the list was chosen randomly to determine the outcome. Data were collected during eight different experiments conducted over a number of years.<sup>76</sup> Some experiments were hypothetical and some resulted in binding outcomes. Different items were used in the eight experiments. Despite mixed results across the experiments (two of the eight experiments cannot rule out the possibility of no gap), the authors concluded that, at least in the aggregate, the data supported loss aversion in goods ( $WTA/CE > 1$ ) but no loss aversion in money ( $CE/WTP = 1$ ).

Novemsky and Kahneman (2005) combined their results with results from other experiments to formulate two propositions:<sup>77</sup>

(1) individuals are averse to losses of benefits rather than attributes of a good so we should expect no loss aversion for exchanges of goods that are close substitutes, and

(2) goods that are exchanged as intended are not evaluated as losses<sup>78</sup> (e.g., shoe sellers intend to exchange shoes for money, so they will not exhibit loss aversion when they give up the shoes).

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<sup>76</sup> Aggregated results were produced using averages weighted by sample sizes. Weighting by sample size ensures that results from sessions with a large number of subjects don't get weighted more heavily than results from smaller sessions.

<sup>77</sup> The authors developed a third proposition related to the relationship between risk aversion and loss aversion. Ariely et al. (2005) responded to these results and their potential interpretation, which are beyond the scope of this review.

<sup>78</sup> No loss aversion for money is a special case of this proposition. Svirsky (2014) reported additional evidence that supports the general claim. He observed a valuation gap for chocolate coins described to subjects as chocolate but not for money or for chocolate coins described as tokens. He did not take a position, however, on what drives the observed gap given the wide array of possibilities in the literature, some of which relate to basic design choices.

These sorts of results highlighted a potential need to refine endowment theory in a more general way. Much of the reported evidence failed to support endowment theory's assumption that reference points are set by endowments. Köszegi and Rabin (2006) proposed a theory that moves away from this assumption. Their model instead assumed that one's overall utility for a riskless outcome depends on consumption utility and on gain-loss utility, the sensation of gain or loss due to a departure of the endowment from some reference point. Their model assumed that reference points are set not by one's endowment but by one's "rational expectations held in the recent past about outcomes."<sup>79</sup> So, for example, a merchant who regularly sells goods expects not to end the day as owner of the merchandise. Thus, the merchant does not experience negative gain-loss utility when he sells goods. In addition, reference point updating might lag behind belief updating. Thus, one might have expectations over ending up with a good that get resolved, but preferences continue to depend on the expectations. For example, I might expect to receive a new bike for my birthday, but I do not receive the bike. The model predicts that, even after the uncertainty is resolved, my willingness to pay for the bike is higher than it was before I expected to receive it. This model, which I'll refer to as "expectation theory," seems a good replacement for Tversky and Kahneman's (1991) endowment theory because its predictions are consistent with a larger swath of the data that had been published by the mid-2000s.<sup>80</sup>

In a similar vein, Brenner et al. (2007) distinguished between "possession loss aversion" (disutility that arises from the loss of any endowment, which is more severe than the utility that arises from a gain of the same good if not endowed) and "valence loss aversion" (disutility that arises from changes perceived as negative developments, which is more severe than the utility that arises from changes perceived as positive developments) and posited that both play a role in valuation gaps. In questionnaire-type, hypothetical choice experiments, the authors produced data suggesting that valence loss aversion tends to dominate possession loss aversion.<sup>81</sup> The authors claimed that valence loss aversion also tends to better organize the array of data published through the mid-2000s. How much weight can be placed on these results, however, is unclear given that the experiment design is not completely in line with the assumptions of the theories (i.e., that choices are followed by actual consequences).

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<sup>79</sup> "Specifically, a person's reference point is her probabilistic beliefs about the relevant consumption outcome held between the time she first focused on the decision determining the outcome and shortly before consumption occurs" (p. 1141).

<sup>80</sup> For example, Köszegi and Rabin's (2006) model was able to explain the lack of aversion to losses of money (e.g., Novemsky and Kahneman 2005) and goods obtained for purposes of reselling them (e.g., List 2003).

<sup>81</sup> Shu and Peck (2011; study 7) collected data using similar hypotheticals and found a correlation between the valence of the endowed good, affective reaction towards the good and feelings of ownership.

Ericson and Fuster (2011) directly tested expectation theory by manipulating subject expectations and correlating the induced expectations with reluctance to trade. In experiment 1, subjects were endowed with a randomly selected good (either a mug or a pen, both university memorabilia) and individually randomly assigned to having either a 10% or 90% chance to decide whether to trade for the other good. Thus, subjects in one treatment expected that they likely would be in a position to decide whether to trade, and subjects in the other did not. Subjects then completed a questionnaire after which they were reminded about instructions for the (possible) exchange. This reminder was intended as a check on understanding of the task and to get them to think about the possible decision. Another questionnaire was administered, after which the subjects were asked to report choices that would be administered if they end up in a position to trade. After another questionnaire, a die was rolled, and decisions for those allowed to choose were effectuated. The results supported expectation theory: subjects expecting not to be able to trade their endowed good were less likely to report being willing to trade than those expecting to be able to trade.

The authors ran a second experiment designed to induce expectations over ownership. Subjects were individually randomly assigned either a 10% or 80% chance of receiving the mug in their possession and leaving with it at the end of the experiment, each with equal likelihood. Each subject also had a 10% chance of being in a position to choose between the mug and some randomly determined amount of money. Finally, each subject had a 10% chance of getting no mug and no money. After the questionnaire and a reminder about the task, subjects were asked to make choices between the mug and different monetary amounts (from \$0 to \$9.57 in 33 cent increments) and told that these choices would be effectuated in the case they were in a position to choose between the mug and money. In this case, the experimenter would randomly choose an amount from the list to determine which choice would be implemented. They were then told that if they ended up getting no mug and no money they would get to choose between a pen and some random amount of money. They then made choices between the pen and different monetary amounts (the same list used to elicit mug valuations). The pen valuations were used to difference out preferences for university memorabilia. In line with the predictions of expectation theory, subjects with a high chance of receiving and leaving with the mug valued it (weakly) significantly higher in the absolute sense than those who had a low

chance.<sup>82</sup> This finding supports expectation theory, but the magnitude of the gap was substantially lower than the oft-cited 2-to-1 ratio of WTA to WTP.<sup>83</sup>

Smith (2012) designed an experiment similar to Ericson and Fuster's (2011) second experiment, but his focus was on expectation theory's predictions related to lagged beliefs. Recall that expectation theory assumes that preferences might lag behind beliefs (my valuation for a good I expected to receive but didn't receive is higher relative to the valuation I had for it prior to developing the expectation even though I now expect not to get it). To test whether preferences are influenced by lagged beliefs, Smith determined whether subjects were endowed with the good before eliciting valuations. Subjects had either a 10% or 70% chance of getting a water bottle. Once the subjects individually determined the outcome by drawing a marble out of a bag, valuations were elicited using the multiple price list format. Those who won a mug valued it as a seller, and those who did not valued it as a buyer. The demand-revealing BDM mechanism was used to determine which subjects transact, and sales and purchases were made privately in an adjacent room. To reduce the impact of reference point formation related to expectations over the buying/selling task, subjects were not told about the task until endowments were determined. The elicitation mechanism, however, was explained before subjects reported valuations, which might have contaminated their expectations. Smith tested two predictions from expectation theory: (1) WTP for those with high expectations of winning is greater than WTP of those with low expectations of winning (due to lagged beliefs) and (2) WTA for those with high expectations exceeds WTP for those with high expectations (due to loss aversion). The results support the assumption of loss aversion but not the predicted influence of lagged beliefs. Smith pointed out that subjects possibly did not hold the lotteries for a sufficient length of time to incorporate expectations into their reference points. Alternatively, it might be that in this context subjects were able to quickly update their reference points upon resolution of the lotteries. Of course it's also possible that preferences simply are not a function of lagged beliefs. In any event, the data stand as evidence against a basic tenant of expectation theory.

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<sup>82</sup> The authors estimated the difference a second time assuming that the effect of a high probability of getting the mug is approximately proportional to the consumption utility of the mug to determine whether mug lovers will boost their valuations more than those not so passionate about mugs. The authors used regression analysis to correlate log-transformed mug valuations with the likelihood of getting the mug, controlling for log-transformed pen valuations (a proxy for preferences over university memorabilia to reduce idiosyncratic noise) and subject demographics. They found that valuations for the mug were between 20-30% higher on average for those with a high probability of getting one.

<sup>83</sup> Ericson and Fuster (2011) ran a third experiment to separate expectation theory from motivated taste change theory (Strahilevitz and Loewenstein 1998), which assumes that preferences are impacted by self-image partly driven by self-perceived desirability of one's own possessions. Their results provided no support for motivated taste change. See details behind the literature related to mere-ownership theory *infra*.



Heffetz and List (2014) designed another set of experiments to directly test expectation theory. Unlike in Ericson and Fuster's (2011) design, their subjects did not own either of the goods before deciding which they would choose if given the opportunity to make a choice. Like in Ericson and Fuster (2011), the experiment was designed to induce varying expectations over which item will be received to test the impact of expectations over outcomes on choices. They first asked subjects to flip a coin and choose a number between 1 and 100. Subjects were then allowed to inspect two items (a mug and a pen) and were told that they would get one of the items as a gift. Whether they got to choose the gift or were assigned one of the items according to the coin flip was determined randomly according to known probabilities (e.g., 99% chance that the chosen good is received and a 1% chance that the coin flip determines which good is received). The randomization procedure was explained, a test of understanding was administered and default goods were revealed (e.g., if you are not allowed to choose, you will receive the pen if your coin flip came up heads and the mug otherwise). After completing an unrelated questionnaire (to pass time), all subjects chose a good that would be given to them in the event they were allowed to choose. The uncertainty was resolved, and subjects either received the chosen good or were assigned one of the goods based on the outcome of the coin flip. The treatments varied subject expectations over whether they will end up with the default good (either a 1% chance or a 99% chance).<sup>84</sup> Thus, expectation theory predicts different choices. The theory predicts that those with a strong expectation that they will receive the default good will chose the default good and that those with a strong expectation of getting a choice will make choices that are independent of the default good (half are predicted to choose the mug and half the pen). The standard model predicts that choices are independent of reference points, so the standard model predicts that subjects with a strong expectation of getting the default will choose the mug or the pen independent of the default good. The data revealed that subjects' choices were independent of their expectations across the board. Unlike in Ericson and Fuster (2011), expectation theory was not supported by the data.

Although choices seemed not to be influenced by expectations, Heffetz and List (2014) found that they are correlated with the coin flip, even when it's virtually irrelevant.<sup>85</sup> This result is predicted by neither standard theory nor expectation theory (when combined with the results related to expectations). In a second experiment, designed to explore both the disparity in results relative to Ericson and Fuster (2011) and the observed coin-flip dependence in the first experiment, the authors brought the design more in line with

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<sup>84</sup> The authors used a survey to verify expectations. The vast majority of subjects correctly answered questions related to expectations. Almost all of the others correctly answered after being prompted to re-read the instructions and try again.

<sup>85</sup> For subjects who correctly answered on the first attempt questions meant to check understanding, choices were correlated with the coin flip ( $p = 0.03$ ). The result was not statistically significant for all subjects ( $p = 0.13$ ) but likely would be if the authors ran a one-sided test, which is arguably the better test given the nature of expectation theory's predictions.

Ericson and Fuster's design.<sup>86</sup> In addition, they varied the strength of the language used to convey the endowment and to remind subjects of the endowment at the time of choice. When endowments were emphasized and subjects were reminded of them, the results observed in the previous experiment held up. Specifically, expectations over outcomes did not impact choices, but choices were correlated with the coin-flip. When the language used to convey endowment was deemphasized, however, no statistically significant correlation between the coin flip and choices was observed, and choices did not depend on expectations over outcomes. This evidence suggests that the language used to convey ownership impacts choices. The divergent results call into question the ability of expectation theory, in its simple form, to predict behavior.<sup>87</sup>

### 6.3. Uncertain Preferences

At the same time that researchers were testing and refining both endowment theory and substitution theory, additional alternative theories were being generated. Several theorists have focused on uncertainty over preferences as an explanation for observed gaps. For example, Hoehn and Randall (1987) posited that individuals must consult their preferences to determine their true valuations for goods and that this consultation is time-consuming and might be stopped short when they face time pressure to report WTP, biasing it downward. Dubourg et al. (1994) explored whether gaps are driven by imprecise preferences by eliciting valuations for hypothetical changes in the risk of nonfatal road injuries. They concluded that gaps seem to be correlated with imprecise preferences but that imprecision explains only a portion of observed gaps. They pointed to endowment theory as a potential explanation for the remaining portion.<sup>88</sup> Kolstad and

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<sup>86</sup> For example, subjects had either a 90% or 10% chance of being able to choose rather than 99% or 1%, subjects answered additional survey questions used to measure expectations, and the time they spent thinking about one good versus the other was adjusted to be more in line with the amount of time Ericson and Fuster allowed.

<sup>87</sup> In another (working) investigation of expectation theory, Goette et al. (2014) argued that varying the probability of the ability to choose is not a sharp test of the theory. Instead, the authors varied the probability of a forced exchange. Owners were endowed with a good and non-owners were endowed with money. Valuations were elicited after subjects were told that they would be forced to trade with some probability. When that probability was set to zero, the results replicated Kahneman et al. (1990)—WTA exceeds WTP. Expectation theory predicts that the gap should disappear when the probability of a forced trade is 0.5 and should reverse itself when the probability exceeds 0.5. When Goette et al. varied this probability, however, they observed the usual valuation gap. The authors suggested that expectation theory needs to account for individuals' lack of ability to fully forecast future reactions to gains and losses when developing plans of action.

<sup>88</sup> Dubourg et al. (1991) dismissed substitution effects as a plausible explanation for their experimental results. They claimed that this sort of risk had substitutes because "drivers of less safe cars can switch some journeys to public transport, or trade speed and convenience for safety by driving more slowly and carefully" (p. 127-28). Of course, as the authors mentioned, whether subjects actually contemplated these sorts of substitutes

Kolstad and Guzman (1999) attempted to explain valuation gaps in contexts where experimenters employ first-price auction mechanisms to elicit valuations.<sup>89</sup> They assumed that subjects are able to expend costly effort to reduce uncertainty about their valuations. Their theory predicted that when the payoff from trade is small relative to the cost of information, subjects will tend to understate WTP and overstate WTA. The theory, however, relates only to valuations elicited using first-price auctions, so it cannot explain divergence in second-price auctions, which are commonly used to elicit valuations in experiments.<sup>90</sup> Plott (1996) suggested a similar process of preference discovery. Specifically, Plott laid out what he terms the “discovered preference hypothesis,” which models decision making in three stages. Stage one is characterized by a lack of experience with the environment that maps choices into outcomes. In this stage, choices are driven by self-interest but are impulsive, and thus might appear irrational. Decision makers transition into stage two as they gain experience with the environment, practicing and learning from feedback following bidding choices. During this stage, choices begin to stabilize and more closely align with preference-based models. By stage three individuals anticipate that others will act rationally, and choices become best responses to the predicted rational behavior of others. This hypothesis suggests that seemingly irrational behavior might instead be a symptom of a lack of experience or understanding of the environment, and that practice and experience might be a necessary component of preference discovery.

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before reporting hypothetical valuations for risk reductions was unclear. Despite this lack of clarity, the authors deemed endowment theory to be a “better explanation.”

Morrison (1998, p. 190) pointed out, however, that knowing whether gaps are caused by endowment theory or alternative theories, such as lack of market discipline and preference imprecision, is impossible given the context in which Dubourg et al. elicited valuations. That is, she argued that Dubourg et al. (1994) did not provide strong evidence given the hypothetical nature of the valuation elicitation procedure. As evidence against alternative theories, she pointed to elicited valuations reported in her earlier paper (Morrison 1997b), which imposed market discipline by using an incentive-compatible elicitation device and employing repeated trials to allow subjects to gain experience using the device. She measured preference precision by asking owners, who were endowed with mugs over which subjects are assumed to have imprecise preferences, to state (1) the minimum value that they were sure they would be willing to accept to give up their endowment and (2) the maximum value that they were sure they would not accept. Analogous responses were elicited from non-owners. She found that minimum WTA exceeded maximum WTP (Fig. 2, p. 193) and argued that this evidence cuts against preference imprecision as a driver of observed gaps.

<sup>89</sup> In these auctions, the highest bidder buys and pays his bid, and the lowest asker sells and receives her ask.

<sup>90</sup> In second-price auctions, the highest bidder buys but pays an amount equal to the second-highest bid. Selling works similarly. Second-price auctions were designed to encourage the reporting of true valuations.

Zhao and Kling (2001) took a related approach in an attempt to organize the then-existing data better than both endowment theory and substitution theory. Their commitment cost theory built upon an assumption of imprecise preferences and predicted that subjects would inflate WTA when they were uncertain about their valuations.<sup>91</sup> The theory predicts that a potential seller will report a WTA that is higher than her true WTA if she is forced to state a valuation that will potentially result in her having to give up the good for money sooner than she would choose to give it up. By announcing a higher WTA, she buys time to discover her valuation because she is more likely to leave the experiment with the good and have opportunities to determine her true valuation and then to sell the good after the experiment. Similarly, potential buyers will offer less to avoid buying until they can obtain more information about their true valuation for the good. The theory posits that we can think of the difference between reported WTA (WTP) and actual WTA (WTP) as the amount the subject is willing to forego to postpone the decision until she is able to obtain more information about her true valuation.<sup>92</sup> Zhao and Kling argued that data reported in other experiments supported their theory. For example, when values are certain (e.g., values for induced-value tokens in Kahneman et al. 1990), we do not observe gaps. Kahneman et al. (1990) did observe gaps, however, for mugs even after opportunities to learn during repeated bidding rounds. The author noted, though, that subjects need opportunities to learn not only about how the valuation elicitation mechanism works but also about their true valuations.

Kling et al. (2013) designed an experiment to test commitment cost theory. They began by refining the theory. They noted that commitment cost theory is incomplete without some source of asymmetry in beliefs over the ease in buying and selling outside the experiment. If one anticipates the possibility that he might wish to reverse the trade made

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<sup>91</sup> Li et al. (2002) empirically estimated the impact of uncertainty over welfare effects of a proposed change on distributions of valuations. They found that “individuals who [were] uncertain about the welfare effects of a proposed change tend[ed] to have higher expected WTA values than under certainty.”

<sup>92</sup> Zhao and Kling (2004) presented a formal dynamic model of an individual’s decision to purchase or sell under conditions of uncertainty, irreversibility and learning. The theory assumes that “commitment costs arise when the following conditions are met: the individual (1) is uncertain about the value of the good, (2) expects that she can learn more about the value in the future, (3) has some willingness to wait, (4) expects a cost associated with reversing the action of buying or selling, and (5) is forced to make a trading decision now even though she might prefer to delay the decision” (Zhao and Kling 2004, p. 510).

Simonson and Drolet (2004) also studied the impact of uncertainty on reported valuations and consider how their findings might inform theories intended to explain gaps. They focused on individuals’ uncertainty regarding whether they wish to sell an endowed good. They examined the impacts of anchors on reported WTA. They found that uncertainty is correlated with an irrelevant anchor’s influence on reported WTA. They did not, however, go as far as suggesting that uncertainty causes WTA to exceed WTP.

during the experiment after he learns more about his value and the market value of the good, then the valuation he reports during the experiment will depend on his beliefs about the ease of buying and selling after the experiment. If beliefs about ease are symmetric, then we would expect  $WTA = WTP$ . Under Kling et al.'s (2013) version of commitment cost theory, valuation gaps are caused by asymmetries in beliefs about ease of buying versus ease of selling, which they assume stem from cognitive dissonance and/or limited memory. Under the assumption of cognitive dissonance, subjects' beliefs about the ease of buying or selling are correlated with their role in the experiment because individuals tend to believe that their trading position in the experiment, say as a seller, is a "good" position, which triggers the belief that selling in the future will be easier relative to buying. The same is true for potential buyers. Buyers believe that the buyer role is a "good" position, which triggers the belief that buying in the future will be easier relative to selling. These divergent beliefs cause potential sellers to report high WTA because they believe that they will be able to *sell* outside relatively easily if they resolve their uncertainty after the experiment and wish to reverse the experiment outcome of no sale. Potential buyers, on the other hand, report low WTP because they believe that they will be able to *buy* easily outside if they resolve uncertainty after the experiment and wish to reverse the choice not to purchase in the experiment. Alternatively, the authors suggested, the asymmetry could be caused by limited memory of past buying and selling experiences coupled with the assumption that we perceive selling as easier than buying if we more readily recall selling experiences and buying as relatively easier if we readily recall buying experiences. Most gap experiments provide subjects with experience trading before measuring the gap; therefore, sellers get experience selling and buyers get experience buying. Thus, beliefs over ease of buying and selling diverge along role lines. This leads to the same predictions as under the assumption of cognitive dissonance. Buyers will report low WTP because they believe they will easily be able to buy after the experiment if they so wish after their uncertainties about their valuation and the market price are resolved (or reduced).

To test this theory, the researchers conducted what they describe as a "field" experiment.<sup>93</sup> The experiment was conducted using subjects drawn from a pool of people who were attending a sportscard show. In one set of experiments, half the subjects were given a baseball card with a market value of roughly \$12, and the other half were given \$12 in cash to rule out income effects. After eliciting valuations using an incentive compatible mechanism,<sup>94</sup> the subjects were asked to report whether they intended to keep, trade or sell the card if they ended up with one at the end of the experiment. Subjects also were asked to report how easy they thought it might be to sell or purchase

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<sup>93</sup> See Harrison and List (2004) for a description of field experiments, in which data are collected using experimental methods that are applied in actual markets rather than in the laboratory. Despite the use of the term, Kling et al.'s (2013) experiment might better be described as a quasi-field experiment in the sense that the data were collected using subjects that were attending a sportscard show. Subjects reported valuations in a (mobile) laboratory setting and not as participants in actual transactions at the sportscard show.

<sup>94</sup> Valuations were elicited using the Shogren et al. (2001) nth-price auction, which is designed to encourage reports of non-strategic valuations.

the card outside the experiment. Subjects were told that their responses would be kept confidential and that they would be contacted within three days if they were among the traders based on reported valuations,<sup>95</sup> and cash (cards) were mailed to subjects who mailed in cards (cash). The authors observed a valuation gap.<sup>96</sup> More analysis was performed to determine the cause of the gap. The authors found that potential sellers who planned to keep the card stated statistically significantly higher values on average than those who planned to sell outside the experiment. They also found asymmetric beliefs about the ease of transacting outside the experiment. For example, those intending to keep the card reported beliefs of higher levels of difficulty selling outside the experiment relative to those who did not intend to keep. Generally, the results support the predictions of Zhao and Kling's commitment cost theory.<sup>97</sup> WTA decreased and WTP increased as the perceived difficulty of reversing the transaction decreased.<sup>98</sup>

Others have proposed similar theories that assume uncertain preferences. For example, Inder and O'Brien (2003) suggested that individuals might report low WTP and high WTA if they are uncertain about how a transaction will impact their utility in an effort to avoid negative emotional states that might arise from disappointment or regret.<sup>99</sup> Such

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<sup>95</sup> Subjects endowed with cards traded if their reported valuations were less than a randomly chosen number. In exchange for their cards, they received a number of dollars equal to the randomly chosen number. Those not endowed traded if their reported valuations were more than a different randomly chosen number. In exchange for cash equal to the randomly chosen number, they received a card.

<sup>96</sup> The gap was statistically significant at the 5% level according to both parametric and non-parametric tests. Non-parametric tests are employed when the populations from which the samples are drawn are not normally distributed. The null hypothesis is that the samples were drawn from the same population (i.e., a group of individuals that behave similarly regardless of which treatment is applied).

<sup>97</sup> Ratan (2012) reported evidence from simple exchange settings that support a similar theory.

<sup>98</sup> Corrigan et al. (2008) conducted additional tests of the impact of commitment costs on WTP and found that "respondents offered the opportunity to delay their purchasing decisions until more information became available were willing to pay significantly less for improved water quality than those facing a now-or-never decision." Lusk (2003) put predictions related to WTP to the test in the lab and found that most of his results were not in line with the theory's predictions. He noted several problems with the experiment design (pp. 1321-1322), however, so it's unclear how much weight we can confidently place on the results.

<sup>99</sup> See also Zhang and Fishbach (2005) who reported evidence that suggests that the magnitude of gaps is affected by regret-type feelings that are associated with losing possession of a potentially valuable object (for sellers) or losing money on a potentially worthless purchase (for buyers). Ratan (2014) found evidence of regret avoidance in simple exchange experiments that allow subjects to reverse trading decisions if they wish. See *infra* for details on experiments designed to test regret theory.

reactions might be triggered, for example, if an individual does not know the market value of the good and purchases the good during the experiment for an amount above an amount she could gain from selling the good after the experiment (or for an amount that exceeds the utility she eventually derives from the good).

Carmichael and MacLeod (2006) also developed a rational choice theory model based on principals similar to those employed by Zhao and Kling (2004). The authors crafted a trading model that assumes that individuals have the capacity to walk away from a seemingly unfair deal even if it requires giving up a potential gain. They assumed that individuals are endowed with goods and have the ability to “act decisively before they have fully analyzed a situation” (p. 213). Their model predicted that individuals might refuse to trade if the perceived gains from trade are small relative to the expected gains from waiting to fully analyze things. The model seems to be the first to suggest that valuation gaps are the result of bargaining strategies developed through evolution. The basic idea is that “survival” depends on strategic reluctance to give up one’s endowments, and that we naturally default to these “adaptive structures known to exist in our brains” (p. 213).

Tsur (2008) modeled valuation uncertainty from a different angle. He assumed that gaps were caused by uncertain preferences, but he diverged from previously posited theories regarding how that uncertainty impacts behavior. Rather than assuming positive costs of committing to a transaction prior to discovering one’s valuation, Tsur assumed that individuals, faced with opportunities to transact, predicted their uncertain utility from a trade by using selective past experiences. Selectivity results from the assumption that individuals place greater weight on past utility from transactions that were carried out relative to those that were not. Valuation gaps result because buyers recall past purchases, which were more likely to occur after an overestimation of value relative to previously avoided buying opportunities, and sellers recall past sales, which were more likely to occur after an underestimation of value relative to previously avoided selling opportunities. Buyers reduce their predicted utility (and therefore their reported valuations), and sellers increase theirs, based on experienced utility. Tsur’s model built in variation in levels of sophistication to predict larger gaps for those who failed to account for selectivity (naïve agents) compared to those who did (rational agents). Tsur did not run experiments to test his model, but he did attempt to square the model’s predictions with previously reported data. He argued that his theory explained variation in gap size. Specifically, valuation gaps tend to be larger for non-market goods (such as air quality and nuclear water repositories) than for ordinary market goods, such as pens and mugs, and induced-value tokens, which have certain values. In addition, he argued that his theory also accommodated results suggesting that experienced traders’ valuations do not depend on their reference states.

Kingsley and Brown (2013) revisited the basic theories of preference uncertainty—e.g., Plott’s (1996) discovered preference hypothesis and List’s (2003) market experience conjecture—and put these theories to the test by providing subjects with opportunities to discover their preferences for goods by engaging in a “value learning exercise.” In the baseline treatment, student subjects were paid a \$10 show-up fee and handed a coffee

mug with the school's insignia. Valuations were elicited using the multiple price list format. Subjects received instruction on the mechanism and participated in hypothetical induced-value practice rounds as hypothetical owners and non-owners. Subjects were randomly assigned to either the owner or non-owner group, and valuations were collected. Transactions were completed anonymously. A second treatment included a value-learning exercise before valuations were elicited. The subjects were asked to make 155 hypothetical choices between pairs of items including the mug, five other locally available private goods, four public goods, and 11 different dollar amounts. The purpose of the exercise was to provide subjects with an opportunity to learn their valuation for the mug. If uncertain preferences explain observed valuation gaps, and the exercise helps subjects learn their preferences, then the valuation gap should disappear after subjects complete the value-learning exercise. Kingsley and Brown observed a valuation gap in the baseline treatment but not in the treatment that provided the mechanism for learning one's valuation. This result supports Plott's (1996) discovered preference hypothesis and suggests that explanations that assume loss aversion are not robust.

In an effort to develop a general theory that can accommodate outcomes that vary based on preference uncertainty, Loomes et al. (2009) proposed a model that assumed that individuals are loss averse and that reluctance to trade varies with the characteristics of relevant goods and an individual's knowledge about and experience with the good.<sup>100</sup> The model predicted that "exchange resistance" increases as utility loss aversion and uncertainty about future preferences over relevant goods increase. The assumed dependence of reluctance to trade on preference uncertainty allows the theory to explain a wider range of experimental findings than Tversky and Kahneman's (1991) endowment theory. For example, the theory predicted that gaps are reduced or eliminated in contexts in which experience or experimental procedures reduce uncertainty about future preferences. Loomes et al. did not, however, put this theory up against other theories that have found support in the literature. Thus, more work is required to determine which theory best unifies the reported findings.

#### **6.4. Mere-Ownership Theory**

Moving away from the assumption that individuals experience disutility from losses, some have developed theories that suggest that mere ownership of a good can change the nature and value of the good. This camp of theories posits that reluctance to trade is caused by the placement of a higher valuation on an owned good relative to the same good when it lies outside one's endowment. This explanation is an alternative to endowment theory, which assumes valuation gaps are driven by sellers' demand for compensation in return for suffering a loss of a good valued the same regardless of whether she owns it. In other words, higher WTA under endowment theory is assumed to be driven not by divergent valuations of goods based on endowment status but by amounts of cash (or other goods) required by owners to compensate them for the

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<sup>100</sup> In support of this assumption, Landesberg (2007) observed valuation gaps for an unfamiliar good but not for a familiar good. Familiarity was measured in part by how often the subjects purchased the good outside the lab.



disutility they experience when they give up an endowment. This distinction is important and is sometimes missed by legal scholars.<sup>101</sup>

Loewenstein and Adler (1995) characterized the impact of ownership on valuation as a “type of endogenous taste-change.” They suggested that WTA exceeds WTP because individuals experience extra utility from the owning of a good as opposed to the assumption that individuals demand compensation for losses.<sup>102</sup> They explored whether individuals are able to predict the impact of ownership on valuation. The authors provided subjects with a monetary incentive to accurately predict their own WTA to give up a mug in the event they obtain one by correctly guessing the result of a coin flip. Once mug ownership was randomly determined, mug owners announced that they wished they had reported higher WTA. Why can’t individuals predict the impact of ownership on valuation? The authors posited that “a person must be threatened with the loss of an object to appreciate his or her heightened attachment to it.” They concluded that valuations reported for hypothetically owned goods or rights are likely biased downward.<sup>103</sup>

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<sup>101</sup> For example, see Korobkin (2014) who suggested that attachment to substantive endowments is one possible psychological explanation for loss aversion—“the endowment effect could result from an attachment to substantive entitlements that forms solely as a consequence of ownership or possession. Once a widget becomes my widget, perhaps I like the widget more” (p. 17). He incorrectly described attachment as a driver of loss aversion rather than an alternative to it. He made the same mistake with his descriptions of transactional disutility, regret theory, and query theory, all of which are offered by their authors as alternatives to loss aversion. These theories are described *infra*.

<sup>102</sup> Others posit that ownership might create a psychological association between the object and the owner. Beggan (1992) found that subjects evaluate a good more favorably when they own the good even when they do not chose it. He suggested that this finding reflects a general tendency of people to make self-enhancing judgments—i.e., implicit evaluations of oneself are transferred to objects one owns. Similarly, Nesselroade et al. (1999) found that subjects tend to enhance their possessions when they compare them to possessions of the same type that others own. Kogut and Kogut (2011) found a correlation between subjects’ self-reports of levels of attachment to those with whom they have close relationships, self-reported levels of attachment anxiety, and valuations of both sellers and buyers. They found a positive correlation between attachment anxiety and valuations, both as buyers and sellers but stronger for sellers. They concluded that some of the variation in valuations can be attributed to variation in attachment anxiety in close relationships that individuals transfer to goods. See Morewedge et al. (2009) for a summary of the broader literature in psychology.

<sup>103</sup> Other researchers have explored whether individuals are able to predict and anticipate valuation gaps in themselves and in others. For example, Van Boven et al. (2000) predicted an underestimation of the magnitude of the gap due to “egocentric empathy gaps,” an overestimation of the similarity between their own valuation and the valuation of the person on the other side of the transaction. In addition, they predicted that individuals make biased predictions about what their valuations would be if they found

Carmon and Ariely (2000) reported data that supports the claim that potential buyers and potential sellers assess the value of the same item differently, which leads to divergent valuations. Their experimental data suggests that “buyers and sellers focus on aspects of the exchange associated with what they will forgo and differ in the attention they pay to attributes of the evaluated item and in how they evaluate what they notice” (p. 368). sometimes referred to as “focus on the foregone theory.”<sup>104</sup> Nayakankuppam and Mishra (2005) designed an experiment to test whether the behavior reported by Carmon and Ariely (2000) was due instead to buyers and sellers focusing on different features of the good. For example, a potential seller might be more likely to notice the benefits he derives from a good and fail to notice its negative features. Buyers on the other hand might notice both positive and negative features when deciding whether and for how much to purchase a good. Their evidence suggests that potential buyers and potential sellers do, in fact, tend to focus on different aspects of goods, and this differential focus causes valuation gaps.<sup>105</sup> Okada (2010) found a similar result for goods with uncertain

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themselves on the opposite side of the transaction. They found evidence of both predictions. They also found that misestimation led to reduced earnings for subjects when placed in a market setting, suggesting that markets might not reduce the observed biases. Subjects who gained experience in both roles of potential buyer and potential seller exhibited a smaller egocentric empathy gap. Later Van Boven et al. (2003) further explored whether ownership creates attachment utility. They reported experimental results suggesting that individuals do not anticipate endowment effects in their trading partners. Bischoff and Meckl (2008) offered a model to illuminate the normative implications of assuming that gaps are caused by attachment utility (which they label the “ownership-utility effect”) as opposed to loss aversion. Specifically, they argued that if an ownership-utility effect as opposed to loss aversion causes gaps, then public goods will be overproduced under certain conditions.

The attachment utility hypothesis, however, has not enjoyed unanimous support. Loewenstein and Kahneman (1991), for example, pointed out findings from Kahneman et al. (1991) that suggested that pen owners were no more likely than non-pen-owners to rate pens highly on an attractiveness scale. In addition, the “instantaneous” nature of gaps seems to work against attachment theory, at least if it assumes that attachment requires some time to develop. (Kahneman et al. 1990, p. 1342; but see Coren 2007, who suggested that attachment might occur instantly).

<sup>104</sup> Shu and Peck (2011; study 4) employed a hypothetical survey on valuation of basketball tickets to study whether focus on attributes of the object or money owned is correlated with feelings of ownership. Subject responses suggest a positive correlation.

<sup>105</sup> In the same vein, Casey (1995) proposed a “transaction encoding framework,” predicting that individuals encode the transaction problem differently along a number of dimensions, only one of which is endowment. While Casey (1995) acknowledged that some researchers observe no gap between WTP and WTA, his theory is not able to explain those findings.

values that become certain after transactions occur (e.g., forward contracts).<sup>106</sup> She attributed valuation gaps to potentially different foci of owners and non-owners on the good's features—owners on positive features and non-owners on negative ones—that are driven by risk aversion.

Johnson et al. (2007) explored a similar theory, which they describe as a “query theory of value construction.” They designed an experiment to test whether individuals determine valuations by answering a series of questions whose order differs depending on one's reference point. The idea is that the order of questions an individual asks herself when attempting to determine her value of an item differs depending on whether she owns the item, and the order systematically generates values that are higher for owned items relative to non-owned items. More specifically, the theory posits that potential sellers consider the advantages of keeping the item first and then the advantages of selling it, while potential buyers (or choosers) consider the advantages of not obtaining the item (the non-owner's status quo) and then the advantages of obtaining it. Judgments related to advantages and disadvantages are based on information retrieved from memory.<sup>107</sup> The asymmetry is purported to arise from the greater weight placed on answers to the question first considered.

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<sup>106</sup> Parametric tests were used although the distribution of the data likely does not satisfy the necessary assumption of normality, thus confidence in the results is limited.

<sup>107</sup> Ashby et al. (2012) expanded query theory to include situations where information is, instead, provided during the valuation and preference construction phase rather than retrieved from memory. They derived a set of hypotheses that set out the assumptions of their Biased Evidence Accumulation theory. The theory assumes that potential buyers focus more on value-decreasing attributes relative to potential sellers, and this bias impacts valuation. Using eye-tracking devices, the authors found that potential buyers of lotteries attended more to the low outcome on average. They also found a negative correlation between time spent focusing on the low outcome and reported valuations, and a negative correlation between the gap and deliberation time, suggesting that as time passes, attention shifts—potential buyers begin to consider positive attributes of the good, and potential sellers shift their attention to negative attributes of the good.

In a similar study, Pachur and Scheibehenne (2012) designed an experiment to study information search behavior of owners and non-owners. To the extent that information is available to help determine valuations, they predicted that owners would stop searching after encountering signals of high value and non-owners after low-value signals. Subjects were allowed to play the lottery until they felt ready to value it. Each time they played a lottery, the computer would randomize over the possible outcomes according to the assigned probabilities and produce a result. Subjects then valued hypothetical lotteries as owners and non-owners. Observed within-subject valuation differences support the authors' search theory. Valuations as hypothetical owners exceeded valuations as hypothetical non-owners. Search termination was correlated with owner/non-owner roles and received signals—disparities in termination choices result in hypothetical owners and non-owner exposure to different samples from lottery plays. Sellers stopped searching after observing high value signals, and buyers after low value signals. Distributions of signals correlated with valuations.

To test their theory, Johnson et al. used the multiple price list format<sup>108</sup> to elicit valuations of subjects endowed with a mug and subjects who were presented choices between the mug and various amounts of cash.<sup>109</sup> Subjects performed a “practice task,” during which they reported non-binding valuations for induced-value items. Those who did not report the induced value were eliminated from the experiment. Subjects were also given tests of understanding, and those who failed were eliminated. All subjects were given a chance to inspect a mug placed in front of them.<sup>110</sup> They then proceeded to computers where they learned their endowment state (seller or chooser). Before using the list to make choices between the good and different amounts of cash, the subjects listed the aspects they considered in making the decision. The reported aspects were used to draw inferences about the questions subjects asked themselves and whether the order of the questions depends on the subject role. Subjects then used the multiple price list to report their preferences. A previously determined random number was announced, and transactions were completed. A valuation gap was observed—sellers and choosers reported average valuations of \$5.71 and \$3.42 respectively (statistically significant at the 1% level under both parametric and non-parametric tests of differences). The authors also noted differences between sellers’ and choosers’ descriptions of aspects. Sellers were more positive about the mug relative to the cash, and they listed positive mug aspects earlier than positive cash aspects. They concluded that this evidence supports query theory. Interestingly, they found that listed aspects explain much more variation in valuations than the endowment state, suggesting that endowment alone is insufficient to explain gaps and that individuals might be heterogeneous in how endowments impact

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<sup>108</sup> The authors referred to the multiple price list method as the BDM mechanism, but, technically, the BDM mechanism requires subjects to report valuations rather than make a series of choices presented in the list. Use of the BDM mechanism avoids any influence experimenters might have on reported valuations when they choose prices that appear in the list (Anderson et al. 2006, 2007).

<sup>109</sup> Johnson et al. claimed that, by comparing valuations of potential sellers to choosers rather than potential buyers, they eliminated wealth effects. This is not true, however. Theoretically, at least, owners might feel wealthier on average relative to choosers because they received more from the experimenters than did the choosers. The endowment puts the sellers on different indifference curves relative to the choosers. The amount of the difference, however, likely is too small to trigger concerns that wealth effects drive the reported results. The eliminated concern is not income effects but budget constraints. Under this design, we don’t have to worry about buyers announcing low valuations because they don’t have cash available to pay an amount equal to their true valuation.

<sup>110</sup> The practice task and test for understanding were motivated by results produced by Plott and Zeiler (2005) discussed *infra*). Plott and Zeiler showed that the gap disappears when controls for subject misconceptions about the valuation elicitation device are employed. Johnson et al. (2007) did not, however, employ all of Plott and Zeiler’s controls, making it difficult to completely rule out subject misconceptions as a driver of the results.

query order.<sup>111</sup> One potential concern is priming. The impact of eliciting subject views on aspects immediately following endowment (or assignment to the chooser role) and before eliciting valuations is unknown. By eliciting views of aspects of items, the experimenters might have focused subjects' attention in a way that deviates from environments outside the lab. Additional research is required to explore this issue.

The studies summarized in this section all reported evidence in support of mere-ownership theory. These results are important, but they do not allow us to draw inferences about the impact of reference dependence and loss aversion, if any. It's quite possible that both explanations, mere-ownership theory and endowment theory, play a role in observed reluctance to trade. Morewedge et al. (2009) pointed out the difficulty in testing one theory against the other—both theories predict gaps in the presence of ownership. What's needed is a way to separate the theories by generating a design that leads to divergent predictions. To this end, Morewedge et al. designed an experiment to hold ownership constant and vary whether subjects experience a loss or a gain. Using the multiple price list method with a randomly generated price, they estimated the valuation of mugs by both sellers and by choosers who already owned one mug.<sup>112</sup> The owner-choosers were asked to choose between various amounts of money and a second mug. Endowment theory predicts that such owner-choosers would report lower values relative to sellers while mere-ownership theory predicts they would report values equal to sellers. They assumed that owner-choosers will value a second mug the same as the owned mug. In support of mere ownership theory, they find equivalent average values of owner-choosers and sellers. One obvious alternative explanation is that some other difference between the two groups is driving the result—namely, that owner-choosers will end up owning a pair of mugs, which might increase their individual value over the value of an endowed single mug. To rule out complementarity, Morewedge et al. estimated the value of two mugs to those who own none and were asked to choose between two mugs and various amounts of cash. The per-mug value for non-owners was the same regardless of how many mugs the experimenters offered. This suggests that complementarity does not explain the main result.<sup>113</sup>

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<sup>111</sup> Similarly, Shu and Peck (2011; study 3) replicated some of the study's findings and reported a correlation between query order and self-reported feelings of psychological ownership.

<sup>112</sup> Morewedge et al. referred to choosers as buyers for ease of exposition, but I use choosers here to maintain consistency with descriptions of other studies.

<sup>113</sup> Others have explored the impact of the number of goods owned or considered for purchase. For example, Burson et al. (2012) found variation in observed gaps for single units (gap in valuations for one chocolate) versus multiple units (no gap in valuations of 25 chocolates) versus multiple units described as one unit (gap in valuations for 20 chocolates described to subjects as a box of chocolates). They offered four possible explanations for this variation including modifications to endowment theory and alternatives to endowment theory. Schurr and Ritov (2014) studied the impact of the number of units but from a different angle. They found valuation gaps when subjects were forced to sell (buy) all or nothing, but not when they could sell (or buy) just some owned (or considered) units. They referred to this finding as the “giving-it-all-up effect.”

The authors were also interested in comparing valuations of seller-owners and seller-non-owners and the valuations of chooser-owners and chooser-non-owners. They estimated values by asking subjects to make choices as agents for others, some who have an opportunity to sell a good they own and others who do not own but are presented a choice between the good and some amount of money.<sup>114</sup> The authors claimed that endowment theory predicts that those acting as agents for sellers will report relatively high values regardless of whether they own the good. Alternatively, they argued, mere-ownership theory predicts that those who own the good will report relatively high values regardless of whether they are acting as agents for sellers or choosers. Their findings support mere-ownership theory.<sup>115</sup> Valuations are higher for owners relative to non-owners, both for those representing choosers and for those representing sellers. Conditional on ownership, valuations do not differ depending on who is represented. These results seem to be in line with those Loewenstein and Adler (1995) reported. The findings also are consistent with

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The authors interpreted this finding as evidence against endowment theory, which would predict gaps regardless of whether endowments or expectations set reference points. They did, however, suggest that loss aversion might depend on the magnitude of the change since individuals are not asymmetrically impacted by small losses. Of course this interpretation is rejected by many experiments that find valuation gaps for single low-value goods identical to those used by Schurr and Ritov. Their findings, though, might be important for identifying conditions under which we would predict valuation gaps. They suggested that gaps should not be expected when sellers decide to sell a few of many and buyers decide to buy a few more than they already own.

<sup>114</sup> The experimenters did not deceive subjects. They later brought another group into the lab, randomly assigned them to the agents and gave them cash or mugs depending on the randomly determined price and the agents' choices.

<sup>115</sup> Maddux et al. (2010) used the standard design based on Kahneman et al.'s (1990) BDM mechanism elicitation approach and found differences in the magnitudes of gaps for East Asians (smaller gaps) and Westerners (larger gaps). They attributed these differences to self-enhancement tendencies in Western cultures versus those in East Asia. Assuming that mere ownership causes gaps, Maddux et al. attributed the observed differences in gap magnitudes to the tendency of Westerners to engage in more self-aggrandizement than East Asians, which leads to higher valuations of owned goods that are infused with value from mere association with the highly valued self. It should be noted here, though, that the authors used parametric tests, the results of which might be invalid given that valuation data tends to be non-normally distributed.

Dommer and Swaminathan (2013) investigated why mere ownership leads an owner to increase his valuation for an endowed good. They reported evidence suggesting that owners increase valuation to enhance the self and that this effect is stronger when one's self-esteem is threatened. They also reported differences between males and females that they attributed to gender disparities in reactions to valuations as owners of out-group goods (i.e., goods associated with others). They suggested that such "motivational factors can often override the impact of loss aversion in influencing valuations for goods" (p. 1047).

previous results for non-owners Marshall et al. (1986) reported, although they suggested that individuals are loss averse but do not anticipate loss aversion in others. The results Morewedge et al. reported suggest this is not the case. If it were, we would have observed owners reporting valuations similar to those of non-owners, but we do not. We might wonder whether loss aversion is anticipated only if the agent is an owner, but Morewedge et al. found that owners report the same average valuation regardless of whether they are deciding for sellers or choosers, and those average values are higher than the values reported by both groups of non-owners. Thus, while the results cannot rule out loss aversion as a sufficient condition for valuation gaps, they do suggest it is not a necessary condition. In the end, however, the amount of weight we can place on any of the results is limited by the test Morewedge et al. used to measure gaps. They generated all results using parametric tests. Generally, non-parametric tests are employed in this literature given the likelihood that the data are non-normally distributed. Morewedge et al. did not report whether the data satisfy the normality assumption, so caution is warranted when drawing inferences from the results.<sup>116</sup>

### **6.5. Enhancement Theory**

On a parallel track, others have investigated the influence of methods used in the laboratory to endow owners and to elicit choices. Plott and Zeiler (2007) revisited the line of research that explores the drivers of exchange asymmetries in experiments where subjects are endowed with one good and asked whether they'd like to trade their good for another good. The authors posited several potential influences acquisition and choice methods might have on reluctance to trade: (1) experimenters, through involvement over the choice of which good to endow, might signal something about relative value to subjects or suggest that the item is a "gift" from the experimenter,<sup>117</sup> (2) language used to endow subjects and to elicit subject choices might suggest relative value of the items,<sup>118</sup> (3) location of the good at the time of choice might signal relative value or generate

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<sup>116</sup> See Schmidt and Traub (2009) for a useful discussion of impacts of employing different statistical tests to measure gaps.

<sup>117</sup> Others have posited similar conjectures. For example, see Nesselrode et al. (1999), who suggested that the giving of objects by the experimenter to the subjects "may have caused participants to enhance the value of the gift to thank the gift giver" (p. 23). Ericson and Fuster (2011) found support in their data for this conjecture, which they refer to as the "value inference effect."

<sup>118</sup> Mandel (2002) also considered the impact of language used to elicit valuations. He designed an experiment to investigate potential confounds created by the language Thaler (1980) used to elicit valuations. Mandel hypothesized that by mentioning to each subject endowed with a hypothetical bottle of wine that "a wine merchant offers to purchase it from you," the experimenter might have signaled that the buyer might be willing to buy at a high price, triggering strategic considerations that move the reported valuation away from the subject's non-strategic valuation. While an available supplier was mentioned to buyers, the prompt did not mention any intention to sell. This insight was one of the earliest warnings about the subtle impact language can have on reported valuations.

positive transaction costs, and (4) choices might depend on what other subjects choose. To test these conjectures, the authors altered procedures used to endow subjects and to collect choices. Plott and Zeiler started by replicating the exchange asymmetry reported by Knetsch (1989)—this “standard procedures” treatment resulted in an asymmetry that was statistically significant at the 6% level. In a separate treatment, they implemented a set of procedures designed to control for the impact of acquisition and choice methods. The good to be endowed was randomly chosen rather than appearing to be chosen by the experimenter; the subjects were told, “These coffee mugs are yours” rather than “I’m giving you the coffee mug. It is a gift. You own it. It is yours”; subjects were asked to circle the item they wanted to take home with them (mug, pen, I don’t care) rather than choosing between the options “I want to keep my mug” and “I want to trade my mug for a pen”; and subjects made choices privately and with neither the endowed good nor the alternative good in possession. No exchange asymmetry was observed. They also ran a treatment that included the full set of controls but left both the endowed and alternative goods in the subjects’ possession. Possession did not change the null result—no statistically significant exchange asymmetry was observed. These results provide support for the claim that exchange asymmetries are explained not by endowment theory but by classical preference theories such as signaling, information aggregation and other-regarding preferences.<sup>119</sup> Some refer to this collection of conjectures as “enhancement theory” (Klass and Zeiler 2013).<sup>120</sup>

In a direct response to Plott and Zeiler (2007), Knetsch and Wong (2009) suggested that the disappearance of exchange asymmetries is due not to influences suggested by enhancement theory but rather by experimental procedures that diminish the subjects’ reference state. For example, Knetsch and Wong posited that reference states are muddled when subjects possess both goods instead of just the endowed good, when the endowed good is randomly chosen as opposed to determined by the experimenter, and when the choice is neutrally framed (i.e., “Which good would you like to take home?” as opposed to “Would you like to trade your X for a Y?”). This muddling, the theory goes, diminishes the perception of the giving up of the endowed good as a loss to be avoided. Knetsch and Wong purported to test their theory by adopting all necessary controls to eliminate enhancements triggered by the experiment procedures and by generating reference states of varying strengths across treatments to test how this variable impacts exchange behavior. The theory predicts that exchange asymmetries will appear when the

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<sup>119</sup> Ericson and Fuster (2010 working paper version of Ericson and Fuster 2011, on file with author) argued that the language used by Plott and Zeiler (2007) (“We began these sessions by informing the subjects that mugs and pens would be used during the experiment. Subjects were then told that a coin was flipped before the start of the experiment to determine which good, the mug or the pen, would be distributed first. We then distributed mugs to the subjects and announced, ‘These mugs are yours’.”) triggered an expectation in subjects that they would also be given a pen or that they would get an opportunity to trade the mug for a pen. This is an open question.

<sup>120</sup> This theory should not be confused with self-enhancement theory, which assumes that ownership triggers an increase in the value of a good because the owner associates the good with himself (Beggan 1992).



reference state, which might not hinge on ownership, is strong and thus more likely to trigger a perceived loss.

The authors designed three treatments to estimate the effects of reference state strength. However, despite their claim to the contrary, they could not rule out Plott and Zeiler's (2007) conjectures as drivers of the divergent outcomes across treatments. In Treatment 1 ("owned and weak reference"), all subjects were endowed with the same randomly chosen item. Subjects were told that they had "earned" the good and now owned it, and they could take it home with them if they wished to. After subjects had time to inspect the good, which was then removed from their possession, they were offered a trade and privately chose a good. Choices were presented neutrally—i.e., "which item would you like to take home?" In line with both theories' predictions, no exchange asymmetry was observed.

Treatment 2 ("owned and semi-strong reference") was identical to Treatment 1 except that the "earned" item was determined randomly using student identification card numbers. Half the subjects in the room were told that they owned one good, and the other half were told they owned the other. This design change was meant to enhance the reference state by creating a feeling of "deservedness" that comes from "winning" the good during the random assignment. As in treatment 1, subjects were given time to inspect the goods, but they did not possess them at the time of choice. Choices were made privately, but the language was changed to emphasize ownership ("keep X" or "trade X for a Y"), which was meant to enhance the reference state. Their theory predicts that these two design changes will result in a higher reluctance to trade relative to treatment 1. The result was in line with this prediction, and the authors concluded that diminished reference states rather than Plott and Zeiler's enhancement theory explained Plott and Zeiler's (2007) results. The obvious problem here, though, is that enhancement theory *also* predicts a stronger reluctance to trade given the design changes. Specifically, it predicts that experimenter emphasis of ownership will signal the goods' relative values. In addition, while Plott and Zeiler did not discuss feelings of deservedness, increased reluctance to trade in response to the altered method of endowment is in line with their intuitions about how endowment methods might impact perceived value of an endowed good. The same logic applies to telling subjects they earned the endowed good. While this feature can't account for any of the variation in choices across treatments because it's held constant across each of them, it is yet another way in which Knetsch and Wong did not control enhancements. So, despite Knetsch and Wong's claim that they ruled out enhancements, they in fact did not. For this reason, their design could not effectively separate their theory from enhancement theory.

Treatment 3 ("not-owned and strong reference") was plagued by the same problem. The authors' goal here was to test for the effects of design features predicted to produce strong reference points in the absence of ownership. In this treatment, the experimenter chose which good to (eventually) endow, which the authors predicted would strengthen the reference state. Subjects were told they don't own the good, but they would eventually if they earned it by completing a questionnaire. Subjects were allowed to inspect but not to use the good, which stayed in their possession. This design change is

noted as a second feature meant to strengthen the reference state. After subjects completed the questionnaire, they were allowed to inspect the alternative good, which was then placed in front of the room, out of their possession. Subjects then made a private choice between “earn and keep the X” and “give up earning X and earn Y instead,” language designed to strengthen the reference state in a third way. As their theory predicted, this treatment resulted in the largest exchange asymmetry. The problem, however, is that Plott and Zeiler’s enhancement theory also predicted that this treatment would produce the largest exchange asymmetry. According to their enhancement theory, experimenter involvement in the choice over which good to endow, placement of the goods and the language used to elicit choices can all signal relative value of the goods. Thus, treatment 3, like the other treatments, was ill equipped to separate Knetsch and Wong’s hypotheses from Plott and Zeiler’s. While the experiment did provide evidence that ownership is not required to trigger reluctance to trade, it did not help us determine what exactly causes it in these types of settings.

Engelmann and Hollard (2010) set out to disentangle the number of potential drivers of exchange asymmetries posited by Plott and Zeiler (2007). They focused on two types of uncertainty that might impact choices: “choice uncertainty” defined as uncertainty about the relative values of the endowed and alternate goods that might arise from public choices of others, and “trade uncertainty” defined as uncertainty about whether trading is optimal given potential transaction costs (e.g., experimenter involvement in the choice over which good to endow and decision costs in the presence of indifference). They also explored the role of trading experience on choices, following on work by List (2004). They hypothesized that List’s (2004) results suggesting that trading experience seems to reduce exchange asymmetries are, in fact, driven by the possibility that those voluntarily choosing to gain trading experience are more likely to have less trade uncertainty. The basic idea is that exchange asymmetries are caused not by loss aversion of the inexperienced but by lower trade uncertainty of experienced traders, which makes it more likely for them to trade. The authors remedied this selection problem by strongly encouraging one set of subjects to trade to induce experience and reduce trade uncertainty. The authors conducted two treatments, both with two stages. In the first stage of the free-trade treatment, subjects were randomly endowed with a good and allowed to trade with other subjects if they wished to do so. In stage one of the forced-trade treatment, subjects lost their randomly endowed good if they did not trade it for an alternative good. In both treatments, an identical second stage was conducted where subjects faced the standard choice between an earned endowed good (chosen by the experimenter) and an alternative good.<sup>121</sup> The results suggest that force trading in stage 1 drives higher rates of trading in stage 2. If we assume that even very limited trading experience reduces trade uncertainty for those who would otherwise not trade due to such uncertainty, this result supports the conjecture that trade uncertainty plays a role in

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<sup>121</sup> While stage 2 would have been cleaner if the experiments would have endowed subjects with randomly chosen goods, the experimenters chose which good to endow and subjects earned them in both treatments, so any differences cannot be attributed to this design feature. It’s impossible, however, to determine exactly what drives exchange asymmetries in stage 2 of the free-trade treatment.

exchange asymmetries. They argued that experience is unlikely to change expectations that set one's reference point. Thus, endowment theory likely does not explain observed exchange asymmetries.

Ratan (2014) employed a different experiment design to test whether trade uncertainty affects reluctance to trade in simple exchange experiments. He wondered whether anticipated regret theory might explain observed exchange asymmetries. If subjects were uncertain about whether to trade, then they might lean toward not trading to avoid regret that might arise from a bad decision. He designed an experiment that reduced the likelihood that subjects would consider future regret when deciding whether to trade the endowed goods for the alternate goods. Specifically, subjects in the treatment group were allowed to reverse their decisions within 24 hours. Ratan observed an exchange asymmetry in the control group, which did not have an opportunity to reverse choices, but not in the treatment group. He concluded that removing any anticipation of regret is sufficient to eliminate reluctance to trade in simple exchange settings. He also noted that his result bolsters the more general claim that asymmetries are sensitive to small changes in the experiment design and calls into question the necessity of trading experience for elimination of exchange asymmetries.

Brown et al. (2015) were also interested in exploring which design features do the most work to trigger a reluctance to exchange one good for another. They began by reviewing the existing literature to generate a list of potential explanations that find support in the data.<sup>122</sup> They then reported the results from 11 experiments designed to test a series of hypotheses related to the potential drivers of exchange asymmetries. The experiments differed in the goods used, the number of endowed goods (all subjects endowed with same good or half of subjects endowed with one and other half with other), location of goods at the time of choice, passage of time after endowment, and the method of choice (raised hands or private forms). The extreme trading observed by Knetsch (1989) was not observed in any of the 11 experiments. The lowest percentage of trading over all experiments was 21%. Exchange asymmetries were observed in all but two experiments. In one of the two, half the subjects received one good and half the other (to control for signaling of relative value through endowment), subjects possessed the endowed good but not the alternative at the time of choice, subjects completed an unrelated questionnaire after endowment and before choosing (to increase "sense of attachment"), and they made public choices by raising hands. This result, however, was not robust to a

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<sup>122</sup> The contenders are many: experimenter emphasis of the endowment (characterization as a gift, personal selection of the good by the experimenter and language used to emphasize ownership), characterization of the decision as trading or choosing, the amount of possession time, whether the decision could later be reversed, location of the goods at the time of choice, utility or disutility from the act of trading (e.g., disutility experienced from the giving up of the good), and utility gained from impressions created by trading (e.g., trading out of solidarity because others are trading or to be part of the in-group ("herding") or not trading to avoid offending the experimenter). The authors added to the list the possible inability of subjects to rank the goods due to indifference or preference imprecision.

change in the goods used. In the other no-asymmetry treatment, half the subjects received one good and the other half received the other, subjects possessed both goods at the time of choice, no time past between endowment and the choice, and subjects chose privately. Given the large number of experiments and the variation in exchange asymmetries, it's difficult to pinpoint what's driving them, as the authors conceded. They tossed out some conjectures (e.g., possession of both goods might dull the sense of endowment,<sup>123</sup> asking the subjects to choose between the goods rather than to decide whether to trade or keep might focus subjects away from the fact that they own one of the goods, telling subjects that there are enough goods for everyone to get what they want might give them the impression that they are just choosing rather than keeping or trading). The data cannot resolve these questions, but, as the authors conceded, “[w]hat seemed at first like the simplest of experiments turns out to be surprisingly complex” (p. 115).

## **6.6. Valuation Elicitation Methods, Subject Misconceptions and Market Instincts**

As noted in the description of the literature's seminal studies, several early researchers pointed to valuation elicitation methods as potential drivers of observed reluctance to trade. While evidence that supported alternatives to endowment theory was often ignored in the early days, some attempted to reconcile the mixed results, a crucial step in theory development. In contrast to Knetsch (1989), Kahneman et al. (1990) and Tversky and Kahneman (1991), Singh (1991), for example, attempted to reconcile the entire body of existing literature. Singh's purpose was to check the robustness of reluctance to trade in a different subject pool—Malaysian civil servants as opposed to American university students— and, perhaps most importantly, to reconcile the results of previous studies. Singh begins by noting three insights from the existing literature: (1) demand-revealing mechanisms reduce the magnitude of valuation gaps but do not always eliminate them, (2) within-subject designs might provide a better measure of gaps and the method of measuring gaps matters (e.g., the ratio of median WTA to median WTP is less influenced by outliers than the ratio of mean WTA to mean WTP), and (3) the method of endowment might matter (e.g., reluctance to trade might disappear when an endowment is the result of a windfall).

Singh endowed all subjects with \$3 and no lottery tickets, two lottery tickets with an expected value of \$1.50 each, or \$1.50 plus one lottery ticket. He elicited (non-binding) valuations at the beginning of the experiment by asking each subject to report his WTA and WTP for a lottery ticket. He then allowed the subjects to trade lottery tickets in a double-bid auction in an hour-long market, which enabled subjects to learn their values

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<sup>123</sup> Kogler et al. (2013) found a disparity between choices made by owners and inspectors when asked to choose between two goods sitting next to each other on a table. Owners owned one of the two goods and inspectors were given time to inspect one of them. Ratan (2012) reported a similar result. This is some evidence that possession of both goods is insufficient to eliminate reluctance to trade.

for the lottery ticket.<sup>124</sup> At the end of the market, subjects again reported (non-binding) WTA and WTP for the lottery. The lottery outcome was determined, and subjects were paid according to their endowments at the end of the market. Before subjects participated in the market, a valuation gap was observed for the civil servants, but it disappeared after they gained experience valuing the lottery during market trading.<sup>125</sup> Singh also measured the gap using a sample of undergraduate and graduate students and observed no gap both before and after the market. He also asked another group to advise hypothetical clients on the highest WTP and lowest WTA, and no gap was observed, although he cautions against putting much weight on this result due to the hypothetical nature of the task. Thus, he finds that the gap disappears after subjects are given opportunities to discover their true valuations for the lottery ticket.

This evidence is in line with Harless' (1989) results, but what about the studies that report significant gaps and exchange asymmetries? Singh attributed the variation in results to the type of asset endowed—when risky but not uncertain are used, no gap is observed, but when assets with uncertain values (e.g., mugs) are employed, gaps appear. With respect to endowment theory, this sort of observation suggests yet another theory refinement. When we combine this refinement with those from Kahneman et al. (1990), endowment theory predicts reluctance to trade only if the asset has an uncertain value, will be consumed rather than sold or exchanged, and has no available perfect substitutes. This nuance seemed to be lost in the applications of endowment theory in law at the time.

Shogren et al. (2001) continued to explore how auction mechanisms impacted valuation gaps. They construct an experiment that holds constant all features across treatments except for the auction mechanism.<sup>126</sup> In rounds using the BDM mechanism, the multiple price list format was used to elicit choices at various prices, and, between rounds, subjects were told the randomly drawn clearing price and how many buyers and sellers were willing to buy and sell at that price. In Vickery auction rounds, subjects were asked to write down a numerical value on a sheet (either the most they were willing to pay or the least amount they were willing to accept), and between rounds subjects were told the market-clearing price, which was determined by the subjects' bids. Endowment theory predicts gaps will persist regardless of the mechanism used to elicit valuations, assuming the mechanism is effective at encouraging reports of true valuations. The results revealed

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<sup>124</sup> In a double auction, owners and non-owners bid simultaneously, and owners willing to sell at prices lower than some non-owners' bids are matched with those non-owners, and trades are effectuated (Fudenberg and Tirole 1991).

<sup>125</sup> Because the data were not distributed normally, Singh employed a non-parametric sign test to determine whether the median individual WTA-to-WTP ratio was greater than 1.1, which allows for a small income effect.

<sup>126</sup> All subjects received \$15 up front, tens rounds were conducted for each auction, candy bars and coffee mugs were auctioned, subjects were not informed of the retail price of the goods, participation was voluntary (as opposed to being a course requirement), and subjects were told that one round would be selected as the binding round at the end of the experiment.

different outcomes across auction mechanisms, both of which are designed to elicit true valuations. In the BDM treatment, for both candy bars and mugs, gaps were observed in the first round and persisted throughout. In the Vickery auction treatment, however, while gaps appeared initially, they disappeared by round 2 with candy bars and by round 4 with mugs (reappearing only in the eighth mug round). WTP increased and WTA decreased over the Vickery auction rounds. To test the conjecture that Vickery auctions do not induce the reporting of true valuations of bidders whose values are such that they will never trade,<sup>127</sup> the authors devised a clever auction mechanism—the random  $n^{\text{th}}$ -price auction. In this auction, subjects do not know which value in the list of reported values will set the price from round to round. Under this auction mechanism, the valuation gap disappeared by the fourth candy bar round and by the fifth mug round, and it did not return. Shogren et al. (2001) did not directly test the conjecture that announced market-clearing prices between rounds might move reported valuations away from true valuations, but they pointed to contrary evidence published elsewhere (List and Shogren 1999). The authors concluded that their data do not support endowment theory and that the elicitation device at least partly explains observed gaps.

Sugden (1999) suggested that eliciting valuations might require more than the use of an incentive compatible mechanism. He argues:

“[T]he Becker-DeGroot-Marschak mechanism and the second-price sealed-bid auction are quite complicated, and their incentive-compatibility is not immediately obvious. ... For example, a respondent who is presented with a purportedly take-it-or-leave-it offer may wonder whether the offer really is non-negotiable.... Thus, respondents might misrepresent their preferences in the mistaken belief that it was to their advantage to do so.... [I]n most bargaining situations, it is good tactics to try to give the impression that you are less eager to trade than you really are.... The point... is to try to influence the other party's belief about your reservation price; you want the other party to underestimate your maximum WTP, or to overestimate your minimum WTA.... [R]espondents' understanding of... incentive-compatibility may depend on the clarity of the instructions they are given and on the opportunities they are allowed for gaining experience of how the elicitation mechanism works.”

Plott and Zeiler (2005) designed an experiment to test a conjecture similar to Sugden's (1999). Specifically, they tested endowment theory against an alternative explanation related to subject misconceptions. Misconceptions, they posited, can arise both from lack of familiarity with the elicitation mechanism (Sugden 1999) and during the process of discovering one's value for a good (Plott 1996). The basic idea is that misconceptions might trigger subjects to revert to their basic market instincts to buy low and sell high.<sup>128</sup>

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<sup>127</sup> The authors conjectured that these subjects have no incentive to report true valuations as long as their reported valuations exceed the clearing price, information about which subjects gather from round to round.

<sup>128</sup> Coren (2007, chapter 3) attempted to flesh out this basic concept by developing a theory around the notion of bargaining scripts, which assumes that individuals' self-

After replicating valuation gaps using the Kahneman et al. (1990) design,<sup>129</sup> they altered the design in a number of ways: (1) subjects were provided training on the BDM using numerical examples that illustrated why it was in subjects' best interest to report their true values, (2) subjects were walked through examples on how to determine their true values,<sup>130</sup> (3) subjects participated in unpaid practice rounds, which provided time for questions and an opportunity for the experimenter to check for understanding,<sup>131</sup> (4) subjects participated in a number of paid practice rounds using lotteries, switching between buyer and seller roles throughout, to gain experience with the BDM mechanism,<sup>132</sup> and (5) subjects received payouts anonymously to eliminate the potential for signaling of personal characteristics through revealed valuations (Fremling and Posner 2001). These design changes were driven by a "revealed theory methodology," the adoption of the union of controls found in the literature to control for subject

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interested motivations when placed in bargaining environments are to maximize the amount obtained in exchange for the endowed good or to minimize the amount paid in exchange for the good. Her experimental data (gathered using hypothetical surveys) support the bargaining scripts hypothesis. Binmore (1994), in a much earlier critique of the field's response to anomalous behavior observed in the lab, argued that unless behavior is robust to environments that include strong incentives and ensure subject understanding of the nature of the tasks, "the experimenter has probably done no more than inadvertently to trigger a response in the subjects that is adapted to some real-life situation, but which bears only a superficial resemblance to the problem the subjects are really facing in the laboratory" (pp. 184-185).

<sup>129</sup> Half the subjects, university students, were randomly assigned to be sellers and the other half buyers. Sellers were given mugs with the school logo. Buyers were allowed to inspect a mug. Subjects participated in two unpaid practice rounds using induced-value tokens and one binding round using mugs. Valuations were elicited using the multiple price list method. Payouts were made publically. Buyers used their own money and were told that credit and change were available at the beginning of the experiment.

<sup>130</sup> Potential buyers were instructed to start low and increase until they reach an amount that makes them indifferent between the money and the good. Potential sellers were instructed to start high and decrease to find their indifference point. The experimenter directly elicited individual valuations; the multiple price list format was not used. Non-owners who ended up purchasing a mug used money earned during the lottery rounds to pay for it. This is in contrast to the Kahneman et al. (1990) replication, in which buyers exchanged their own money for the mug.

<sup>131</sup> Corrigan et al. (2014) subsequently studied the impact of hypothetical practice rounds (in the absence of training on the mechanism) and found evidence that practice rounds seem to impact behavior in non-practice rounds and that multiple non-practice rounds seem to mitigate anchoring and subject misconceptions.

<sup>132</sup> Vondolia et al. (2014) reported evidence suggesting that subjects who had experience using trading mechanisms outside the lab reported different valuations for hypothetical goods in the lab. They found that "being familiar with monetary and labour payment vehicles attenuates time/money response asymmetry" (p. 13).

misconceptions about the elicitation device. The authors observed no gap in mug valuations in two experiments using different subject pools (USC Law students and Pasadena City College students).<sup>133</sup>

To test whether experience using the mechanism drove the results, a second group of USC Law students reported mug valuations using the same experiment design except valuations were recorded before the paid practice rounds. No gap was observed, suggesting that experience with the mechanism is not required to control misconceptions.<sup>134</sup> The results support the claim that gaps observed in the laboratory are caused not by loss aversion and reference dependence, but by the methods experimenters

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<sup>133</sup> In a separate study, Kovalchik et al. (2005) used similar procedures and observed no gap in valuations of healthy elderly individuals (average age 82). Roth (2005) also used similar procedures and observed no gap for consumer goods but gaps remained for risky assets. As discussed *supra*, Plott and Zeiler (2010, 2011) also observed gaps in lotteries. Kniesner et al. (2014) found no valuation gap in wage data from the field and suggested that the no-gap result might be due to the fact that labor providers likely have no misconceptions about the trading environment.

<sup>134</sup> Note that once subjects had written down their valuations, they were prompted to consider whether the offer was in fact their actual nonstrategic value, and they were allowed to change the offer before committing to it. This procedure was intended to increase subjects' understanding of and attention to their nonstrategic valuations, a measure that's required to test endowment theory. Kingsley and Brown (2012) noted that this revision prompt had not been previously used, and they wondered whether it might be driving the no-gap result. Using procedures similar to, but not the same as, Plott and Zeiler (2005), Kingsley and Brown (2012) replicated the no-gap result, but they also had subjects submit pre-prompt valuations. Rather than simply giving subjects an opportunity to change their offers, as Plott and Zeiler did, they told the subjects "before you commit to your...offer and we reveal the fixed offer, consider whether your offer reflects your actual, non-strategic, value of the mug. [Your offer] will be discarded." They required all subjects to submit another offer, although they informed the subjects that they were not required to alter their initial offer. The authors observed a gap in pre-prompt offers but not in post-prompt offers. They concluded that the prompt might have suggested to subjects that they did not go far enough in their iterations to find their nonstrategic valuations (see *supra* footnote 130). The authors did note that it's impossible to determine whether pre- or post-prompt valuations more accurately reflect non-strategic valuations. It is possible, however, that the prompt might have led to overcorrections of strategic valuations. In a separate replication of Plott and Zeiler's no-gap result, Isoni et al. (2011), discussed *infra*, did not indicate that they allowed subjects an opportunity to revise their reported mug valuations. More research is required to fully understand the impact of this procedure and its role in the no-gap results reported in the literature. Note that Korobkin (2014) incorrectly pointed to Kingsley and Brown's (2012) findings as evidence of experimenter demand effects (post-prompt reconsideration "caus[e] buyers to believe they should move higher and sellers to believe they should move lower" (p. 12)); the data do not allow us to determine whether subjects are moving toward their true valuations or in the directions the experimenters "demand."



use to elicit valuations.<sup>135</sup> Candidates include the unfamiliar elicitation procedures and lack of anonymity. Recent evidence reported by Brown and Cohen (2015) supports unfamiliar elicitation procedures over anonymity.<sup>136</sup> These results in combination with Plott and Zeiler's suggest that lack of familiarity with the elicitation device causes subjects to misconceive how their reported valuations will impact outcomes and encourages them to rely on their basic market instincts to sell high and buy low. If this conjecture is correct, it implies that the valuations subjects report in experiments that do not control misconceptions are strategic and not useful for testing theoretical assumptions about the deep structure of preferences including reference dependence and loss aversion.

A third potential explanation for Plott and Zeiler's null result is the house money effect. Potential mug buyers had cash to spend from lottery rounds in the controlled experiment

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<sup>135</sup> Köszegi and Rabin (2006) argued that Plott and Zeiler's (2005) results can be explained by reference-dependent preferences. They claimed that "Plott and Zeiler...successfully decoupled subjects' expectations from their initial ownership status." They did not explain what they mean by this or how Plott and Zeiler's design might have caused a "decoupling." It's possible that they're implying that the Plott and Zeiler procedures (e.g., putting each subject in the position of potential buyer and potential seller throughout the binding practice rounds) created an expectation that endowments would be sold. This is only a guess, but it seems at least a plausible interpretation. This interpretation might explain the results from treatments that elicit mug valuations after subjects participate in a number of practice rounds. It does not, however, explain the no-gap result in the treatment where mug valuations are elicited prior to the binding practice rounds.

Ericson and Fuster (2010 working paper on file with author) argued that "the procedures and training used by [Plott and Zeiler] may not have induced a difference between buyers and sellers in their expectations of keeping the mug, as subjects may anticipate the possibility of trade." They did not provide detailed conjectures about which procedures might be setting expectations. We can rule out the binding practice rounds given the results of the second experiment that finds no gaps in the absence of practice rounds. It's possible, however, that training on the BDM mechanism might impact expectations over and above more basic messages used by others about optimal behavior—for example, Kahneman et al. (1990) explained the BDM mechanism and told subjects it was in their best interest to report their true values. It's an open question.

<sup>136</sup> Brown and Cohen (2015) designed a 2 x 2 experiment to test the impact of anonymity on valuation gaps. Valuations were elicited from half the subjects using the procedures employed by Kahneman et al. (1990), half under conditions of anonymity and half whose valuations and payouts could be tied back to them. The other half reported valuations under the Plott and Zeiler (2005) procedures, half assigned to an anonymous condition and the other half to a non-anonymous condition. They observed valuation gaps in the Kahneman et al. treatments regardless of anonymity, and no gap in the Plott and Zeiler treatments regardless of anonymity. The results suggest that anonymity is not the driving factor in Plott and Zeiler's experiment and that subject misconceptions likely drove their no-gap result.

but not in the Kahneman et al. replication, and they might have been more willing to spend cash “won” during the experiment relative to cash from their own pockets. Plott and Zeiler (2005) reported findings demonstrating that lottery round income and WTP are not positively correlated in experiments where subjects reported valuations after the lottery rounds, which stands as evidence against the house money effect. Despite this, WTP in the Kahneman et al. replication, in which subjects did not receive a show up fee but were offered credit, is lower than WTP under the Plott and Zeiler procedures in treatments where potential buyers reported mug valuations after the lottery rounds.<sup>137</sup> In the Plott and Zeiler treatment where potential buyers reported mug valuations before the lottery rounds, subjects did not have the lottery winnings in hand when reporting mug valuations but they did receive a \$5 show up fee at the beginning of the experiment. If the house money effect were driving willingness to pay, we might expect mug valuations to fall somewhere between WTP from the replication and WTP from the controlled experiments since average lottery winnings fell well above \$5. They are roughly in the same ballpark, however, as WTP valuations following the lottery rounds.<sup>138</sup> This is additional evidence that WTP is not correlated with the amount of cash received during the experiment prior to reporting WTP. In addition, gaps have been observed in the absence of show up fees, and gaps remain when show up fees are added.<sup>139</sup> More work is required to determine the impact of cash gained during the experiment and how it influences our ability to measure true WTP.

Landesberg (2007), in a study primarily designed to investigate the impact of familiarity with the good on valuation gaps, employed versions of the controls similar to those that Plott and Zeiler (2005) adopted to control subject misconceptions. Subjects participated in two practice rounds using induced-value tokens, one as owner and one as non-owner, and four binding rounds, during which half the subjects were owners and the other half were non-owners. They were allowed to ask questions during the practice sessions and the binding rounds, and many questions were fielded. Subjects were told that their choices and outcomes would be anonymous. During the binding rounds, the multiple price list method was used to elicit valuations for a voucher that could be exchanged for a sandwich. Subjects were told that one of the four rounds would be chosen at random and

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<sup>137</sup> Mean and median WTP in the Kahneman et al. replication were \$1.74 and \$1.50, respectively. In Plott and Zeiler’s treatments with mug valuations following the lottery rounds, mean WTP was \$5.20 and 7.29 and median WTP was \$5.00 and \$8.00.

<sup>138</sup> Mean WTP is \$7.88 and median is \$6.50. When one outlier is dropped, mean WTP is \$6.50 and median is \$5.00.

<sup>139</sup> For example, Kovalchik et al. (2005) employed the Plott and Zeiler (2005) procedures but did not provide a show up fee. They did not observe a valuation gap. Smith (2012) used Kahneman et al.’s (1990) procedures but added a show up fee. He observed a valuation gap. Perhaps the strongest evidence against the house money effect conjecture is from Bartling et al. (2015), described *infra*. They not only gave subjects a large show up fee, but they reminded subjects about the show up fee when presenting all choices. The house money effect conjecture surely predicts no valuation gap, but they observe one.

that the chosen round would determine payoffs.<sup>140</sup> The elicitation mechanism was explained using numerical examples, and subjects were told that it was in their best interests to report their true valuations as they made choices between the good (a voucher for a sandwich at a nearby shop<sup>141</sup>) and the various monetary amounts in the list. Subjects were told that credit would be available. The random market price was announced between each round. At the end of the experiment, subjects received \$5 for participating in the experiment and transactions were anonymously executed. As a test of misconceptions, the author tallied the number of subjects who reported correct valuations for the practice round induced-value tokens. Ninety-eight of 127 (77%) reported a \$3 valuation for both practice round tokens, which could be exchanged at the end of the experiment for \$3. Those who did not pass were dropped from the dataset.<sup>142</sup> The author observed valuation gaps in all four rounds using the voucher for the unfamiliar sandwich shop (WTA/WTP ratios between 1.27 and 1.40, all significant at the 99% confidence level) and smaller gaps in all four rounds using the voucher for the familiar sandwich shop (ratios between 1.12 and 1.23, two significant at the 90% level and two at the 95% level). What might explain the difference in results between this study and Plott and Zeiler (2005)? While the procedures used were similar, they were not the same.<sup>143</sup> For example, Landesberg did not walk subjects through the procedure Plott and Zeiler employed to help subjects understand the meaning of “true valuation” (buyers start low and increase until they reach an amount of money that makes them indifferent between the good and the money and sellers start high). In addition, Landesberg used the multiple price list method while Plott and Zeiler asked subjects to write down a valuation. The two studies also employed different goods. Given that the design is different from Plott and Zeiler’s in more than one way, it’s impossible to tie down what might be driving the divergent results. It’s important to note, however, that Landesberg’s instruction on the elicitation device might be responsible for reducing the gap from the usual ratio of 2 to 1 down to 1.4 to 1 at the highest.

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<sup>140</sup> It’s important to note here that the binding trial was not randomly determined. The experimenter chose a trial with a random price below \$5 because subjects were given \$5 for participating in the experiment and transactions would be easier (no credit was required for buyers). This sort of deception is strongly frowned upon in experimental economics. It’s not clear whether subjects detected the fraud during the experiment, but the paper clearly states that the author deceived the subjects.

<sup>141</sup> In one treatment, the voucher was for a familiar sandwich from a shop with average sandwich prices of \$4.50. In another treatment, the voucher was for a less familiar sandwich from a shop with average sandwich prices of \$6.50. Subjects were not told the average prices of sandwiches from the two shops.

<sup>142</sup> 79% of the dropped subjects were “endowment prone.” They either reported WTA higher than WTP, WTA above \$3 or WTP below \$3. Their valuations for the vouchers, however, did not differ much from those of subjects who passed the test, perhaps suggesting that both groups’ understanding was roughly the same by the time they started the non-hypothetical sandwich voucher rounds.

<sup>143</sup> Landesberg, in fact, claimed to have implemented a “more complete set of controls than did Plott and Zeiler (2005)” (p. 39), but this does not seem to be the case.

Georgantzis and Navarro-Martínez (2010) designed an experiment to shed light on the psychological basis for valuation gaps. They argued that their results cast “serious doubts on the claim that the gap might be just a consequence of inappropriate experimental practice.” They correlated subject attitudes and feelings about the good, measured using survey instruments, with reported valuations to test theories based on mere-ownership and loss aversion triggered by preference uncertainty. They designed the experiment to “replicate” the valuation gap “using a standard design, while avoiding misconceptions as much as possible” (p. 897). Subjects were divided into two groups, choosers and owners (as opposed to buyers and sellers), and they reported their valuations for a bottle of wine in those roles using the multiple price list format.<sup>144</sup> Two surveys were administered before owners were endowed with the wine bottle. The first was designed to measure attitudes related to “general liking, attitude towards having the good, attractiveness, [and] design and quality” (p. 897), and the second attempted to measure the level of familiarity with the good using the prompt: “under normal conditions, would you buy a bottle of wine like this one?” (p. 898). Owners were then endowed with a bottle of wine, and choosers were allowed to inspect one. Next, subjects completed a second attitude instrument to measure attitudes related to “appearance, attractiveness, quality, taste, refinement, and general liking” (p. 897), and another instrument designed to measure levels of positive and negative feelings (e.g., happy, pleased, good, excited, upset, uncomfortable, awkward, bad).<sup>145</sup> Attitudes towards risk were collected for a portion of the subjects one week prior to the experiment during sessions conducted to run an unrelated experiment.

The authors reported several findings: (1) owner valuations are higher than chooser valuations, (2) choosers and owners report similar attitudes about the good after owners are endowed, even when divided into groups with non-positive and positive attitudes prior to endowment, (3) sellers reported having higher levels of positive feelings post-endowment relative to choosers, positive feelings were correlated with reported valuations, and reports of negative feelings were the same across treatments, (4) neither familiarity nor attitudes towards risk were correlated with chooser valuations, but owners who reported that they would buy a bottle of wine like the endowed one under normal conditions reported lower valuations relative to owners who reported that they wouldn't buy such a bottle, and (5) owners reporting higher levels of risk aversion valued the good more highly than those with lower levels of risk aversion. From these findings, the authors concluded that: (1) subject misconceptions cannot explain the observed gap because they were controlled, (2) changes in attitudes related to the good do not cause gaps, (3) enhanced positive feelings caused by receiving and owning the endowed good

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<sup>144</sup> The working paper version of the study indicates that choosers chose between “I prefer the bottle” and “I prefer the money” for each possible price, and owners chose between “I keep the bottle” and “I exchange the bottle.”

<sup>145</sup> The authors did not estimate within-subject differences in attitudes before and after endowment, arguing that such comparisons are not meaningful because they are different instruments measuring different attitudes and might be plagued by contamination problems. They also measured personality traits, but they are not discussed here.

(mere ownership) contribute to observed gaps, and (4) loss aversion contributes to observed gaps in the presence of unfamiliarity and uncertainty (i.e., those who would not normally purchase the good are less familiar with it, and thus feel more uncertain about their preferences related to it, increasing the level of loss aversion one would experience if the good were exchanged for money). They argued that Plott and Zeiler's (2005) procedures, such as repeated practice rounds, undermine the "necessary psychological underpinnings" (p. 906) of valuation gaps that they uncover.

Whether these findings help us separate experiment design issues from mere ownership theory and uncertainty-driven loss aversion is unclear. First, although the authors argued that the design "avoids misconceptions as much as possible" (p. 897), it's possible that the observed gaps resulted from features of the design that Plott and Zeiler (2005) identified as potential drivers of gaps. For example, subjects were not told that their choices would be anonymous,<sup>146</sup> and, perhaps more importantly, subjects were not trained on the elicitation device. As Plott and Zeiler (2005) emphasized, although the multiple price list format seems quite simple, subjects might not fully grasp the idea that they are best off when they report their true preferences. In addition, even though subjects are not labeled as buyers and sellers, for owners who misconceive how their price-by-price choices will map into outcomes as a function of some randomly generated price, the choices of "keep" or "exchange" might be sufficient to trigger basic seller-type instincts to choose to exchange only at the higher prices in the list. Thus, we cannot rule out misconceptions, at least as Plott and Zeiler (2005) conceptualize them, as drivers of the observed gap.

While the authors argued that their results cast serious doubt on Plott and Zeiler's misconceptions conjecture, it might be consistent with them. Features Plott and Zeiler included in the design to eliminate misconceptions and other influences are not present here; thus, misconceptions about how choices map into outcomes might have triggered basic instincts of the owners, now in a position to exchange their good for money, to exchange at a high price. What do we make, then, about differences in emotions between owners and choosers and the correlations between risk aversion and owner valuations and between familiarity and owner valuations? It's entirely possible that owners report more positive feelings than choosers simply because they just received a good. Those positive feelings, however, might be unrelated to valuation gaps if subjects turn their attention to uncertainty about the elicitation device once the experimenter asks them to choose between the good and various amounts of money. Also, lack of familiarity with the good and higher levels of risk aversion might feed into subject reactions to the unfamiliar elicitation device. Both might compel owners toward basic instincts when they face the unfamiliar device. Choosers don't have basic instincts to fall back on. Alternatively owners might worry that when the experimenters observe their non-anonymous choices, they might perceive low-value owners in some negative way—as soft bargainers or as

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<sup>146</sup> Subject instructions are not included in the published version of the paper, but they do appear in a working paper version (on file with author). Note, however, that Brown and Cohen (2015) reported evidence suggesting that anonymity does not impact the results.

individuals who lack gratitude for “gifts,” etc. The lack of anonymity makes it impossible to rule out these sorts of owner reactions.

Second, the authors’ explanation of Plott and Zeiler’s results is problematic. They argued that “[t]he fact that the gap can be eliminated shows just that the necessary psychological underpinnings for it to appear can be undermined through experimental procedures (like, for example, repeated practice rounds that may lead subjects to perceive the good as something they trade).” Although an interesting research question, the claim is mere conjecture given their results do not provide evidence to support it. Something they did not note is that Plott and Zeiler’s subjects did not trade mugs until the final round used to measure gaps. Lotteries were used in the repeated practice rounds. It’s less likely that trading lotteries in the practice rounds led subjects to perceive mugs as something they trade. If this were true, however, then we might predict no gaps in the field where people transact regularly, although perhaps they don’t sell sufficiently regularly to consider goods as objects of trade. It’s an open question. In any event, Plott and Zeiler observed no gap even when subjects did not participate in the repeated binding practice rounds, so practice rounds can be ruled out as a potential underminer. What’s left then? It is possible that other procedures might do the undermining. Referring to subjects as buyers and sellers or training on the elicitation device might somehow do the work. We can’t be sure without evidence. To test this, the authors might have incorporated these features into their design in a second experiment to examine whether reported emotions and other psychological underpinnings are different in the presence and absence of the relevant features.

Koh and Wong (2013) suggested an alternative interpretation of Plott and Zeiler’s (2005) results. They suggested that certain procedures might have caused the gap to disappear due to the reduced salience of gains and losses. They listed specific procedures that lead to this concern: buyers and sellers both possessed the good at the time of valuation, the experiment did not frame transacting in terms of gains and losses, and owners and non-owners received both buying and selling instructions. More specifically, the authors wondered whether these procedures might have weakened the reference state so that subjects treated their endowment status as irrelevant. In addition, they hypothesized that training procedures that presented yes/no questions related to plausible mug values employed to train subjects on how to find their true valuations might have caused subjects to anchor on those values. Plott and Zeiler’s verbal training procedure ended with an example of \$6.50 as a valuation for an owner and \$5.25 as a valuation for a non-owner. Koh and Wong wondered whether subjects might have anchored on one of these values depending on their roles as potential seller or potential buyer. In a treatment intended to replicate Plott and Zeiler’s (2005) treatment 2 (anonymity, training, two hypothetical practice rounds but no binding experience), the authors found mixed results.<sup>147</sup> In a second treatment, only sellers possessed the mugs. Buyers were allowed to

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<sup>147</sup> The result from a Wilcoxon-Mann-Whitney rank sum test on a sample pooled across four different sessions supports the claim that a valuation gaps exists (at the 95% confidence level), but the result from a median test cannot reject the null hypothesis of no difference between WTA and WTP. One unemphasized difference between Plott and

inspect but did not possess at the time of valuation. Sellers were told “the mug you are inspecting is yours to take home with you at the end of the experiment, if you decide to keep it later.” The instructions were edited to change “the item” and “the mug” to “my mug” and “your mug” for owners. Owners received only the owner instructions and non-owners only the non-owner instructions. Finally, the training procedure was altered so that the example ended with \$650 as a valuation for an owner and \$525 as a valuation for a non-owner, and subjects were told that these were hypothetical examples. The authors observed a valuation gap in this treatment. They ran a third treatment to determine whether the results from their second treatment would change if the Plott and Zeiler examples were used rather than the examples using implausible mug valuations. The result did not change—a valuation gap was observed. The authors interpreted these findings as evidence that Plott and Zeiler’s procedures weaken the subjects’ reference states and that the weakened reference states caused the gap to disappear. An alternative interpretation based on Plott and Zeiler’s 2007 study is that the change in procedures generated enhancement effects. For example, subjects in the owner-only sessions who were repeatedly told that the mug was theirs might have perceived the mug as a gift from the experimenter and perceived the repeated emphasis on “yours” and “mine” as signals of value. Koh and Wong’s results, however, stand as some evidence against Plott and Zeiler’s misconceptions conjecture.

Evident from the descriptions included in this chapter, experimenters commonly employ the theoretically demand-revealing BDM mechanism to elicit valuations.<sup>148</sup> Although Plott and Zeiler’s (2005) results suggest that training on the mechanism might be required to control subject misconceptions over how their reported valuations map into outcomes, training has not caught on. Some have argued that training somehow changes subjects’ reference points (e.g., Köszegi and Rabin 2006) or that elaborate training procedures train subjects to do what the experimenters want them to do (assess true values) when they would not do so in the field (e.g., Kahneman 2011). To further investigate potential misconceptions related to the BDM mechanism, Cason and Plott (2014) designed an experiment to elicit valuations for cards worth \$2 if owned at the end of the experiment. Given that all theories predict that subjects will value the cards at \$2, the authors used reported valuations that deviated from \$2 to test theories related to subject misconceptions about how their choices map into outcomes. They found that with basic

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Zeiler and Koh and Wong’s attempted replication is the payment of the show up fee. Plott and Zeiler paid \$5 to subjects upon arrival. Koh and Wong “eventually paid [a] \$5” show up fee. It’s possible they paid the fee at the end of the experiment rather than the beginning. If so, this might be evidence of a house money effect in Plott and Zeiler’s treatment 2 no-gap result. See the text accompanying footnote 137 for a more detailed discussion of this conjecture.

<sup>148</sup> But see Loomes et al. (2010) (“A guiding principle for the design, widely accepted among stated preference researchers, is that individuals cope more easily with conditional questions requiring yes/no responses (‘If the price was x, would you buy?’) than with unconditional open-ended questions using maximum or minimum concepts (‘What is the highest price you would pay?’)”) (p. 380). They did not provide support for the claim of wide acceptance.

instructions and no training or feedback, only 17% of subjects reported values of \$2. After outcomes were determined using the BDM mechanism, subjects participated in an identical second round. Following one round of feedback, 31% of subjects reported values of \$2. Those who initially chose \$2 tended to stay with \$2 in the second round, but those who made a sub-optimal choice in the first round tended to choose a different value in the second round. Subjects who made costly mistakes in the first round were more likely to value the card at \$2 relative to those who made inconsequential mistakes.<sup>149</sup> They demonstrated that simple interpretations might lead to conclusions that the data support theories grounded in framing (such as endowment theory with reference points set by either endowments or expectations), but more sophisticated analyses suggest that theories that assume “game form misconceptions” fit the data better. Specifically, the data suggested that a substantial portion of subjects “believe that the payment mechanism is similar to a first-price procurement auction in which the lowest offer wins and is paid the offer price” (p. 1257). The basic conclusion is that unless misconceptions are controlled, it’s difficult to determine whether game form misconceptions or framing theories (or other sorts of theories) explain observed phenomena. In addition, if testing a theory or set of theories requires the elicitation of non-strategic (or true) valuations, the presence of game form misconceptions will make testing those theories impossible.

In line with the insights of Cason and Plott (2014), Loomes et al. (2010) tested whether market discipline shrinks observed valuation gaps. They designed an experiment to investigate how feedback generated by the market impacts reported valuations. If market discipline works to encourage the reporting of true valuations and individuals are not loss averse, gaps should decrease in magnitude and eventually disappear as the market institution administers discipline. Specifically, the market discipline hypothesis predicts that negative experiences triggered by non-optimal choices that are punished by the market will encourage optimal choices—in this context the reporting of true valuations—in subsequent rounds. The authors employed a median-price auction, which is demand revealing but does not systematically bias bids and asks.<sup>150</sup> After explaining the auction procedures, subjects participated in two hypothetical practice rounds for induced-value vouchers (i.e., tickets with certain value that can be exchanged for cash at the end of the experiment). Next subjects took part in two binding practice rounds, one as owner and one as non-owner. Subjects were then trained on the special features of the auctions for lottery tickets, and two hypothetical practice rounds were conducted using lottery tickets

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<sup>149</sup> For example, if a subject reported a valuation of \$3 and the random offer was \$4, the subject would receive \$4, the same amount he would have received had he reported \$2 as his valuation. He loses only if the random offer falls between \$2 and his higher reported valuation. In that case, he would keep the card and receive \$2 rather than the higher random offer.

<sup>150</sup> Second-price auctions, the authors pointed out, might encourage owners to increase (and non-owners to decrease) reported valuations across rounds. This is due to the fact that the announced market clearing price in owner (non-owner) auctions likely will be higher (lower) than the average valuation, and the announced prices might give rise to “shaping effects”—a tendency for subjects with uncertain valuations to shift their reported valuations toward the announced market clearing price.



(e.g., a 19% chance of winning X and an 81% chance of winning Y). Following the practice rounds, eight lottery rounds were conducted, two of which collected measures of WTP and WTA used to estimate the valuation gap. Subjects reported their valuations by answering a series of yes/no questions (e.g., would you pay X to get a lottery ticket?) ordered to narrow down to true valuations. After each round the market price was announced for that round, and subjects were informed about their outcomes. Each auction was repeated six times. One round of one auction was chosen at random at the end of the experiment, and payments were made based on the outcome of the chosen auction round. Valuation gap magnitudes decreased over the rounds but did not completely disappear. The authors interpreted this result as support for the market discipline hypothesis.

Lunn and Lunn (2014) proposed a “computational theory of exchange” in line with, but more precise than, Plott and Zeiler’s (2005) notion of reliance on basic instincts: sell high and buy low. Specifically, they assumed that individuals, when responding to elicitation of valuations in unfamiliar settings, “behave as if they are at the start of a potential sequence of trading opportunities, when in fact they are in a one-shot market that will clear at a single price” (p. 5). The basic idea is that “agents will simply extend a logic that they use successfully outside the laboratory to a one-shot experiment where, effectively, it backfires” (p. 5). The model predicts that WTA will exceed WTP because owners, aiming to maximize their surplus, will ask for an amount that exceeds their true value and that depends on their beliefs about what others are willing to pay, and non-owners, also aiming to maximize their surplus, will offer an amount that is lower than their true value and depends on their beliefs about what current owners are willing to accept. Owners and non-owners both assume that they will get a chance to make another offer if the first is rejected and another if the second is rejected, and so on, even if the rules of the auction do not allow for this. The model also predicts that, if an individual is choosing between the good and cash, he will report his true valuation or certainty equivalent (CE). The prediction that separates this theory from others is the relationship between CE and reported valuations of owners and non-owners. The model predicts as one’s CE increases, the ratio between WTA and CE should approach 1 from above, and the ratio between WTP and CE should approach 1 from below. The authors derived predictions about the relationships between CE, WTA and WTP for five alternative theories, all of which differ from the predictions from their theory. The authors used data from previously published studies to test their theory against the others. Data gathered by multiple experimenters supported the model and did not support predictions of the alternative theories. The authors argued that the theory is consistent with self-reports of how subjects set WTA and WTP, the observed correlation between willingness to exchange and perceptions of what others will pay or accept, subject perceptions of market prices, subject responses to feedback on what others pay or accept, and associations between the likelihood of future exchange and reluctance to trade. They claimed that the model might also provide insights into the findings of both Plott and Zeiler (2005) and List (2003), but they did not elaborate.

Finally, Bartling et al. (2015), building on Cason and Plott (2014), studied whether misconceptions about the elicitation device are necessary to produce valuation gaps. Bartling et al.’s aim was to implement procedures to control misconceptions in

experiments that asked subjects to value induced-value cards and to determine whether such controls eliminate valuation gaps. In each session, subjects were randomly assigned to be either all buyers or all sellers and were told they would get a show up fee of 25 CHF. The multiple price list method was used to elicit valuations for an induced-value card that could be exchanged at the end of the experiment for 8.50 CHF. Both buyers and sellers received a card. Buyers were told that they could purchase it; sellers were told that the card was theirs and that they owned it but that they could sell it to the experimenter. The multiple price list was different from the usual list. In each row, the list informed subjects of the outcome of each choice. For example, the buyers' list contained two rows not included in the usual list: one labeled "Final payoff (25 CHF – price + value of card)" and the other labeled "Final Payoff (25 CHF)." The cells in these two columns revealed the total payout that would result for each option in that row. For example, in the row asking whether the subject would be willing to purchase the card for 1 CHF, the subject was informed that he would gain 32.50 CHF if he bought at that price and 25 CHF if he did not. Subjects were constrained to a single switching point. After subjects made choices in each row, they were required to report the final payoff for each choice. The list, including columns with final payoffs for each choice, was in front of them during this exercise. Each subject was allowed to alter choices in this phase. If the subject entered all payoffs correctly, he earned 2 CHF. If mistakes were made, the subject was asked to try again. The subject could continue only when all answers were correct. Subjects then conducted the same exercise with one alteration—the induced-value card was replaced with a box of chocolates.<sup>151</sup> As in the first part, the outcome of each choice was presented to the subjects. For example, in the row asking whether the subject would be willing to purchase the box for 1 CHF, the subject was informed that he would gain "24 CHF + chocolate" if he bought at that price and 25 CHF if he did not. As in the first part, subjects were required to report how much money they would receive for each option and whether they would get the chocolate. Changes were possible during this phase, subjects were paid for correct answers on the first attempt, and they could move on only if all answers were correct.<sup>152</sup> Given that the outcomes from each choice were presented to the subjects, Bartling et al. unsurprisingly observed a higher rate of optimal choices in the induced-value card exercise than did Cason and Plott (71% v. 17%). Eighty-one percent of subjects correctly reported the outcome for each choice in the first attempt. Bartling et al. then split the subjects into two groups based on their performance in the first part. A subject was categorized as "sophisticated" if she both valued the card correctly and correctly identified outcomes across all potential prices in the first attempt in both parts. The main result was that a statistically significant valuation gap for the box of chocolates was observed when including only subjects classified as sophisticated. The authors interpreted the results as evidence that gaps can persist even in the presence of evidence of a lack of misconceptions. Unfortunately, they did not go one step further to give the reader a sense of which theories might best explain the observed gap.

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<sup>151</sup> The boxes were purchased from a local, well-known shop at a retail price of 17 CHF. Subjects were not informed of the price.

<sup>152</sup> The authors used audio recordings to instruct the subjects and posted the recordings on line for easy access. This potentially allows for better replicability relative to having the conductor of the experiment read the instructions aloud.

## 6.7. Gaps in Lottery Valuations: Loss Aversion, Question-Influenced Beliefs, Focus Bias, or Gambling Wealth?

Several researchers have studied reluctance to trade lottery tickets. While endowment theory, which assumes a riskless environment and a market for a certain good (e.g., mugs, pens and chocolates), makes no predictions about disparities in lottery valuations, Kahneman and Tversky's (1979) prospect theory does. The nature of lotteries gives rise to a number of alternative theories as well. This section begins with a debate involving valuations of lotteries by subjects in Plott and Zeiler's (2005) practice rounds. Following that, a quick overview of more general studies of lotteries and the theories developed to explain reluctance to trade lotteries is provided.

Isoni et al. (2011) questioned the generalizability of Plott and Zeiler's (2005) misconceptions conjecture by pointing to the fact that valuation gaps remain in Plott and Zeiler's 14 practice rounds using lottery tickets. The authors posed the question: if procedures are in place to mitigate misconceptions, what explains observed gaps in the lottery rounds? Plott and Zeiler's design was replicated in some aspects, but not all, although the differences arguably are irrelevant given the results were similar in all relevant aspects to Plott and Zeiler's results. Isoni et al. observed gaps for four out of five lotteries. Using Plott and Zeiler's data, they also reported gaps in all their lottery rounds. They concluded that it is "not credible to propose that misconceptions about a common set of elicitation procedures persist... and then suddenly disappear when the mug task is faced." The authors offered some conjectures to explain the mug results—that design features might have "reduced the salience of the distinction between buying and selling tasks," that placement of mugs in front of both buyers and sellers might have affected subjects' reference points (presumably the implication is that buyers' reference points were impacted by possession in the absence of ownership), that training and practice somehow weaken an individual's perception of "not trading" as a reference point (although this is less likely in Plott and Zeiler's treatment 2, where subjects report mug valuations before the 14 paid lottery rounds), that the no-gap mug result was driven by house money effects triggered by the payment of a show-up fee,<sup>153</sup> and that the differing nature of the goods (mugs v. lotteries) explains the disparity in results.

Plott and Zeiler (2011) provided a more nuanced analysis of the lottery data both from Plott and Zeiler (2005) and Isoni et al. (2011), which demonstrates that the data did not support endowment theory, despite the presence of a gap and Isoni et al.'s claim that they controlled for "all sources of contamination." The problems seem to stem from issues listed in Plott and Zeiler (2005; footnote 15) including subjects' perceptions of the nature of randomization and the concept of probability. First, in the four lottery rounds using degenerate lotteries with certain outcomes (e.g., 50% chance of 20 cents and 50% chance of 20 cents), an average of 23% of Isoni et al.'s subjects reported strictly dominated valuations. Interestingly only 3% of Plott and Zeiler's subjects on average did the same. The difference in procedures used during the training rounds might explain the disparate

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<sup>153</sup> See text accompanying footnote 137.

results. In addition, 13% of Isoni et al.'s subjects and 8% of Plott and Zeiler's subjects reported valuations at or outside the range of possible outcomes in the large stakes lottery rounds with non-negative outcomes. Perhaps more telling, subjects were more likely to ask at or above the upper bound as sellers, and bid at or below the lower bound as buyers. When these subjects are removed from the dataset, gaps disappear for two of the 10 examined lotteries (using 90% confidence as the cutoff), and the magnitude of the gap diminishes substantially for the others. These results suggest potential asymmetric beliefs about the outcomes of the lotteries that are tied to buyer/seller roles. Plott and Zeiler (2011) referred to this as a "question-influenced beliefs conjecture," and it stands as an alternative explanation for lottery gaps.<sup>154</sup> In fact, given the evidence that subjects might perceive the same lottery as two different items (with two different likely outcomes), lotteries might be ill-suited for testing endowment theory, which assumes that buyers and sellers value the *same good* differently given loss aversion. Even if we start with the assumption that the goods are the same in the eyes of buyers and sellers, the question-influenced beliefs conjecture stands as an alternative to endowment theory, and the employed designs cannot separate them. Plott and Zeiler (2010) laid out a potential roadmap for applying revealed theory methodology to control for lottery misconceptions using controls adopted in the literature involving lottery valuation elicitation. Finally, Plott and Zeiler (2011) called into question Isoni et al.'s alternative explanations for the no-gap results in Plott and Zeiler's (2005) and Isoni et al.'s (2011) mug rounds. In the end this conversation raises more questions than it resolves: what exactly causes gaps in lottery rounds?, how can we control for misconceptions related to the nature of randomness?, how might show-up fees impact buyer valuations?, how might possession impact buyer valuations?, how might training and practice related to the elicitation device impact one's reference point? While some research exists on many of these questions (and is discussed throughout this chapter), more work is required to better understand these various influences.

Rather than implementing Plott and Zeiler's revealed theory methodology to control for lottery misconceptions, Fehr et al. (2015) took a different approach to test Plott and Zeiler's misconceptions conjecture. They used procedures similar to Plott and Zeiler's (2005) treatments with binding experience (i.e., the lottery rounds) to elicit valuations for lotteries and commodities (mugs and USB sticks). Subjects were trained on both the BDM procedure and on how to locate their true valuations, and they participated in two practice rounds during which they were allowed to ask questions in private (as opposed to publically in Plott and Zeiler). Also, unlike in Plott and Zeiler, choices and payouts were not anonymous.<sup>155</sup> Akin to Bartling et al. (2015), they then used reported lottery

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<sup>154</sup> Given the experiment design, it is impossible, of course, to separate the impact of question-influenced beliefs on valuations within the bounds from the impact of loss aversion or other forces. It's reasonable, though, to believe that question-influenced beliefs play at least some role in gaps for subjects who did not bid at or outside the lottery bounds. Plott and Zeiler (2011) also reported evidence rejecting endowment theory's assumption of stable risk preferences.

<sup>155</sup> Recall, however, that Brown and Cohen (2015) reported findings suggesting that results are similar under anonymous and non-anonymous conditions.

valuations to categorize subjects as either “rational” or “irrational.” For example, they categorized a subject as “rational” if he reported valuations that were either on or inside the lottery bounds for all lotteries. Of the 95 subjects who reported valuations for a mug in the final round, 42 (44%) fit the bill. Using only the mug valuations of these subjects, a valuation gap was observed. The authors interpreted this as evidence against the misconceptions theory. Using other definitions of “rational,” they found similar results. The second major finding was that, unlike Plott and Zeiler (2005) and Isoni et al. (2011), they observed gaps in valuations of both mugs and USB sticks. Thus, the main result of the two previous studies was not replicated. These results potentially called into question the stability of the no-gap result under the Plott and Zeiler (2005) procedures, but were inconsistent with numerous replications of the no-gap result (see, e.g., Kovalchik et al. 2005; Roth 2005; Isoni et al. 2011; Kingsley and Brown 2012; Brown and Cohen 2015).

Others have studied gaps in lottery valuations, and the results support a number of theories. Some have gone back to basics to study the impacts of income effects. Schmidt and Traub (2009) designed an experiment to study within-subject gaps in lotteries and whether income effects cause observed gaps in lottery valuations. They controlled income effects by endowing buyers with an amount of money equal to the highest possible outcome of the lottery endowed to sellers. In addition, in most rounds all buyers and sellers started from and ended in a risky position, which controlled any influences of movements from risky to non-risky positions and vice versa. They concluded that income effects cannot account for gaps in lottery valuations, but that the experiment design might. In particular, their data suggest that lottery valuation gaps might be driven by disparities in starting and ending risk positions across buyers and sellers and by between-subject gap measurement. Interestingly, just as reported by Plott and Zeiler (2011), some of Schmidt and Traub’s subjects reported valuations above the largest possible outcome and below the smallest possible outcome. These data suggest a possible misunderstanding of the nature of lotteries, an issue in need of further study.

Others explored whether gaps are robust to the size of the stakes. Blavatsky and Pogrebna (2010) cleverly employed data compiled from the television show Deal or No Deal, where contestants are given sealed boxes containing some unknown amount of money picked from a known distribution of possible monetary prizes ranging from one cent to half a million euros and asked whether they wish to exchange it for another sealed box containing a different unknown amount of money picked from the same known distribution. Their results suggest that when individuals choose in high stakes environments, exchange asymmetries are substantially reduced.

Others have tested psychological theories related to risk perception. Peters et al. (2003) tested a theory related to affect, which assumes that, when valuing lottery tickets, owners focus on the best possible outcome and have negative affect toward giving up the chance to win that amount. Non-owners, on the other hand, focus on the amount of money they must give up to obtain the ticket and on the likelihood of ending up with the worst

possible outcome.<sup>156</sup> The authors elicited valuations for lotteries with two possible non-negative monetary outcomes (e.g., a 5% chance of winning \$100 and a 95% of winning nothing). Subjects reported their feelings toward the lottery—sellers were asked to report how they would feel about not having the ticket, and buyers were asked how they would feel about having the ticket—and then each subject reported valuations as both buyer and seller, half as seller first and half as buyer first. The BDM mechanism was used to encourage subjects to report non-strategic valuations, and subjects were trained on how the mechanism works. The theory predicts higher valuations for potential sellers. The authors observed a valuation gap and report other evidence supporting their posited role of affect. The authors acknowledged the possibility that the form of the questions about affect might have caused the gap, but they downplayed it given the gap’s robustness in the literature to date. What we have learned about procedures since then, however, suggests that getting subjects to focus on affect before reporting valuations likely impacts their valuations. Whether gaps exist outside the lab when individuals are not prompted to focus on affect is unclear.

Finally, in a new addition to the ever-growing stack of theoretical explanations, Lewandowski (2014) challenged the predictive value of the basic tenant of consequentialism that assumes that individuals make choices conditional on their total wealth. In most experiments, subjects are asked to report valuations for lotteries with small values relative to total wealth. Under expected utility theory and certain assumptions about relative risk aversion, individuals are assumed to be risk neutral when it comes to small-value lotteries. Thus, standard expected utility predicts no gap in small-value lottery valuations. Lewandowski strayed from the standard model only by assuming that individuals do not consider their total wealth but rather the amount of wealth with which they are willing to gamble (aka “gambling wealth”). Similarly, Fudenberg and Levine (2006) developed a dynamic model in which the long-term self controls short-term selves. The long-term self allows the current short-term self to take only a small amount of money (aka “pocket cash”) to places that entice with discretionary spending opportunities (e.g., the casino or the nightclub). This sort of model assumes that short-term selves make choices that are optimal given a small amount of wealth. Lewandowski’s expected utility theory with gambling wealth predicted gaps in lotteries, but he did not attempt to determine whether his theory explains the variation in reported results. This would seem to require a set of hypotheses about how experimental

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<sup>156</sup> This research builds on an earlier study by Einhorn and Hogarth (1985). They posited that owners and non-owners of insurance would pay different amounts of attention to possible losses when considering whether to sell or buy insurance, which drives owner valuations higher than non-owner valuations. The authors found a predicted gap between valuations of buyers and sellers of (hypothetical) insurance. Others have posited different models of lottery value construction. For example, Johnson and Busemeyer (2005) developed the Sequential Value Matching model, which assumes that sellers start with a high price and then insufficiently adjust downwards to reach their indifference point, whereas buyers start with a low price and insufficiently adjust upwards on the way towards their indifference point.

procedures impact perceptions about wealth or a method for estimating beliefs over wealth.

### **6.8. Transaction Disutility, Bad Deal Aversion and Regret Avoidance**

As another alternative to endowment theory, some have posited that owners ask for amounts in excess of their consumption values not to compensate for disutility from experienced losses but to avoid regret. Bar-Hillel and Neter (1996) found that subjects were reluctant to trade an endowed lottery ticket for an alternative identical ticket plus a small monetary incentive. Conversely, over 90% of subjects were willing to trade an endowed pen for an identical pen plus a small cash bonus. They interpreted the evidence as support for the claim that “two lottery tickets, even if they are identical as gambles, have the potential to have different worth once the gambles are played and the uncertainty resolved....[T]he mere fact that two lottery tickets have the potential to result in different outcomes, and in particular, one can result in a desired outcome while the other results in a less desired outcome, suffices to induce an anticipation of regret (which is assumed to be larger for an exchange than for its refusal)” (p. 26).

Van de Ven and Zeelenberg (2011) also found that subjects were reluctant to exchange a lottery ticket for an identical lottery ticket even when they could receive a free pen if they exchanged. When they removed anticipation of regret by making it impossible for subjects to know whether they would have won the lottery had they kept the initial endowment, reluctance to trade was reduced, suggesting that anticipated regret accounts for observed reluctance to trade lotteries, at least in part. In another treatment, subjects were given information that would allow them to know whether they would have won the lottery had they traded. In addition, those who traded would know whether they would have won had they not traded. In this symmetric information treatment, 77% of subjects traded, and that percentage exceeded the percentage who traded in a baseline treatment where only traders would know whether they would have won had they not traded.

Note that these sorts of designs make it difficult to rule out loss aversion as an explanation for gaps given that subjects were paid to trade. It could be that the payment to trade is sufficient to compensate for the disutility from the loss. Kogler et al. (2013) addressed this by designing an experiment to keep the costs of trading and not trading the same. In one experiment, half the subjects were given a lottery ticket and the other half were allowed to inspect one. They were then given the choice of keeping the owned or inspected ticket or getting another identical ticket with the same chance of winning. Both tickets were in possession at the time of choice. Subjects did not receive a bonus for trading, and transactions costs, possession and information were identical across treatments. Half of the non-owners kept the inspected ticket, but the vast majority of owners held on to the endowed ticket. After choices were made, valuations for the chosen ticket relative to the other ticket were elicited. Subjects were asked to state the least amount they would accept to give up the ticket they now owned in exchange for the other ticket. Endowment theory predicts similar valuations for the two groups, but the average valuation of initial owners was higher than the average valuation of initial inspectors. This result is not predicted by endowment theory, but it might be in line with regret

theory. Bar-Hillel and Neter (1996) found evidence of higher levels of regret for previously owned tickets that were given away and turned out to be winners relative to a ticket that was not chosen from a choice set. Thus, feelings of regret depend on both the outcome and on the action taken. When subjects were asked to report anticipated feelings of regret based on hypothetical situations, the highest levels of regret were recorded for switching possessors relative to non-switching possessors and inspectors who either switched or did not. When the experimenters ran the same design with mugs instead of lottery tickets, subjects who were endowed with a mug were reluctant to switch for an identical mug, whereas statistically half of inspectors chose the inspected mug. Reported valuations of owned mugs did not differ between initial owners and initial inspectors. The authors concluded that both endowment theory and regret theory have roles to play depending on whether subjects are evaluating riskless or risky goods.

Isoni (2011) proposed a model that assumes reference-independent valuations for consumption goods. Her model generated valuation gaps instead by assuming price sensitivity and bad-deal aversion. Individuals were characterized by price sensitivity if they got utility from making good deals and suffered disutility from being “ripped off.” Bad-deal aversion is the notion that the pain associated with bad deals outweighs the pleasure derived from same-sized good deals. Isoni defined good and bad deals relative to the expected price, potentially justified by the fact that individuals normally consider a posted price when deciding whether to trade. In environments in which the price is unknown, individuals form expectations about the price, and they experience utility or disutility depending on how the expected price compares with the actual price. Thus, owners will report valuations in excess of their true valuations to avoid selling at a price below the expected price, and non-owners will report valuations below their true valuations to avoid buying at a price above the expected price. The model predicts not only gaps in WTA and WTP but also decaying gaps in repeated markets, shaping effects (i.e., the tendency for reported valuations to move in the direction of announced market clearing prices in repeated markets), and variations in reported valuations elicited using different versions of demand-revealing elicitation devices. Her analysis of the data and the leading theories concludes that bad-deal aversion might be best at organizing the data existing at the time. As she noted, however, it cannot account for exchange asymmetries in simple exchange experiments such as Knetsch (1989). In those experiments, the price (i.e., the alternative good) was known at the time of the choice.

Weaver and Frederick (2012) reported evidence of bad-deal aversion, which they referred to as “transaction disutility.” Half of the endowed owners of boxes of candy were told that the market price of the candy at a local movie theatre was \$4, and the other half were told that a retail store sells the candy for \$1.49 per box (both true statements). Non-owners were split into two groups, and they reported valuations under the same two conditions as owners. The BDM mechanism was used to elicit valuations (price lists were not provided to avoid introduction of alternative reference prices). Under endowment theory, revealed market prices should not impact reported valuations. Bad deal avoidance, on the other hand, predicts that moderate market reference prices will decrease reported owner valuations, reducing or eliminating valuation gaps. The results supported bad deal avoidance. A gap was observed in the high reference price treatment,



but not in the moderate reference price treatment. Owner valuations were significantly lower in the moderate revealed market price treatment relative to the high revealed market price treatment, but non-owner valuations were not significantly different across treatments. The authors ran a second experiment using mechanical pencils with different prices on affixed tags with similar results (i.e., WTA exceeded WTP in the high market price condition but not in the moderate market price condition and the increased market price pushed owner valuations higher but not non-owner valuations). A separate experiment confirmed that non-owner valuations respond to a change in the market price from moderate to low but not moderate to high. They acknowledged that their theory could not account for all results reported in the literature, and thus they argued that their theory should supplement rather than supplant other theories that have found support in the literature.

Evidence for regret theory has been found in simple exchange experiments as well. Ratan (2014) conducted simple exchange experiments and gave subjects 24 hours to reverse the decision made in the lab. Subjects performed a simple task to earn a good (a drink bottle or bookmark—randomly assigned across subjects). Endowment through earning was meant to ensure feelings of endowment without using language to emphasize ownership to avoid signaling relative value (see Plott and Zeiler 2007). They completed a questionnaire and then were supplied with the alternative good for inspection. Subjects were informed of the store prices, the same for both goods, to remove any question about relative values. Choices were made privately and while subjects were in possession of both goods. Two treatments were conducted. In the first, decisions made in the lab were final. In the second, subjects were told that they could reverse their decision during the next 24 hours. Subjects who could not reverse their decision exhibited reluctance to trade while those who could did not. Neither endowment theory nor expectation theory can explain this result. Anticipated regret theory, however, is consistent with the result. The ability to reverse the decision protects subjects against choosers' remorse.

Arlen and Tontrup (2015) designed a set of experiments to test the assumption that anticipated regret impacts choices only when the individual feels solely responsible for the choice.<sup>157</sup> If responsibility is shared, for example with an agent or a set of fellow

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<sup>157</sup> Arlen and Tontrup seemed to assume throughout most of the article that anticipated regret explains gaps generally, although, as is obvious from this review, the theory is inconsistent with a number of reported results. For example, the theory cannot explain no-gap results in experiments that use commodities such as mugs and pens and that do not take steps to eliminate subject uncertainty over value. They did acknowledge near the end of the paper that in some cases reluctance to trade might be caused by “loss aversion caused by attachment to entitlements” (p. 176). This seems problematic for a couple reasons. First, attachment is posited in the literature generally as an alternative to endowment theory (reference dependent preferences plus loss aversion) and not as a cause of loss aversion (one of the assumptions of endowment theory). In fact, Tversky and Kahneman (1991), who the authors cite, did not mention the notion of attachment in their development of endowment theory. Second, the authors' results did not support

voters, then anticipated regret should influence choices less strongly, and we should observe less reluctance to trade. In a base treatment, subjects were endowed with a lottery ticket and asked whether they wanted to trade the ticket for an identical ticket plus a small monetary bonus. In line with previous results, a statistically significant positive percentage of subjects rejected the trade. The result did not change when subjects were told that another subject's agent recommended trading. A statistically significantly higher percentage of subjects (relative to the base treatment) traded when told that an actual agent was paid to recommend trading, and, in fact, recommended trading (69% v. 30% in the lab; 78% v. 56% in treatments conducted online). This supports anticipated regret theory's prediction related to sole v. shared decision responsibility. In addition, relative to the base treatment, a statistically significantly higher percentage of subjects (79%) voted to trade when told that the outcome of a majority vote of at least 80 subjects would determine each subject's outcome. A similar result was observed when subjects were told the same, but also that they could veto the vote outcome and decide on their outcomes individually. In the veto-vote treatment, 85% of subjects voted to trade and only 11% of subjects vetoed the group decision and kept their endowed ticket. In other treatments, the authors found evidence suggesting that individuals are willing to pay to shed sole responsibility for the decision. The authors argued that their results posed a serious challenge to the common assumption that legal intervention is required to alleviate inefficiencies that arise from reluctance to trade. They argued that individuals often use responsibility-shifting institutions to avoid anticipated regret and that efficient outcomes are more likely to result from allowing private orderings relative to interventions that are ill-equipped to sort people by preferences that we cannot observe.

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In summary, this section highlights the substantial number of theoretical explanations for gaps that have been developed and tested including endowment theory, substitution theory, expectation theory, preference uncertainty, mere-ownership theory, query theory, enhancement theory, choice uncertainty, trade uncertainty, subject (game form) misconceptions and reversion to basic market instincts, the computational theory of exchange, the question-influenced beliefs conjecture, the gambling wealth conjecture, transaction disutility, bad deal aversion and regret avoidance. The literature is also filled with evidence related to experiment design features that might impact reluctance to trade such as endowing sellers with the good but not buyers with cash (income effects), endowing buyers with cash (house money effects), announcements of market clearing prices, non-anonymous choices that offer signaling opportunities, length of ownership, possession and many more.

## **6.9. Synthesis and the Frontier**

What general conclusions can we draw from the body of published evidence? Most importantly for legal scholarship, it's safe to conclude that, even though endowment

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endowment theory, and the literature has moved away from it in the face of mounting evidence against it.

theory continues to be cited as the leading explanation of observed reluctance to trade (Klass and Zeiler 2013), the theory has not held up well to the growing body of published data. The social sciences literature essentially has abandoned it. This is not to say that loss aversion and reference dependence have no possible role to play. While much evidence rejects the claim that endowments set reference points, theorists have shifted the theory's assumptions to suggest, for example, that expectations set reference points (Kőszegi and Rabin 2006). While some evidence supports expectation theory (depending on its assumptions about how we form expectations), it is inconsistent with a number of observations in the lab, including some from experiments designed specifically to test it. The same is true for a number of other theories. Preference uncertainty, mere-ownership theory, enhancement theory, subject misconceptions, expectation theory and regret avoidance, among others, have all garnered some support, but no one theory clearly rises to the top as the leading explanation. More work is required to determine which best organizes the body of existing evidence and stands up to tests of robustness.

Although several theories remain in contention, some fair worse than others. Explanations centered on wealth effects seem not to organize the data well. Gaps appear in experiments with goods of relatively low value where we would not expect wealth effects to impact valuations much, and at least some experiments that control for them produce gaps when the theory predicts no gaps. Isoni (2011) convincingly argued that Hanemann's (1991) substitution theory was not a good candidate given the implausibly large WTP response to income changes the theory would need to assume to fit the data. In addition, substitution theory's predictions are out of sync with reported valuations of private goods with plentiful substitutes (e.g., mugs with a university logo available at the campus bookstore) in environments where potential buyers are given cash to remedy budget constraints.

That more than one explanation is at work is also possible. For example, Brown (2005) reported evidence from subject self-reported explanations for gaps that might be interpreted as support for commitment cost theory (e.g., "My thoughts are, what do I think I can get for the notebook" (p. 374).). Other self-reports suggested a reversion to basic sell high – buy low instincts ("I grew up with 'buy low, sell high'" (p. 374).). A handful of subjects complained about being broke, although none seemed worried that they would be unable to obtain the good outside the lab if sold during the experiment, which might constitute mixed evidence of an explanation grounded in substitution effects. Some researchers directly tested multifaceted theories, which suggest that more than one driver might be at work more generally. For example, Chatterjee et al. (2013) reported evidence suggesting that both mere ownership, which they argued triggers an association of the self with the object, and loss aversion played necessary roles in gap formation.<sup>158</sup>

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<sup>158</sup> After reporting results that support their theory, the authors offer explanations for results in the literature that seem to work against the theory. They also point out results their theory does not predict, which opens the door for further exploration.

Some have been working on developing new ways to test theories that attempt to explain observed reluctance to trade.<sup>159</sup> By running experiments on subjects while taking images of their brains using functional MRI technology, researchers are able to identify which parts of the brain are active during decision-making tasks involving valuation in different roles.<sup>160</sup> Research in brain science has taught us much about which parts of the brains are active when we're thinking strategically or motivated by fear or reacting to potential rewards and losses. Even though we have roughly five decades of research on this question under our belts, in many ways we are in the very early stages. Much more work is required before we can confidently employ data from brain scans to home in on the causes of reluctance to trade.

## 7. CONCLUSION: IMPLICATIONS FOR APPLICATIONS IN LAW

Despite the numerous potential explanations for observed reluctance to trade, law and policy scholars generally point to one, endowment theory, and proceed to work out both descriptive theories and normative arguments in a wide variety of legal contexts based on this single theory (Klass and Zeiler 2013). Indeed, even some economists emphasize endowment theory despite numerous alternatives supported by equally strong evidence.<sup>161</sup> While we might well have justified this approach during the 1990s, when endowment theory was new and seemed to be gaining ground, following the turn of the century the continued application of endowment theory in legal scholarship fell out of sync with the economics literature; the latter has long since moved on from endowment theory, while legal scholarship has lagged behind.<sup>162</sup>

Keeping up on developments in the economics literature is not the only issue with which legal scholars have struggled in their attempts to import findings related to reluctance to trade from economics into law. First, at least some legal scholars mistakenly assume that observed deviations from predictions of standard economic models trigger a need for intervention. To determine whether and how to intervene, we need to understand what drives the observed reluctance. As this review has attempted to highlight, economics

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<sup>159</sup> Morewedge and Giblin (2015) review some of the literature.

<sup>160</sup> See Votinov et al. (2010) for a recent example. They provide a summary of the neuroeconomics literature on reluctance to trade, and highlight variation in results from these studies.

<sup>161</sup> See, e.g., Johnson et al. (2006).

<sup>162</sup> See Klass and Zeiler (2013). See also a recent review by law professor Korobkin (2014), which mistakenly points to theories that were proposed as alternatives to endowment theory (e.g., attachment, transaction disutility, regret avoidance, and query theory) instead as drivers of loss aversion. A recent review of some of the relevant literature by economists Ericson and Fuster (2014) more accurately characterizes the alternative theories as alternatives to endowment theory and argues, as mentioned, that loss aversion remains a potential explanation but as part of a substantially modified version of endowment theory and only with the caveat that still more research is required.

experiments are performed not only to identify whether gaps exist but also to identify what explains them. And observed gaps do not necessarily support theories that assume a lack of rationality.<sup>163</sup> Different causes can lead to different policy responses and some causes suggest no policy response is required. For example, if we believe that gaps are an artifact of experiment designs that do not have analogs in settings outside the lab, then we would not expect gaps outside the lab, and we would need no policy intervention. The first step is to understand what causes observed reluctance to trade, and more work is required. This, of course, does not mean we should not act until we fully understand the cause(s). Intervention might be warranted before we achieve a full understanding, but we must account for the risks of intervening in the face of incomplete information before deciding whether and how to move forward. We must also accurately represent the state of scientific knowledge when offering proposals.

Second, law and policy scholars tend to focus on the trees (or, more likely, a single tree) and often fail to appreciate the large and continually changing forest (Klass and Zeiler 2013). The vastness of the reluctance to trade literature makes it impossible to draw conclusions from any one study or even a handful of studies.<sup>164</sup> As this review makes clear, those who wish to draw lessons from the literature must evaluate the body of evidence as a whole to understand which inferences are valid. The reluctance to trade literature reveals that no one theory finds universal (or close to universal) support. Many open questions remain. We are still in search of a theory that is able to organize a substantial portion of the reported results. As is also clear, relying on second-hand descriptions of studies and claims about what we can learn from any one study or the literature more generally is dangerous. Both lawyers and economists sometimes get it wrong, even when describing single studies.<sup>165</sup> Best practice requires careful reading of primary sources.

Third, law and policy scholars often fail to appreciate how little weight we can confidently place on any one experimental finding when we aim to import theory into descriptive and normative claims related to law and policy. Findings reported in one study that support some tested theory are but a first step on the road toward a theory with support sufficient to warrant substantial weight. In well-developed literatures, such as the one on reluctance to trade, researchers have reported a substantial number of findings and have posited and tested a wide array of theories. Law and policy scholars should strive to identify the theory that best organizing the entire body of evidence in the literature. In

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<sup>163</sup> As mentioned, Tversky and Kahneman (1991) were agnostic as to whether loss aversion is irrational. More generally, depending on the context in which they appear, observed gaps sometimes constitute support for a wide array of rational choice theories.

<sup>164</sup> See, e.g., Open Science Collaboration (2015) (“As much as we might wish it to be otherwise, a single study almost never provides definitive resolution for or against an effect and its explanation.”)

<sup>165</sup> Some have gone as far as drawing inferences from “handfuls” of studies that do not exist. See, e.g., Klass and Zeiler (2013) who point out Arlen and Talley’s (2008) unsupported claims.

high quality studies, authors summarize the findings from the existing literature and attempt to assess how well the tested theory organizes the entire body of evidence. If the study does not provide such an analysis, the reader should either assess the theory along these lines or, at a minimum, warn the reader of the literature's existence.<sup>166</sup> In addition, extreme caution should be exercised until results are replicated (Open Science Collaboration, 2015). The first step in testing alternative theories is often to replicate reported results. Often, even when the same or very similar procedures are used to elicit responses from subjects, results vary, suggesting that the finding is fragile to changes in the subject pool or small variations in procedures. In law and policy scholarship, we should take care not to place much weight, if any, on new results and those that have yet to be replicated. While waiting to import a newly posited theory until convincing evidence supports is unnecessary, the importer should accurately report on the contours of the economics literature to give readers an accurate sense of how much weight should be placed on the theory.

One approach a legal scholar might (mistakenly) take in the face of so many theory contenders is that it doesn't matter much what explains reluctance to trade. We know individuals are reluctant—we observe it all the time in the lab. So, no matter what's driving it, the argument might go, we can expect reluctance. For example, if a legal rule places a right or good into the hands of some party, that party will be reluctant to trade the right or good away. Thus, counter to Coase's (1960) famous prediction, law matters. The reluctance to trade might prevent the right or good from getting into the hands of the person who values it the most. A closer analysis of the literature, however, demonstrates the flaw in this reasoning. Certainly the law matters if we experience a disutility from the giving up of something we own or expect to end up with. If endowment theory or expectation theory explains observed reluctance to trade in the lab, we should expect individuals to be tight-fisted when it comes to legal entitlements, at least under certain conditions. If, on the other hand, uncertain preferences explain reluctance to trade in the lab, our take changes. First, we might expect less uncertainty outside the lab. Second, we might be able to find ways to assist individuals with preference discovery. The same sort of analysis applies if subject misconceptions are responsible for reluctance to trade in the lab. We would start by asking whether we expect such misconceptions outside the lab. In contexts in which individuals face unfamiliar elicitation devices, we might require information disclosures that help ensure accurate reporting. Of course, this sort of requirement would be unnecessary if observed gaps are caused by loss aversion as opposed to misconceptions. If loss aversion explains observed gaps, then we would not perceive valuation gaps as errors, and we would be best served by allowing free

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<sup>166</sup> The most unhelpful approach is to point readers to a subset of studies that support the author's pet theory while failing to include others that do not, even when they are published in the same journal issue as the cited studies. (See, e.g., Korobkin (2014), which cites to Isoni et al. (2011), but not to Plott and Zeiler (2011), which is printed immediately following the former and provides evidence against many of its claims). Law review editing procedures are not set up to catch this sort of cherry picking. Misleading reviews serve to exacerbate the confusion in legal scholarship.

expression of preferences. As these examples illustrate, it matters greatly for legal applications which theory rises to the top as the leading theory.

The experimental literature on reluctance to trade is not unlike other literatures on a variety of issues studied by economists and psychologists that potentially impact law and policy. Most experimental literatures have features similar to the literature described here. They report findings that support a substantial number of different theories. They are comprised of studies that take incremental steps towards understanding some particular observed phenomenon. They include studies that vary widely in the theories they test, the methods they use to elicit subject responses, and the controls employed to rule out alternative explanations. In our efforts to import interesting findings into law and policy, we often lose sight of this variation and the limitations it places on our ability to draw useful insights from a single study or a small number of studies. The detailed literature review provided here will hopefully foster an appreciation for the nature of experimental findings and a deeper understanding of how best to import them into legal scholarship.

## References

- Adamowicz, Wiktor L., Vinay Bhardwaj, and Bruce Macnab. 1993. "Experiments on the Difference between Willingness to Pay and Willingness to Accept." *Land Economics* 69:416-427.
- Aggarwal, Pankaj and Meng Zhang. 2006. "The Moderating Effect of Relationship Norm Salience on Consumers' Loss Aversion." *Journal of Consumer Research* 33:413-419.
- Amiran, Edoh Y. and Daniel A. Hagen. 2003. "Willingness to Pay and Willingness to Accept: How Much Can They Differ? Comment." *American Economic Review* 93:458-463.
- Anderson, Steffan, Glenn W. Harrison, Morten I. Lau, and E. Elisabet Ruström. 2006. "Elicitation Using Multiple Price List Formats." *Experimental Economics* 9:383-405.
- Anderson, Steffan, Glenn W. Harrison, Morten I. Lau, and E. Elisabet Ruström. 2007. "Valuation Using Multiple Price List Formats." *Applied Economics* 39:675-682.
- Apicella, Coren L., Eduardo M. Azevedo, Nicholas A. Christakis, and James H. Fowler. 2014. "Evolutionary Origins of the Endowment Effect: Evidence from Hunter-Gatherers." *American Economic Review* 104:1793-1805.
- Ariely, Dan and Itamar Simonson. 2003. "Buying, Bidding, Playing, or Competing? Value Assessment and Decision Dynamics in Online Auctions." *Journal of Consumer Psychology* 13:113-123.
- Ariely, Dan, Joel Huber, and Klaus Wertenbroch. 2005. "When Do Losses Loom Larger than Gains?" *Journal of Marketing Research* 42:134-138.
- Arlen, Jennifer, Matthew L. Spitzer, and Eric L. Talley. 2002. "Endowment Effects within Corporate Agency Relationships." *Journal of Legal Studies* 31:1-37.
- Arlen, Jennifer and Stephan Tontrup. 2015. "Does the Endowment Effect Justify Legal Intervention? The Debiasing Effect of Institutions." *The Journal of Legal Studies* 44:143-182.
- Ashby, Nathaniel J.S., Stephan Dickert, and Andreas Glöckner. 2012. "Focusing on What You Own: Biased Information Uptake Due to Ownership." *Judgment and Decision Making* 7:254-267.
- Bar-Hillel, Maya and Efrat Neter. 1996. "Why Are People Reluctant to Exchange Lottery Tickets?" *Journal of Personality and Social Psychology* 70:17-27.



- Bartling, Björn, Florian Engl, and Roberto A. Weber. 2015. "Game Form Misconceptions are not Necessary for a Willingness-to-Pay vs. Willingness-to-Accept Gap." *Journal of the Economic Science Association* 1:72-85.
- Bateman, Ian, Alistair Munro, Bruce Rhodes, Chris Starmer, and Robert Sugden. 1997. "A Test of the Theory of Reference-Dependent Preferences." *Quarterly Journal of Economics* 112:479-505.
- Bateman, Ian, Ian H. Langford, Alistair Munro, Chris Starmer, and Robert Sugden. 2000. "Estimating Four Hicksian Welfare Measures for a Public Good: A Contingent Valuation Investigation." *Land Economics* 76:355-373.
- Bateman, Ian, Daniel Kahneman, Alistair Munro, Chris Starmer, and Robert Sugden. 2005. "Testing Competing Models of Loss Aversion: An adversarial collaboration." *Journal of Public Economics* 89:1561-1580.
- Becker, Gordon M., Morris H. DeGroot, and Jacob Marschak. 1964. "Measuring Utility by a Single-Response Sequential Method." *Behavioral Science* 9:226-232.
- Beggan, James K. 1992. "On the Social Nature of Nonsocial Perception: The Mere Ownership Effect." *Journal of Personality and Social Psychology* 62:229-237.
- Biel, Anders, Olaf Johansson-Stenman, and Andreas Nilsson. 2011. "The Willingness to Pay-Willingness to Accept Gap Revisited: The Role of Emotions and Moral Satisfaction." *Journal of Economic Psychology* 32:908-917.
- Binmore, Kenneth. 1994. *Playing Fair*. Cambridge, MA: MIT Press.
- Bischoff, Ivo and Jürgen Meckl. 2008. "Endowment Effect Theory, Public Goods and Welfare." *The Journal of Socio-Economics* 37:1768-1774.
- Bishop, Richard C. and Thomas A. Heberlein. 1979. "Measuring Values of Extramarket Goods: Are Indirect Measures Biased?" *American Journal of Agricultural Economics* 61:926-930.
- Bishop, Richard C., Thomas A. Heberlein, and Mary Jo Kealy. 1983. "Contingent Valuation of Environmental Assets: Comparisons with a Simulated Market." *Natural Resources Journal* 23:619-633.
- Blavatskyy, Pavlo and Ganna Pogrebna. 2010. "Endowment Effects? 'Even' with Half a Million on the Table!" *Theory and Decision* 68:173-192.
- Borges, Bernhard F.J. and Jack L. Knetsch. 1998. "Tests of Market Outcomes with Asymmetric Valuations of Gains and Losses: Smaller gains, fewer trades, and less value." *Journal of Economic Behavior & Organization* 33:185-193.

Boyce, R.R., T.C. Brown, G.H. McClelland, G.L. Peterson, and W.D. Schulze. 1992. "An Experimental Examination of Intrinsic Values as a Source of the WTA-WTP Disparity." *The American Economic Review* 82:1366-1373.

Brenner, Lyle, Yuval Rottenstreich, Sanjay Sood, and Baler Bilgin. 2007. "On the Psychology of Loss Aversion: Possession, Valence, and Reversals of the Endowment Effect." *Journal of Consumer Research* 34:369-376.

Brosnan, Sarah F., Owen D. Jones, Susan P. Lambeth, Mary Catherine Marenco, Amanda S. Richardson, and Steven J. Schapiro. 2007. "Endowment Effects in Chimpanzees." *Current Biology* 17:1704-1707.

Brosnan, Sarah F., Owen D. Jones, Molly Gardner, Susan P. Lambeth, and Steven J. Schapiro. 2012. "Evolution and the Expression of Biases: Situational Value Changes the Endowment Effect in Chimpanzees." *Evolution and Human Behavior* 33:378-386.

Brookshire, David S. and Don L. Coursey. 1987 "Measuring the Value of a Public Good: An Empirical Comparison of Elicitation Procedures." *American Economic Review* 77:554-566.

Brown, Thomas C. 2005. "Loss Aversion Without the Endowment Effect, and Other Explanations for the WPA-WTP Disparity." *Journal of Economic Behavior & Organization* 57:367-379.

Brown, Alexander L. and Gregory Cohen. 2015. "Does Anonymity Affect the Willingness to Accept and Willingness to Pay Gap? A Generalization of Plott and Zeiler." *Experimental Economics* 18:173-184.

Brown, Thomas C., Mark D. Morrison, Jacob A. Benfield, Gretchen Nurse Rainbolt, and Paul A. Bell. 2015. "Exchange Asymmetry in Experimental Settings." *Journal of Economic Behavior & Organization* 120:104-116.

Burson, Katherine, David Faro, and Yuval Rottenstreich. 2012. "Multiple-Unit Holdings Yield Attenuated Endowment Effects." *Management Science* 59:545-555.

Carmichael, Lorne H. and W. Bentley MacLeod. 2006. "Welfare Economics with Intransitive Revealed Preferences: A Theory of the Endowment Effect." *Journal of Public Economic Theory* 8:193-218.

Carmon, Ziv and Dan Ariely. 2000. "Focusing on the Forgone: How Value Can Appear So Different to Buyers and Sellers." *Journal of Consumer Research* 27:360-370.

Casey, Jeff T. 1995. "Predicting Buyer-Seller Pricing Disparities." *Management Science* 41:979-999.

- Cason, Timothy N. and Charles R. Plott. 2014. "Misconceptions and Game Form Recognition: Challenges to Theories of Revealed Preference and Framing." *Journal of Political Economy* 122(6):1235-1270.
- Chapman, Gretchen B. 1998. "Similarity and Reluctance to Trade." *Journal of Behavioral Decision Making* 11:47-58.
- Chatterjee, Promothesh, Caglar Irmak, and Randall L. Rose. 2013. "The Endowment Effect as Self-Enhancement in Response to Threat." *Journal of Consumer Research* 40:460-476.
- Chen, M. Keith, Venkat Lakshminarayanan, and Laurie R. Santos. 2006. "How Basic are Behavioral Biases? Evidence from Capuchin Monkey Trading Behavior." *Journal of Political Economy* 114:517-537.
- Chilton, Susan, Michael Jones-Lee, Rebecca McDonald, and Hugh Metcalf. 2012. "Does the WTA/WTP Ratio Diminish as the Severity of a Health Complaint is Reduced? Testing for Smoothness of the Underlying Utility of Wealth Function." *Journal of Risk and Uncertainty* 45:1-24.
- Coase, Ronald. 1960. "The Problem of Social Cost." *Journal of Law & Economics* 1:1-44.
- Coren, Amy E. 2007. "Bridging the WTA-WTP Gap: Ownership, Bargaining, and the Endowment Effect." PhD diss., The University of Texas at Austin.
- Cook, H.E. and A. Wu. 2001. "On the Valuation of Goods and Selection of the Best Design Alternative." *Research in Engineering Design* 13:42-54.
- Corrigan, Jay R., Catherine L. Kling, and Jinhua Zhao. 2008. "Willingness to Pay and the Cost of Commitment: An Empirical Specification and Test." *Environmental Resource Economics* 40:285-298.
- Corrigan, Jay R., Matthew C. Rousu, and Dinah Pura T. Depositario. 2014. "Do Practice Rounds Affect Experimental Auction Results?" *Economics Letters* 123:42-44.
- Coursey, Don L. 1987. "Markets and the Measurement of Value." *Public Choice* 55:291-297.
- Coursey, Don L., John L. Hovis, and William D. Schulze. 1987. "The Disparity Between Willingness to Accept and Willingness to Pay Measures of Value." *Quarterly Journal of Economics* 102:679-690.
- Cummings, R.G., D.S. Brookshire, and W.D. Shulze. 1986. *Valuing Environmental Goods: An Assessment of the Contingent Valuation Method*. New Jersey: Rowman & Allanheld.

- Dommer, Sara Loughran and Vanitha Swaminathan. 2013. "Explaining the Endowment Effect through Ownership: The Role of Identity, Gender, and Self-Threat." *Journal of Consumer Research* 39(5):1034-1050.
- Dubourg, W.R., M. W. Jones-Lee, and Graham Loomes. 1994. "Imprecise Preferences and the WTP-WTA Disparity." *Journal of Risk and Uncertainty* 9:115-133.
- Einhorn, Hillel J. and Robin M. Hogarth. 1985. "Ambiguity and Uncertainty in Probabilistic Inference." *Psychological Review* 92:433-461.
- Engelmann, Dirk and Guillaume Hollard. 2010. "Reconsidering the Effect of Market Experience on the 'Endowment Effect'." *Econometrica* 78:2005-19.
- Ericson, Keith M.M. and Andreas Fuster. 2011. "Expectations as Endowments: Evidence on Reference-Dependent Preferences from Exchange and Valuation Experiments." *Quarterly Journal of Economics* 126:1879-1907.
- Ericson, Keith M. M. and Andreas Fuster. 2014. "The Endowment Effect," *Annual Review of Economics* 6:555-579.
- Fehr, Dietmar, Rustamdjan Hakimov, and Dorothea Kübler. 2015. "The Willingness to Pay-Willingness to Accept Gap: A Failed Replication of Plott and Zeiler." *European Economic Review* 78:120-28.
- Flemming, Timothy M., Owen D. Jones, Laura Mayo, Tara Stoinski, and Sarah F. Brosnan. 2012. "The Endowment Effect in Orangutans." *International Journal of Comparative Psychology* 25:285-298.
- Franciosi, Robert, Praveen Kujal, Roland Michelitsch, Vernon Smith, and Gang Deng. 1996. "Experimental Tests of the Endowment Effect." *Journal of Economic Behavior & Organization* 30:213-226.
- Friedman, David. 2004. "Economics and Evolutionary Psychology." In *Evolutionary Psychology and Economic Theory (Advances in Austrian Economics, Volume 7)*, edited by Roger Koppl, 17-33. Emerald Group Publishing Limited.
- Fremling, Gertrud and Richard A. Posner. 2001. "Market Signaling of Personal Characteristics." *John M. Olin Law & Economics Working Paper* No. 87 (2D Series). [http://www.law.uchicago.edu/files/files/87.RAP\\_.MarketSignaling.pdf](http://www.law.uchicago.edu/files/files/87.RAP_.MarketSignaling.pdf).
- Fudenberg, Drew and Jean Tirole. 1991. *Game Theory*. Cambridge: MIT Press.
- Fudenberg, Drew and David K. Levine. 2006. "A Dual-Self Model of Impulse Control." *The American Economic Review* 96(5):1449-1476.

- Georgantzís, Nikolaos and Daniel Navarro-Martínez. 2010. "Understanding the WTA-WTP Gap: Attitudes, Feelings, Uncertainty and Personality." *Journal of Economic Psychology* 31:895-907.
- Gerking, Shelby, Menno de Haan, and William Schulze. 1988. The Marginal Value of Job Safety: A Contingent Valuation Study." *Journal of Risk and Uncertainty* 1: 185-199.
- Gintis, Herbert. 2007. "The Evolution of Private Property." *Journal of Economic Behavior & Organization* 64:1-16.
- Goette, Lorenz, Annette Harms, and Charles Sprenger. 2014. "Randomizing Endowments: An Experimental Study of Rational Expectations and Reference-Dependent Preferences." *Institute for the Study of Labor (IZA) (Discussion Paper No. 8639)*.
- Gregory, Robin and Lita Furby. 1987. "Auctions, Experiments and Contingent Valuations." *Public Choice* 55:273-289.
- Hammack, Judd and Gardner Mallard Brown, Jr. 1974. *Waterfowl and Wetlands: Toward Bioeconomic Analysis*. Baltimore: Johns Hopkins University Press.
- Hanemann, W. Michael. 1991. "Willingness to Pay and Willing to Accept: How Much Can They Differ?" *American Economic Review* 81:635-647.
- Hanemann, W. Michael. 2003. "Willingness to Pay and Willingness to Accept: How Much Can They Differ? Reply." *American Economic Review* 93:464.
- Harbaugh, William T., Kate Krause, and Lise Vesterlund. 2001. "Are Adults Better Behaved Than Children? Age, Experience, and the Endowment Effect." *Economics Letters* 70:175-81.
- Harless, David W. 1989. "More Laboratory Evidence on the Disparity Between Willingness to Pay and Compensation Demanded." *Journal of Economic Behavior and Organization* 11:359-379.
- Harrison, Glenn W. and John A. List. 2004. "Field Experiments." *Journal of Economic Literature* 42:1009-1055.
- Hartman, Raymond S., Michael J. Doane, and Chi-Keung Woo. 1991. "Consumer Rationality and the Status Quo." *Quarterly Journal of Economics* 106:141-162.
- Heffetz, Ori and John A. List. 2014. "Is the Endowment Effect an Expectations Effect?" *Journal of the European Economic Association* 12:1396-1422.
- Heifetz, Aviad and Ella Segev. 2004. "The Evolutionary Role of Toughness in Bargaining." *Games and Economic Behavior* 49:117-134.

- Hicks, J.R. and R.G.D. Allen. 1934. "A Reconsideration of the Theory of Value. Part I." *Economica* 1:52-76.
- Hoehn, J.P. and A. Randall. 1987. "A Satisfactory Benefit Cost Indicator from Contingent Valuation." *Journal of Environmental Economics and Management* 14:226-247.
- Horowitz, John K. and Kenneth E. McConnell. 2002. "A Review of WTA/WTP Studies." *Journal of Environmental Economics and Management* 44:426-47.
- Hooren, Vera, Nicole Remmers, and Kamieke van de Riet. 1999. "Time is an Amazingly Variable Amount of Money: Endowment and Ownership Effects in the Subjective Value of Working Time." *Journal of Economic Psychology* 20:383-405.
- Huck, Steffan, Georg Kirchsteiger, and Jorg Oechssler. 2005. "Learning to Like What You Have: Explaining the Endowment Effect." *The Economic Journal* 115:689-702.
- Inder, Brett and Terry O'Brien. 2003. "The Endowment Effect and the Role of Uncertainty." *Bulletin of Economic Research* 55:289-301.
- Irwin, Julie R. 1994. "Buying/Selling Price Preference Reversals: Preference for Environmental Changes in Buying Versus Selling Modes." *Organizational Behavior and Human Decision Processes* 60:431-457.
- Isoni, Andrea. 2011. "The Willingness-to-Accept/Willingness-to-Pay Disparity in Repeated Markets: Loss Aversion or 'Bad-deal' Aversion?" *Theory and Decision* 71:409-430.
- Isoni, Andrea, Graham Loomes, and Robert Sugden. 2011. "The Willingness to Pay-Willingness to Accept Gap, the 'Endowment Effect,' Subject Misconceptions, and Experimental Procedures for Eliciting Valuations: Comment." *American Economic Review* 101:991-1011.
- Johnson, Eric J., Simon Gächter, and Andreas Herrmann. 2006. "Exploring the Nature of Loss Aversion." IZA Discussion Paper No. 2015.
- Johnson, Eric J., Gerald Häubl, and Anat Keinan. 2007. "Aspects of Endowment: A Query Theory of Value Construction." *Journal of Experimental Psychology: Learning, Memory, and Cognition* 33:461-74.
- Johnson, Eric J., Hershey, J., Meszaros, J., and Kunreuther, H. 1993. "Framing, Probability Distortions, and Insurance Decisions." *Journal of Risk and Uncertainty* 7:35-51.
- Johnson, Joseph G. and Jerome R. Busemeyer. 2005. "A Dynamic, Stochastic, Computational Model of Preference Reversal Phenomenon." *Psychological Review* 112:841-861.

Jones, Owen. 2001. "Time-shifted Rationality and the Law of Law's Leverage: Behavioral Economics Meets Behavioral Biology." *Northwestern University Law Review* 95:1141-1205.

Jones, Owen. 2017. "Why Behavioral Economics Isn't Better, and How It Could Be." In *Research Handbook on Behavioral Law and Economics*, edited by Joshua C. Teitelbaum and Kathryn Zeiler, [insert page numbers]. Edward Elgar.

Jones-Lee, M. W., M. Hammerton, and P. R. Phillips. 1985. "The Value of Safety: Results of a National Sample Survey." *The Economic Journal*. 95:49-72.

Kahneman, Daniel and Amos Tversky. 1979. "Prospect Theory: An Analysis of Decision Under Risk." *Econometrica* 47:263-292.

Kahneman, Daniel, Jack L. Knetsch, and Richard H. Thaler. 1990. "Experimental Tests of the Endowment Effect and the Coase Theorem." *Journal of Political Economy* 98:1325-1348.

Kahneman, Daniel, Jack L. Knetsch, and Richard H. Thaler. 1991. "The Endowment Effect, Loss Aversion and Status Quo Bias." *Journal of Economic Perspectives* 5:193-206.

Kahneman, Daniel, Jack L. Knetsch, and Richard H. Thaler. 2008. "The Endowment Effect: Evidence of Losses Valued More than Gains." In *Handbook of Experimental Economics Results: Volume 1* 939-948. Elsevier B.V.

Kahneman, Daniel. 2011. *Thinking Fast and Slow*. New York: Farrar, Straus & Giroux.

Kanngiesser, Patricia, Laurie R. Santos, Bruce M. Hood, and Josep Call. 2011. "The Limits of Endowment Effects in Great Apes (Pan Paniscus, Pan Troglodytes, Gorilla Gorilla, Pongo Pygmaeus)." *Journal of Comparative Psychology* 125(4): 436-445.

Kelman, Mark. 1979. "Consumption Theory, Production Theory, and Ideology in the Coase Theorem." *Southern California Law Review* 52:669-698.

Kermer, Deborah A., Erin Driver-Linn, Timothy D. Wilson, and Daniel T. Gilbert. 2006. "Loss Aversion is an Affective Forecasting Error." *Psychological Science* 17:649-653.

Kingsley, David and Thomas Brown. 2012. "Does Prompting for Revision Influence Subjects' Offers in Willingness to Accept - Willingness to Pay Lab Experiments?" *Economics Bulletin* 32:2580-2585.

Kingsley, David and Thomas Brown. 2013. "Value Learning and the Willingness to Accept-Willingness to Pay Disparity." *Economics Letters* 120:473-476.

- Klass, Gregory and Kathryn Zeiler. 2013. "Against Endowment Theory: Experimental Economics and Legal Scholarship." *UCLA Law Review* 61:2-64.
- Kling, Catherine L., John A. List, and Jinhua Zhao. 2013. "A Dynamic Explanation of the Willingness to Pay and Willingness to Accept Disparity." *Economic Inquiry* 51:909-921.
- Knetsch, Jack L. 1989. "The Endowment Effect and Evidence of Nonreversible Indifference Curves." *American Economic Review* 79:1277-1284.
- Knetsch, Jack L. and J.A. Sinden. 1984. "Willingness to Pay and Compensation Demanded: Experimental Evidence of an Unexpected Disparity in Measures of Value." *Quarterly Journal of Economics* 99:507-521.
- Knetsch, Jack L. and J.A. Sinden. 1987. "The Persistence of Evaluation Disparities." *Quarterly Journal of Economics* 102:691-696.
- Knetsch, Jack L. and Wei-Kang Wong. 2009. "The Endowment Effect and the Reference State: Evidence and Manipulations." *Journal of Economic Behavior & Organization* 71:407-413.
- Knez, Peter, Vernon L. Smith, and Arlington W. Williams. 1985. "Individual Rationality, Market Rationality, and Value Estimation." *American Economic Review* 75:397-402.
- Kniesner, Thomas J., W. Kip Viscusi, and James P. Ziliak. 2014. "Willingness to Accept Equals Willingness to Pay for Labor Market Estimates of the Value of a Statistical Life." *Journal of Risk and Uncertainty* 48:187-205.
- Kogler, Cristoph, Anton Kühberger, and Rainer Gilhofer. 2013. "Real and Hypothetical Endowment Effects When Exchanging Lottery Tickets: Is Regret a Better Explanation Than Loss Aversion?" *Journal of Economic Psychology* 37:42-53.
- Kogut, Tehila and Ehud Kogut. 2011. "Possession Attachment: Individual Differences in the Endowment Effect." *Journal of Behavioral Decision Making* 24:377-393.
- Koh, Weining and Wei-Kang Wong. 2013. "The Willingness to Accept-Willingness to Pay Gap: Do Possession and Framing Still Matter Despite Important Controls for Subject Misconceptions?" *National University of Singapore Working Paper*.
- Kolstad, Charles D. and Rolando M. Guzman. 1999. "Information and the Divergence between Willingness to Accept and Willingness to Pay." *Journal of Environmental Economics and Management* 38:66-80.
- Korobkin, Russell. 1998. "The Status Quo Bias and Contract Default Rules." *Cornell Law Review* 83:608-687.



Korobkin, Russell. 2003. "The Endowment Effect and Legal Analysis." *Northwestern University Law Review* 97:1227-93.

Korobkin, Russell. 2014. "Wrestling with the Endowment Effect, or How to Do Law and Economics Without the Coase Theorem," In *The Oxford Handbook of Behavioral Economics and the Law*, edited by Eyal Zamir and Doron Teichman, [page numbers]. Oxford University Press.

Kőszegi, Botond and Matthew Rabin. 2006. "A Model of Reference-Dependent Preferences." *Quarterly Journal of Economics* 121: 1133-1165.

Kovalchik, Stephanie, Colin F. Camerer, David M. Grether, Charles R. Plott, and John M. Allman. 2005. "Aging and Decision Making: A Comparison Between Neurologically Healthy Elderly and Young Individuals." *Journal of Economic Behavior & Organization* 58:79-94.

Lakshminarayanan, Venkat, M. Keith Chen, and Laurie R. Santos. 2008. "Endowment Effect in Capuchin Monkeys." *Philosophical Transactions: Biological Sciences* 363:3837-3844.

Landesberg, Stuart A. 2007. "Why We Will (Sometimes) Not Sell What We Would Not Buy: Empirical Evidence of a Conditional Endowment Effect." B.A. diss. Amherst College, Amherst, MA.

Lerner, Jennifer S., Deborah A. Small, and George Loewenstein. 2004. "Heart Strings and Purse Strings: Carryover Effects of Emotions on Economic Decisions." *Psychological Science* 15:337-341.

Lewandowski, Michal. 2014. "Buying and Selling Price for Risky Lotteries and Expected Utility Theory with Gambling Wealth." *Journal of Risk and Uncertainty* 48:253-283.

Li, Chuan-Zhong, Karl-Gustaf Lofgren, and W. Michael Hanemann. 2002. "Real Versus Hypothetical Willingness to Accept: The Bishop and Heberlein Model Revisited." In *Economic Theory for the Environment: Essays in Honour of Karl-Goran Maler*, edited by Bengt Kristrom, Partha Dasgupta, and Karl-Gustaf Lofgren, 205-218. Edward Elgar.

Lin, Chien-Huang, Shih-Chieh Chuang, Danny T. Kao, and Chaang-Yung Kung. 2006. "The Role of Emotions in the Endowment Effect." *Journal of Economic Psychology* 27:589-597.

Liberman, Nira, Lorraine Chen Idson, Christopher J. Camacho, and E. Tory Higgins. 1999. "Promotion and Prevention Choices Between Stability and Change." *Journal of Personality and Social Psychology* 77(6):1135-1145.

List, John A. 2003. "Does Market Experience Eliminate Market Anomalies?" *Quarterly Journal of Economics* 118:41-71.

List, John A. 2004. "Neoclassical Theory Versus Prospect Theory: Evidence from the Marketplace." *Econometrica* 72:615-625.

List, John A. 2011. "Does Market Experience Eliminate Market Anomalies? The Case of Exogenous Market Experience." *American Economic Review* 101:313-317.

List, John A. and Jason F. Shogren. 1999. "Price Information and Bidding Behavior in Repeating Second-Price Auctions." *American Journal of Agricultural Economics* 81:942-949.

List, John A. and Jason F. Shogren. 2002. "Calibration of Willingness-to-Accept." *Journal of Environmental Economics and Management* 43:219-233.

Loomes, Graham, Shepley Orr, and Robert Sugden. 2009. "Taste Uncertainty and Status Quo Effects in Consumer Choice." *Journal of Risk and Uncertainty* 39:113-135.

Loomes, Graham, Chris Starmer, and Robert Sugden. 2010. "Preference Reversals and Disparities Between Willingness to Pay and Willingness to Accept in Repeated Markets." *Journal of Economic Psychology* 31:374-387.

Loewenstein, George and Daniel Kahneman. 1991. "Explaining the Endowment Effect." *Carnegie Mellon University Working Paper*.

Loewenstein, George and Samuel Issacharoff. 1994. "Source Dependence in the Valuation of Objects." *Journal of Behavioral Decision Making* 7:157-168.

Loewenstein, George and Daniel Adler. 1995. "A Bias in the Prediction of Tastes." *The Economic Journal* 105:929-937.

Lunn, Pete and Mary Lunn. 2014. "What Can I Get for It? The Relationship Between the Choice Equivalent, Willingness to Accept and Willingness to Pay." *ESRI Working Paper* 479.

Lusk, Jayson. 2003. "An Experimental Test of the Commitment Cost Theory." *American Journal of Agricultural Economics* 85:1316-1322.

Maddux, William W., Haiyang Yang, Carl Falk, Hajo Adam, Wendi Adair, Yumi Endo, Ziv Carmon, and Steven J. Heine. 2010. "For Whom is Parting with Possessions More Painful? Cultural Differences in the Endowment Effect." *Psychological Science* 21:1910-1917.

Mandel, David R. 2002. "Beyond Mere Ownership: Transaction Demand as a Moderator of the Endowment Effect." *Organizational Behavior and Human Decision Processes* 88:737-747.

- Marshall, James D., Jack L. Knetsch, and J.A. Sinden. 1986. "Agent's Evaluations and the Disparity of Measures of Economic Loss." *Journal of Economic Behavior and Organization* 65:115-127.
- Martinez, Luis F., Marcel Zeelenberg, and John B. Rijsman. 2011. "Regret, Disappointment and the Endowment Effect." *Journal of Economic Psychology* 32:962-968.
- Morewedge, Carey K., Lisa L. Shu, Daniel T. Gilbert, and Timothy D. Wilson. 2009. "Bad Riddance or Good Rubbish? Ownership and Not Loss Aversion Causes the Endowment Effect." *Journal of Experimental Social Psychology* 45:947-51.
- Morewedge, Carey K. and Colleen E. Giblin. 2015. "Explanations of the Endowment Effect: An Integrative Review." *Trends in Cognitive Sciences* 19:339-348.
- Morrison, Gwendolyn C. 1997a. "Resolving Differences in Willingness to Pay and Willingness to Accept: Comment." *American Economic Review* 87:236-240.
- Morrison, Gwendolyn C. 1997b. "Willingness to Pay and Willingness to Accept: Some Evidence of an Endowment Effect." *Applied Economics* 29:411-417.
- Morrison, Gwendolyn C. 1998. "Understanding the Disparity Between WTP and WTA: Endowment Effect, Substitutability, or Imprecise Preferences?" *Economic Letters* 59:189-194.
- Morrison, Gwendolyn C. 2000. "WTP and WTA in Repeated Trial Experiments: Learning or Leading?" *Journal of Economic Psychology* 21:57-72.
- Munro, Alistair and Robert Sugden. 2003. "On the Theory of Reference-dependent Preferences." *Journal of Economic Behavior & Organization* 50:407-428.
- Nash, Jane G. and Robert A. Rosenthal. 2014. "An Investigation of the Endowment Effect in the Context of a College Housing Lottery." *Journal of Economic Psychology* 42:74-82.
- Nayakankuppam, Dhananjay and Himanshu Mishra. 2005. "The Endowment Effect: Rose-Tinted and Dark-Tinted Glasses." *Journal of Consumer Research* 32(3):390-395.
- Nesselroade, Jr., K. Paul, James K. Beggan, and Scott T. Allison. 1999. "Possession Enhancement in an Interpersonal Context: An Extension of the Mere Ownership Effect." *Psychology & Marketing* 16:21-34.
- Novemsky, Nathan and Daniel Kahneman. 2005. "The Boundaries of Loss Aversion." *Journal of Marketing Research* 42:119-128.

Okada, Erica M. 2010. "Uncertainty, Risk Aversion, and WTA vs. WTP." *Marketing Science* 29:75-84.

Open Science Collaboration. 2015. "Estimating the Reproducibility of Psychological Science," *Science* 349:943.

Ortona, Guido and Francesco Scacciati. 1992. "New Experiments on the Endowment Effect." *Journal of Economic Psychology* 13:277-296.

Pachur, Thorsten and Benjamin Scheibehenne. 2012. "Constructing Preference from Experience: The Endowment Effect Reflected in External Information Search." *Journal of Experimental Psychology: Learning Memory and Cognition* 38:1108-1116.

Peters, Ellen, Paul Slovic, and Robin Gregory. 2003. "The Role of Affect in the WTA/WTP Disparity." *Journal of Behavioral Decision Making* 16:309-330.

Plott, Charles R. 1996. "Rational Individual Behavior in Markets and Social Choice Processes: The Discovered Preference Hypothesis." In *The Rational Foundations of Economic Behaviour*, 225-250. London: McMillan Publishing.

Plott, Charles R. and Kathryn Zeiler. 2005. "The Willingness to Pay-Willingness to Accept Gap, the 'Endowment Effect,' Subject Misconceptions, and Experimental Procedures for Eliciting Valuations." *American Economic Review* 95:530-545.

Plott, Charles R. and Kathryn Zeiler. 2007. "Asymmetries in Exchange Behavior Incorrectly Interpreted as Evidence of Endowment Effect Theory and Prospect Theory?" *American Economic Review* 97:1449-1466.

Plott, Charles R. and Kathryn Zeiler. 2010. "Web Appendix to Endowment Effect Theory, Subject Misconceptions and Enhancement Effect Theory: A Reply to Isoni, Loomes and Sugden." [https://www.aeaweb.org/aer/data/april2011/20100063\\_app.pdf](https://www.aeaweb.org/aer/data/april2011/20100063_app.pdf).

Plott, Charles R. and Kathryn Zeiler. 2011. "The Willingness to Pay-Willingness to Accept Gap, the 'Endowment Effect,' Subject Misconceptions, and Experimental Procedures for Eliciting Valuations: Reply." *American Economic Review* 101(2):1012-1028.

Randall, Alan and John R. Stoll. 1980. "Consumer's Surplus in Commodity Space." *American Economic Review* 71:449-457.

Ratan, Anmol. 2012. "Mistakes, Closure and Endowment Effect in Laboratory Experiments." *Monash University, Department of Economics (Discussion Paper 22/12)*.

Ratan, Anmol. 2014. "Anticipated Regret or Endowment Effect? A Reconsideration of Exchange Asymmetry in Laboratory Experiments." *Journal of Economic Analysis & Policy* 14:277-298.

Reb, Jochen and Terry Connolly. 2007. "Possession, Feelings of Ownership and the Endowment Effect." *Judgment and Decision Making* 2:107-114.

Roth, Gerrit. 2005. "Predicting the Gap between Willingness to Accept and Willingness to Pay." PhD diss., Munich Graduate School of Economics.

Saqib, Najam U., Norman Frohlich, and Edward Bruning. 2010. "The Influence of Involvement on the Endowment Effect: The Moveable Value Function." *Journal of Consumer Psychology* 20:355-68.

Sayman, Serdar and Ayşe Öncüler. 2005. "Effects of Study Design Characteristics on the WTA–WTP Disparity: A Meta Analytical Framework." *Journal of Economic Psychology* 26:289-312.

Schmidt, Ulrich and Stefan Traub. 2009. "An Experimental Investigation of the Disparity Between WTA and WTP for Lotteries," *Theory and Decision* 66:229-262.

Sen, Sankar and Eric J. Johnson. 1997. "Mere-Possession Effects without Possession in Consumer Goods." *Journal of Consumer Research* 24:105-117.

Shogren, Jason F., Seung T. Shin, Dermot J. Hayes, and James B. Kliebenstein. 1994. "Resolving Differences in Willingness to Pay and Willingness to Accept." *American Economic Review* 84:255-270.

Shogren, Jason F. and Dermot J. Hayes. 1997. "Resolving Differences in Willingness to Pay and Willingness to Accept: Reply." *American Economic Review* 87:241-244.

Shogren, Jason F., Sungwon Cho, Cannon Koo, John List, Changwon Park, Pablo Polo, and Robert Wilhelmi. 2001. "Auction Mechanisms and the Measurement of WTP and WTA." *Resource and Energy Economics* 23:97-109.

Shu, Suzanne B. and Joann Peck. 2011. "Psychological Ownership and Affective Reaction: Emotional Attachment Process Variables and the Endowment Effect." *Journal of Consumer Psychology* 21:439-452.

Simonson, Itamar and Aimee Drolet. 2004. "Anchoring Effects on Consumers' Willingness-to-Pay and Willingness-to-Accept." *Journal of Consumer Research* 31:681-690.

Singh, Harinder. 1991. "The Disparity Between Willingness to Pay and Compensation Demanded." *Economic Letters* 35:263-266.

Smith, Alec. 2012. "Lagged Beliefs and Reference-Dependent Preferences." *University of Arizona Working Paper 08-03*.

Strahilevitz, Michal A. and George Loewenstein. 1998. "The Effect of Ownership History on the Valuation of Objects." *Journal of Consumer Research* 25:276-289.

Sugden, Robert. 1999. "Alternatives to the Neo-Classical Theory of Choice." In *Valuing Environmental Preferences: Theory and Practice of the Contingent Valuation Method in the US, EU, and Developing Countries*, edited by Ian J. Bateman and Kenneth G. Willis, 152-180. Oxford: Oxford University Press.

Svirsky, Daniel. 2014. "Money is No Object: Testing the Endowment Effect in Exchange Goods." *Journal of Economic Behavior & Organization* 106:227-34.

Thaler, Richard. 1980. "Toward a Positive Theory of Consumer Choice." *Journal of Economic Behavior & Organization* 1:39-60.

Tsur, Matan. 2008. "The Selectivity Effect of Past Experience On Purchasing Decisions: Implications for the WTA-WTP Disparity." *Journal of Economic Psychology* 29:739-746.

Tuncel, Tuba and James K. Hammitt. 2014. "A New Meta-Analysis on the WTP/WTA Disparity." *Journal of Environmental Economics and Management* 68:175-187.

Tversky, Amos and Daniel Kahneman. 1991. "Loss Aversion in Riskless Choice: A Reference-Dependent Model." *Quarterly Journal of Economics* 106:1039-1061.

Van Boven, Leaf, David Dunning, and George Loewenstein. 2000. "Egocentric Empathy Gaps Between Owners and Buyers: Misperceptions of the Endowment Effect." *Journal of Personality and Social Psychology* 79:66-76.

Van Boven, Leaf, George Loewenstein, and David Dunning. 2003. "Mispredicting the Endowment Effect: Underestimation of Owners' Selling Prices by Buyer's Agents." *Journal of Economic Behavior & Organization* 51:351-365.

van de Ven, Niels, Marcel Zeelenberg, and Eric van Dijk. 2005. "Buying and Selling Exchange Goods: Outcome Information, Curiosity and the Endowment Effect." *Journal of Economic Psychology* 26: 459-468.

van de Ven, Niels and Marcel Zeelenberg. 2011. "Regret Aversion and the Reluctance to Exchange Lottery Tickets." *Journal of Economic Psychology* 32:194-200.

van Dijk, Eric and Dann van Knippenberg. 1996. "Buying and Selling Exchange Goods: Loss Aversion and the Endowment Effect." *Journal of Economic Psychology* 17:517-524.

van Dijk, Eric and Dann van Knippenberg. 1998. "Trading Wine: One the Endowment Effect, Loss Aversion, and the Comparability of Consumer Goods." *Journal of Economic Psychology* 19:485-495.

Vickery, William. 1961. "Counterspeculation, Auctions, and Competitive Sealed Tenders." *The Journal of Finance* 16:8-37.

Viscusi, W. K., W. A. Magat, and J. Huber. 1987. "An Investigation of the Rationality of Consumer Valuations of Multiple Health Risks." *The RAND Journal of Economics* 18:465-479.

Vondolia, Godwin K., Håkan Eggert, Ståle Navrud, and Jesper Stage. 2014. "What Do Respondents Bring to Contingent Valuation? A Comparison of Monetary and Labor Payment Vehicles." *Journal of Environmental Economics and Policy* 3:253-267.

Votinov, Mikhail, Tatsuya Mima, Toshihiko Aso, Mitsunari Abe, Nobukatsu Sawamoto, Jun Shinozaki, and Hidenao Fukuyama. 2010. "The Neural Correlates of Endowment Effect Without Economic Transaction." *Neuroscience Research* 68:59-65.

Walker, Michael E., Osvaldo F. Morera, Joanne Vining, and Brian Orland. 1999. "Disparate WTA-WTP Disparities: The Influence of Human versus Natural Causes." *Journal of Behavioral Decision Making* 12:219-232.

Weaver, Ray, and Shane Frederick. 2012. "A Reference Price Theory of the Endowment Effect." *Journal of Marketing Research* XLIX:696-707.

Willig, Robert. 1976. "Consumer's Surplus Without Apology." *American Economic Review* 66:589-597.

Zeiler, Kathryn. 2010. "Cautions on the Use of Economics Experiments in Law." *Journal of Institutional and Theoretical Economics* 166:178-193.

Zhang, Ying and Ayelet Fishbach. 2005. "The Role of Anticipated Emotions in the Endowment Effect," *Journal of Consumer Psychology* 15:316-324.

Zhao, Jinhua and Catherine L. Kling. 2001. "A New Explanation for the WTP/WTA Disparity." *Economic Letters* 73:293-300.

Zhao, Jinhua and Catherine L. Kling. 2004. "Willingness-to-Pay, Compensating Variation, and the Cost of Commitment." *Economic Inquiry* 42:503-517.