

**Why We Will (Sometimes) Not Sell What  
We Would Not Buy:**  
Empirical Evidence of a Conditional Endowment  
Effect

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## **Introduction**

Economic theory suggests that people will rationally choose the option with the highest utility. Because utility is not measurable, economists use revealed preferences to determine the relative utility of choices; by definition, the preferred option provides the most utility. For example, before one makes the decision to buy a \$5 coffee mug, the individual determines that it would bring him at least as much utility as \$5; thus, its value to him in dollars is at least five.

In addition to goods, however, individuals may (and do) value intangible, “irrational” things such as security. Because of this behavior, the utility function differs significantly from a monetary value function. For example, consider a choice between an 80% chance to win \$4,000 and a guarantee of \$3,000. In a study, an overwhelming (80%) majority of people selected the certain \$3,000 even though its expected value is lower by \$200 (Kahneman and Tversky, 1974, p. 266). The conventional, neo-classical model of utility preferences reflects this common, risk-averse behavior through the now standard principle of diminishing marginal utility. Graphically, this corresponds to the concavity of the utility function, as seen in Figure 1.5. One further property of this model is that preferences do not depend on the “reference point” from which one evaluates them; initial endowments do not affect preferences. A simple application of this property is that, all transaction costs and income effects aside, the value or price a person would be willing to accept (the WTA) for good X (a mug, for example), the value of X when he owns it, will not differ from his willingness to pay (the WTP) for good X, the value of X when he does not own it. Empirical evidence, however, has suggested the influence of the reference point, the initial condition of owning or not owning a good, on the valuation of that good.

According to these results, we seem to value a good more when we own it than when we do not.

Over the last 35 years, researchers have studied a theory of “reference-dependent preferences.” In this framework, a good’s value from the position of ownership – the value of a loss – is greater than the same good’s value from the position of non-ownership – the value of an equal sized gain; thus, losses may weigh more heavily than commensurate gains. For example, if an individual received the \$5 coffee mug for free in the mail, although he elected not to purchase it for \$5 ( $WTP < 5$ ), he may elect not to sell it for \$5 once he has it, even with negligible transaction costs ( $WTA > 5$ ). A large difference between the minimum value an individual would accept to give up a good and the maximum value he would pay to acquire the same good (the “WTA-WTP gap”) contradicts the conventional model of utility theory. The prevalent phenomenon of  $WTA > WTP$  is known as the “endowment effect” (Thaler, 1980)<sup>1</sup> and is very common in the literature (for a review see Horowitz and McConnell, 2002). There is, however, continued debate as to both the cause and the universality of endowment effect findings.

This paper attempts to address both issues simultaneously. It differentiates itself from previous work in two ways. No prior study has applied a complete set of experimental controls and still found a WTA-WTP gap (Plott and Zeiler, 2005, p. 537); therefore, I hypothesize that the extensive controls used here will moderate the size of the WTA-WTP gap. Further, this study is the first to directly test whether the existence and size of the WTA-WTP gap are conditional upon the unfamiliarity of the endowment good, where in this paper “familiar” goods are regularly consumed goods purchased with very low opportunity cost consideration. I elicit WTA and WTP valuations for two goods,

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<sup>1</sup> The endowment effect is so named for the inherent preference towards one’s current endowment.

sandwiches from two different sandwich shops (via gift certificates), that differ in one fundamental way: how often test subjects eat them. The findings reveal evidence that a WTA-WTP gap does exist, although it is far smaller than reported in some previous studies. As predicted, WTA-WTP gaps decrease in size as goods become more familiar and, in many trials for familiar goods, the gap was not statistically different from zero. Together, these findings imply that the endowment effect exists only when the endowment good is unfamiliar.<sup>2</sup>

The paper lays out the model of conventional preference theory and summarizes the modifications the WTA-WTP gap implies. Further, it explains and defines the endowment effect, the most important implication of loss aversion. Section 2 explores the mental framing and accounting of decision making and relates these cognitive processes to WTA-WTP disparities. Section 3 reviews experiments similar to this study and examines the trends and experimental design flaws in those results. Section 4 describes this study's experimental design and methods with the results of the study presented in section 5. Finally, sections 6 and 7 conclude by discussing implications and foundations for future research.

## **1 Neo-Classical and Reference-Dependent Models**

### 1.1 Valuation of Goods

Experimental trials often measure the value of an amount of a good  $Y$ ,  $\Delta Y$ , in terms of the amount of another good  $X$ ,  $\Delta X$ , exactly sufficient to make the individual indifferent between the two endowments. Consider the value of the good 7 units of good  $Y$  ( $\Delta Y = Y_7$ ) in Figure 1.1 with points A,B,C and D representing possible initial endowments (4,10),

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<sup>2</sup>While the term "loss aversion" is used often for consistency with the prior literature, a particular distaste for losses is not implied by the results of this study. In the following sections, "loss aversion" refers exclusively to the value disparity between ownership and non-ownership conditions in which losses have more weight than gains because of the higher ownership value; it makes no comment about why.

(4,3), (12,3) and (12,10) respectively. Each point represents a possible endowment condition (where  $X_{\text{high}}$  is  $X = 12$  to stand for a high endowment of good X, of which  $X_8$  could be exchanged for  $Y_7$ ) as follows: A: endowed with only  $Y_7$ , B: endowed with neither  $Y_7$  nor  $X_{\text{high}}$ , C: endowed with only  $X_{\text{high}}$  and D: endowed with both  $Y_7$  and  $X_{\text{high}}$ . Let  $(X_n, Y_n)$  equal the values of X and Y at n and  $u_n(X, Y)$  represent the two good utility function evaluated from the point n, such that at any n where  $n \in N$ ,  $N = \{A, B, C, D, \dots\}$ ,  $u_n(n) = u_n(X_n, Y_n)$ . For example, in Figure 1.1  $u_A(A) = u_A(C)$  and  $u_A(X_A, Y_A) = u_A(X_C, Y_C)$  where at  $u_A(X_C, Y_C)$  C indexes the point referenced from A.<sup>3</sup> For any points  $n_i$  and  $n_j$  where  $i$  is the initial point and  $j$  is the final point reflecting the change in X required for  $u_i(n_i) = u_i(n_j)$ ,

(1) the value of  $\Delta Y$  can be written terms of  $\Delta X_{ij} = |X_j - X_i|$  where  $\Delta X_{ij}$  is the amount of good X necessary to make the individual indifferent to the change of  $\Delta Y$  from  $n_i$  to  $n_j$ .

When  $n_i$  is a point endowed with  $Y_7$  (A or D), the value of  $Y_7$  is elicited through a loss of  $Y_7$ ; the opposite is true when  $n_i$  is not endowed with  $Y_7$ . Thus, four types of valuation are possible by starting at each of the points A, B, C, D (Bateman, et al, 1997, p. 481). The four valuations can be defined by the following equations, each illustrated by a movement between endowment points.

(2) *From point A to C, WTA (willingness-to-accept)* Moving from A to C implies a loss of  $Y_7$  ( $Y_C = Y_A - Y_7$ ). The value of  $Y_7$  is the value of  $\Delta X_{AC}$  where  $u_A(X_A, Y_A) = u_A(X_A + \Delta X_{AC}, Y_A - Y_7)$ . Because  $u_A(X_A, Y_A) = u_A(X_C, Y_C)$ ,  $\Delta X_{AC} = |X_C - X_A|$ . Thus, the WTA value of a loss of  $Y_7$  is the increase in X sufficient to make the individual indifferent about the loss of  $Y_7$ .  $WTA = \Delta X_{AC}$ .

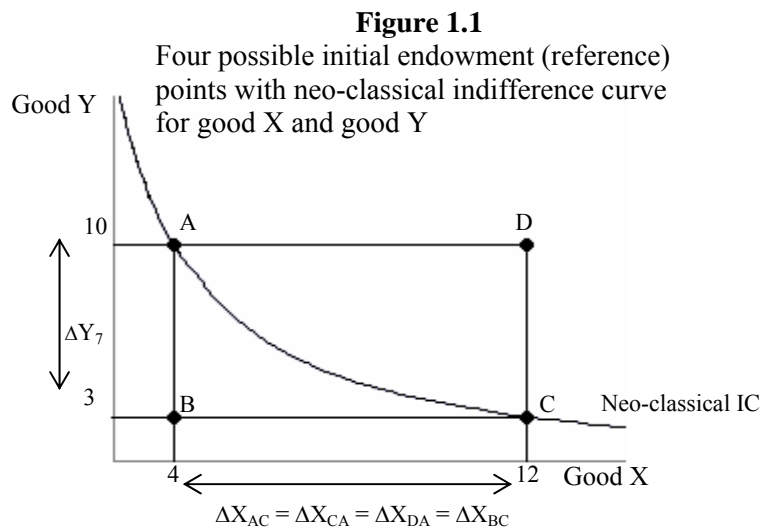
(3) *From point C to A, WTP (willingness-to-pay)* Moving from C to A implies a gain of  $Y_7$  ( $Y_A = Y_C + Y_7$ ). The value of  $Y_7$  is the value of  $\Delta X_{CA}$  where  $u_C(X_C, Y_C) = u_C(X_C + \Delta X_{CA}, Y_C - Y_7)$ . Because  $u_C(X_C, Y_C) = u_C(X_A, Y_A)$ ,  $\Delta X_{CA} = |X_A - X_C|$ . Thus, the WTP value of a loss of  $Y_7$  is the decrease in X sufficient to make the individual indifferent about the gain of  $Y_7$ .  $WTP = \Delta X_{CA}$ .

<sup>3</sup> Accordingly,  $u_C(A) = u_C(C) = u_A(X_A, Y_A) = u_A(X_C, Y_C)$ .



(4) *From point D to C (change in Y) or A (change in X), EL (equivalent loss)* Moving from D to C implies a loss of  $Y_7$  ( $Y_C = Y_D - Y_7$ ). The value of  $Y_7$  is the value of  $\Delta X_{DA}$  (note that it does not equal  $\Delta X_{DC} = 0$ ) where  $u_D(X_D, Y_D - Y_7) = u_D(X_C, Y_C)$ . Because  $u_D(X_C, Y_C) = u_D(X_A, Y_A) = u_D(X_D - \Delta X_{DA}, Y_D)$ ,  $u_D(X_D - \Delta X_{DA}, Y_D) = u_D(X_D, Y_D - Y_7)$  and  $\Delta X_{DA} = |X_D - X_A|$ . Thus, the EL value of a loss of  $Y_7$  is the decrease in X sufficient to make the individual indifferent between that loss and the loss of  $Y_7$ .  $EL = \Delta X_{DA}$ .

(5) *From point B to A (change in Y) or C (change in X), EG (equivalent gain)* Moving from B to A implies a gain of  $Y_7$  ( $Y_A = Y_B + Y_7$ ). The value of  $Y_7$  is the value of  $\Delta X_{BC}$  (note that it does not equal  $\Delta X_{BA}$ ) where  $u_B(X_B, Y_B + Y_7) = u_B(X_A, Y_A)$ . Because  $u_B(X_A, Y_A) = u_B(X_C, Y_C) = u_B(X_B - \Delta X_{BC}, Y_B)$ ,  $u_B(X_B - \Delta X_{BC}, Y_B) = u_B(X_B, Y_B + Y_7)$  and  $\Delta X_{BC} = |X_B - X_C|$ . Thus, the EG value of a loss of  $Y_7$  is the increase in X sufficient to make the individual indifferent between that gain and the gain of  $Y_7$ .  $EG = \Delta X_{BC}$ .



This paper will test a model in which preferences are “reference-dependent;” that is, from different initial endowment points (reference points), individuals report different valuations of a good ( $Y_7$  or otherwise).<sup>4</sup>

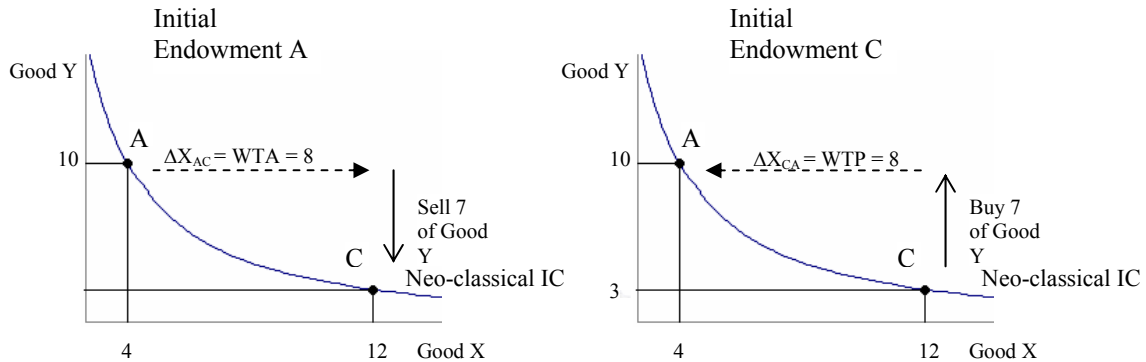
## 1.2 Comparisons to the Neo-Classical Model of Preferences

The conventional model of preferences assumes that value does not depend on initial endowment. Thus, (in the absence of income effects, information asymmetries, and transactions costs) preferences between goods are identical when evaluated from any initial

<sup>4</sup> Despite possible limitations of using only two (out of four) valuations, the vast majority of the literature uses only WTA and WTP valuations (e.g. Horowitz and McConnell, 2002; Kahneman, Knetsch and Thaler, 1990; Saymen and Onculer, 2005). Further, Bateman et al. (1997, p. 499) find that even when using all four valuation measures, trends are similar to those found using only WTA and WTP. Thus, although WTA-WTP measures are not a completely comprehensive test of preferences, this study follows the precedent of preceding work and does not examine EG or EL.

endowment and indifference curves (ICs) between goods are always reversible, identical moving from A to C and from C to A (Figures 1.1 and 1.2 illustrate the neo-classical

**Figure 1.2**



theory). When an individual considers selling starting from point A, (buying starting from point C)  $Y_7$ , exactly  $\Delta X_{AC}$  ( $\Delta X_{CA}$ ) will make him indifferent between the potential sale (purchase) of  $Y_7$  and his current position. At A, one would be willing to accept 8 or more of good X,  $\Delta X_{AC} \geq |X_C - X_A| = WTA = 8$ , to move from A to C; he would require a gain of  $\Delta X_{AC} = 8$  to maintain an equal level of utility after giving up  $Y_7$ . To move back from C to A, for a gain of  $Y_7$  he would pay a maximum of 8 of good X,  $\Delta X_{CA} \leq |X_A - X_C| = WTP = 8$ ; he would require a loss of  $\Delta X_{CA} = 8$  to maintain an equal level of utility after gaining  $Y_7$ . Thus, in this model, the maximum  $WTP = \Delta X_{CA}$  is equal to the minimum  $WTA = \Delta X_{AC}$ . Recalling that A and C are reference points with different endowments of  $Y_7$ , we see that the difference in initial endowment does not imply a difference in value of  $Y_7$ .

Thus, for the neo-classical model,

(6)  $u_A(X_A + \Delta X_{AC}, Y_A - Y_7) = u_A(X_A, Y_A) = u_A(X_C, Y_C) = u_A(X_C - \Delta X_{CA}, Y_C + Y_7)$ ; <sup>5</sup> therefore,  $\Delta X_{AC} = \Delta X_{CA}$ ,  $WTA = WTP$ .

The WTA and WTP recorded in many studies, however, has eroded support for the reference independence of the conventional theory. In a broad survey of WTA-WTP

<sup>5</sup> Accordingly,  $u_C(X_C - \Delta X_{CA}, Y_C + Y_7) = u_C(X_C, Y_C) = u_C(X_A, Y_A) = u_C(X_A + \Delta X_{AC}, Y_A - Y_7)$ ; which would also prove  $\Delta X_{AC} = \Delta X_{CA}$ ,  $WTA = WTP$

studies, Horowitz and McConnell found the mean WTA/WTP ratio for trials with market goods to be 2.9 (2002, p. 433).<sup>6</sup> This remarkably high ratio comes from varied experimental designs, none of which adequately control for possible biases, and may be mollified greatly in experiments with complete controls (Plott and Zeiler, 2005). Nevertheless, the preponderance of high WTA/WTP ratios suggests that individuals often value a good more they own it than when they do not; thus, *the starting point has importance in shaping the indifference curves.*

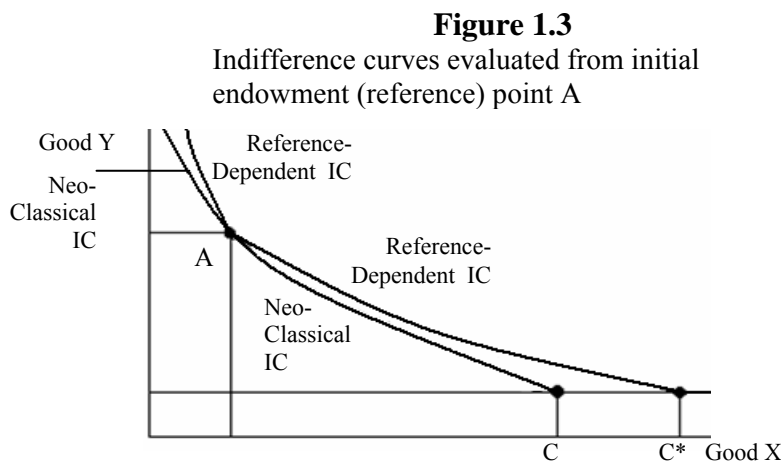


Figure 1.3 illustrates the difference between a reference-dependent IC and a neo-classical IC. In this reference-dependent context, individuals need to be compensated more when they are giving up a good than when they are receiving it in order to stay on the same IC; thus, the ICs *depend on the reference point*. A reference-dependent structure has the property of loss aversion<sup>7</sup> for good Y for all points n and m<sup>8</sup> where  $Y_n > Y_m$ ,  $\Delta X_{nm} > |X_m - X_n|$ .<sup>9</sup> Because each direction from the reference point represents the loss of a different good, reference-dependent ICs have a kink in the IC at the reference point, as

<sup>6</sup> This paper will reexamine this sample more carefully and divide the market goods based on familiarity.

<sup>7</sup> “Loss aversion” implies *only* the higher value of goods from the ownership compared to the non-ownership condition, as explained more fully in footnote 2.

<sup>8</sup> In the figures, the points n and m are represented by A and C.

<sup>9</sup> Similarly, loss aversion for good X is defined by  $X_n > X_m$ ,  $\Delta X_{nm} < |X_m - X_n|$ .

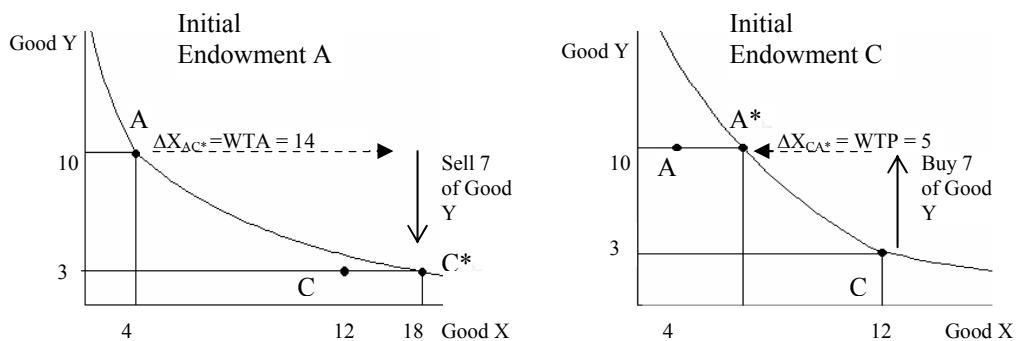
illustrated in Figure 1.3. Thus, the reference-dependent IC for A is unique to an individual who begins with (4,10) and would not apply to any other point, even those on the IC itself, because only at A is a loss defined as  $X < 4$  or  $Y < 10$ .

Figure 1.4 reconsiders the valuations of  $Y_7$  from point A and point C with loss-averse preferences. In order to give up  $Y_7$  as before, one would now require 14 of X to remain indifferent between the two because with reference-dependent preferences,  $u_A(A) \neq u_A(C)$ . Now,  $\Delta X_{AC^*} > \Delta X_{AC}$  because of the higher value in the ownership condition; thus,  $u_A(A) = u_A(C^*)$ .  $\Delta X_{AC^*} = |X_{C^*} - X_A| = WTA = 14$ . Similarly, when gaining  $Y_7$  starting from C, loss aversion for good X means that one would be willing to give up less of good X than traditionally predicted, only 5 units because now  $u_C(A) \neq u_C(C) = u(A^*)$ ; thus,  $\Delta X_{CA^*} = |X_C - X_{A^*}| = WTP = 5$ . Thus, the  $WTA > WTP$  and the  $WTA - WTP$  gap is 9.<sup>10</sup>

Thus for the reference-dependent model,

$$(7) \quad u_A(X_A + \Delta X_{AC^*}, Y_A - Y_7) = u_A(X_A, Y_A) = u_A(X_{C^*}, Y_{C^*}), \quad u_C(X_C - \Delta X_{CA^*}, Y_C + Y_7) = u_C(X_C, Y_C) = u_C(X_{A^*}, Y_{A^*}) \text{ and } X_{C^*} > X_C, X_{A^*} > X_A \text{ therefore, } \Delta X_{AC^*} > \Delta X_{CA^*}, WTA > WTP.$$

**Figure 1.4**



<sup>10</sup> It is important to note here that the WTA would exceed the WTP even if the individual experiences loss aversion for only one of the two goods (although the  $WTA - WTP$  gap would be smaller). When good X is an “exchange good” for which people do not have loss-averse preferences (tokens redeemable for cash are the classic exchange good), the WTA would still increase ( $C^* > C$ ;  $\Delta X_{AC} < \Delta X_{AC^*}$ ) while the WTP would not change ( $A = A^*$ ;  $\Delta X_{CA} = \Delta X_{CA^*}$ ). This is the situation when, as is done in this paper, goods are valued in terms of money, which is generally considered to be an exchange good.

To return to the example of the \$5 coffee mug, one could consider  $Y_7$  as the mug and the 8 units of good X as \$5.<sup>11</sup> In the conventional model (Figure 1.2), a person would pay \$5 or less for the mug and would sell it for \$5 or more; the  $WTA = WTP = \$5$ . An individual with reference-dependent preferences (Figure 1.4) at A would require more than \$5 ( $\Delta X_{AC^*} > \Delta X_{AC}$ ). Similarly, the individual without the mug at C would no longer buy the mug for \$5; he would pay less ( $\Delta X_{CA^*} < \Delta X_{CA}$ ) because he requires additional compensation for the shift from the ownership to non-ownership evaluation of good X.<sup>12</sup>

### *Reference-Dependent Utility Functions*

In the accepted neo-classical model, an individual's preferences are reversible, transitive, continuous and both concave and increasing over positive bundles (Bateman et al, 1997, p. 481). Because the conventional model assumes invariance in preferences, the utility function is symmetric in gains and losses; the absolute value of the slope of the utility function is the same above (in quadrant 2) and below (in quadrant 4) the origin (the left panel of Figure 1.5).<sup>13</sup> Thus, the model assumes that the gain of a good causes the same size impact on utility as a loss of the good; for example, the amount of utility lost giving up a \$5 coffee mug is exactly equal in absolute value to the utility from gaining that mug.

The empirical demonstrations of reference-dependence, however, contradict this property of the conventional utility function. Tversky and Kahneman (1991) developed a more specific "reference-dependent utility function" that directly incorporates loss

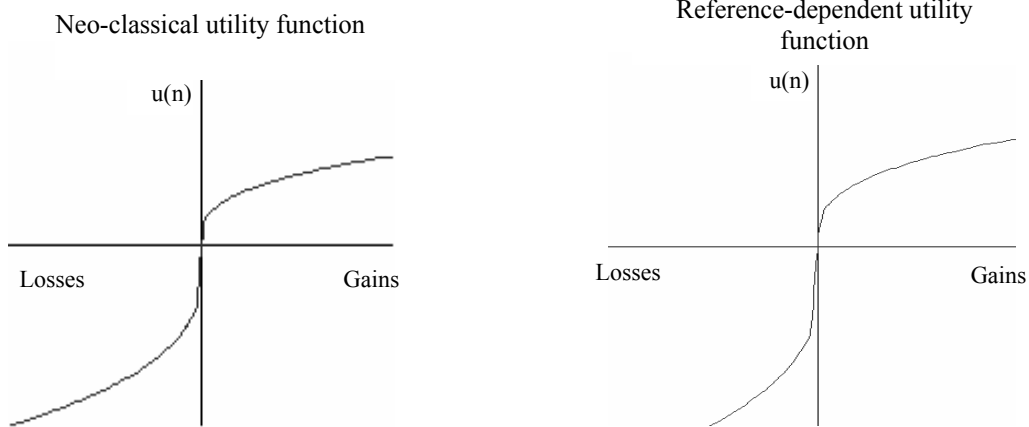
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<sup>11</sup> Although individuals generally do not exhibit loss aversion for money because money is an exchange good, in this case dollars are treated as a consumption good for which loss aversion would apply. In accordance with footnote 10, this does not change the point of the example,  $WTA > WTP$ .

<sup>12</sup> This is true only if the person is loss-averse towards good X, which is not the case with dollars.

<sup>13</sup> All of the utility diagrams assume that income effects are negligible for possible gains and losses. This is done both for simplicity and because it is correctly assumed for the inexpensive goods used in most of the relevant literature.

**Figure 1.5**



aversion.<sup>14</sup> The right panel of Figure 1.5 traces the reference-dependent utility function where the origin represents the current endowment point.

If humans were hyper-rational, each person would determine his reference point via an instantaneous summation of all of his possessions. No one takes an exact inventory his assets before making valuations and thus the reference point is *subjective* and influenced by mental processes. The cognitions driving evaluations from different reference points do not always receive due consideration (Tversky and Kahneman et al (1991, p. 1046) explicitly leave this issue unresolved) but are explored at length in section 2.

#### *Qualifying Comparisons to Neo-Classical Theory*

WTA-WTP disparities are often assumed to violate neo-classical principles because valuations differ based on reference point (Bateman et al, 1997, p. 481); however, WTA-WTP gaps do not *necessarily* provide evidence contradicting the classical theory.<sup>15</sup> Randall and Stoll (1980) first found that while WTA might rationally exceed WTP in neo-classical theory, if income effects are small – most studies use goods valued around \$5 – WTA should exceed WTP by no more than a few percentage points. The most prominent

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<sup>14</sup> Kahneman and Tversky (1974) first suggested utility function that accounted for loss aversion as a part of a larger theory known as “prospect theory.”

<sup>15</sup> While large income effects, high transactions costs, and information asymmetries would all explain the WTA-WTP gap, these simple explanations are extensively controlled for in nearly all tests.

explanation of WTA-WTP gaps within the neo-classical preference model attributes larger WTA/WTP ratios to poor substitutability between the goods (money and air quality, for example) (Hanemann, 1991). Without a sound measure of the substitutability of goods (and because most market goods and money are good substitutes), it is hard to say that this theory reconciles the observed WTA-WTP gaps with the neo-classical model.

## 1.2 Implications of Reference-Dependence: The Endowment Effect

The reference-dependent utility function predicts several behavioral patterns in direct contradiction to the traditional expectation. Most research has centered around the “endowment effect” (Thaler, 1980). The endowment effect is not separate from reference-dependence; rather, it is the most common demonstration of its influence on choices.

### *The Endowment Effect*

The endowment effect refers to the tendency of an individual to value an object more as soon as he owns it. Because this utility weighting is revealed via preferences, the endowment effect is particularly well suited for experimental tests. It has been extensively demonstrated in studies that randomly divide a sample between two different reference points by giving half of the sample a small market good (a coffee mug is a common good) and then eliciting values of the good from each group. Individuals without the good give their value via WTP and those with the good do so via WTA. Higher WTA/WTP ratios indicate larger endowment effects. In trials with coffee mugs, Swiss chocolate bars, sports memorabilia, binoculars and many other goods, participants who start with the good report a WTA that exceeds the WTP reported by participants who start without the good.

The size of the WTA-WTP gap has varied based on many factors including the nature of the endowed good itself (Horowitz and McConnell, 2002; Saymen and Onculer, 2005). The endowment effect does not appear with equal strength in every situation. “Exchange goods” whose primary purpose is exchange – inventory in a store or money, for

example – do not elicit an endowment effect (Kahneman, 1992; Horowitz and McConnell, 2005). Thus the endowment effect applies only to “consumption goods,” goods the subject intends to use rather than put on eBay (making it an exchange good).

In experiments, the endowment effect shows up in a large WTA-WTP gap. Many of these trials elicit the WTA and WTP immediately after the endowment is received, evidencing an “instant endowment effect” (Kahneman, et al, 1990). While one might logically explain the “overvaluation” of a good he owns with many reasons other than a behavioral irrationality (increased information and sentimental attachment for example), none of these reasons apply to the experimental case. Thus, these instant endowment effects especially support the legitimacy of a reference point induced WTA-WTP gap.

Knetsch (1989) demonstrated the power of the endowment effect in a simple experiment. He conducted two trials in separate rooms in which he gave the group in one room a chocolate bar and the group in the other room a coffee mug. Then, he asked each subject if he would trade for the other item (those who received chocolate could trade for a mug and vice versa). Only ten percent of participants in *each* condition chose to trade.

Despite the robustness of some findings, many authors are critical of the endowment effect, particularly because experiments that find the endowment effect often use insufficient experimental controls. Thus, while the preponderance of evidence for an endowment effect is encouraging, it is far from conclusive.

## **2 Mental Framing in Decision Making**

The “mental framing” of a good or situation refers to the cognitive processes by which an individual interprets a situation and makes choices. Individuals often use simplifying cognitive heuristics that can cause preferences to violate the neo-classical principle of invariance, thus diverging from the paradigm of the rational actor (Kahneman



and Tversky, 1974, 2003).<sup>16</sup> The WTA-WTP disparity illustrates that valuations may differ based solely on mental framing differences; the good is identical in the two conditions (ownership or non-ownership), yet the mental framing of the good clearly differs based on context. The mental framing behind the endowment effect is *not* necessarily an innate opposition to loss, as the term “loss aversion” seems to imply; any framework where a good is valued more from the ownership condition would create  $WTA > WTP$ .<sup>17</sup> Two types of mental framing may cause what appear to be non-utility maximizing choices in the current period: 1) intuition, the instantaneous evaluation of choices made without conscious effort, and 2) mental accounting, cognitive guidelines and accounts that guide consumer spending and decision making.

## 2.1 Accuracy of Cognitive Judgments

Frederick (2003, personal communication as cited in Kahneman, 2003, p. 1450) used a simple puzzle to demonstrate the prevalence of intuition based error. He asked the question, “A bat and a ball cost \$1.10 in total. The bat costs \$1 more than the ball. How much does the ball cost?” 54% of nearly 400 respondents answered this question incorrectly because they gave the intuitive response: “ten cents.” The quality of the intuitive decision depends on several factors, but “the rules that govern intuition are generally similar to the rules of perception (Kahneman, 2003, p. 1450).” The accessibility of intuitions (the ease with which they come to mind) in a particular decision depends crucially on familiarity and on salience. Intuitive choices are most accurate in very familiar situations and where the options are very salient and accessible to the decision

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<sup>16</sup> The limitations of the individual to make completely rational choices, as illustrated by the aforementioned study where a certain \$3000 was preferred to an 80% chance to win \$4000 despite the lower expected value, represent the “bounded rationality” of human decision-making (Kahneman, 2003).

<sup>17</sup> This study finds that the endowment effect exists for some goods and not for others; thus, the endowment effect is *not* determined by the presence of a loss. The description “loss aversion” associated with the mental framing behind the endowment effect may be a misnomer. For example, section 2.2 explains how hyperbolic discounting and our internal protections against its time inconsistent preferences could also create endowment effects.

maker.<sup>18</sup> The context of the choice options also influences preferences (Kahneman, 2003, p. 1455). For example, Thaler (1999 p. 248) found that individuals would pay more for a cold drink purchased at a resort than at a convenience store, even if the individual did not experience any utility from the actual place of purchase. The “reference value,”<sup>19</sup> the standard, expected option (here, the price of a drink at the resort or convenience store), is overwhelmingly favored in intuitive choice decisions (Kahneman, 2003, p. 1459).

When we walk into any store, what we *can* buy with our assets is not equal to what we *consider purchasable*. The difference between the two is often the result of mental accounting practices that guide consumer spending (Thaler, 1999). According to this hypothesis, assets – even money from different sources – are not seen as fungible largely because of various mental accounts that consumers use. For example, an increase in the value of home equity does not correlate with an increase in leisure spending because they are in separate mental accounts (Levin, 1998). Thus, the mental account to which we assign a good will influence our perception of transactions involving that good (Thaler, 1999, p. 243). Mental budgets constrain the consumers’ decisions on nearly all scales. Kahneman and Tversky (1984) found that subjects were less willing to purchase a ticket to a play after having lost their original ticket than after having lost an equivalent amount of money. A specific mental account for the theatre going experience explains this finding because while a second ticket might strain the theatre mental account, the loss of money does not apply to it (Thaler, 1999, p. 251). Although mental accounting and budgeting often prevent us from spending beyond our means and over-consuming, they also create certain irrational frames where utility is reference-dependent thus creating endowment effects.

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<sup>18</sup> The chess master who walks by a chess match and, apparently without thinking, remarks “white mates in three,” is a classic illustration of the influence of familiarity on intuitive choice (Kahneman, 2003, p. 1450).

<sup>19</sup> “Default option” in Kahneman (2003, p 1459).

## 2.2 Defining the Consumption Bundle

Because the endowment effect relies critically upon an underpinning of intuitive decisions and mental accounting, the perception of goods in these cognitive frameworks is the key to determining how the nature of a good influences the endowment effect. The mental framing behind the endowment effect may follow a process where the endowed individual thinks, “if I do not keep this good, I would not otherwise buy it; therefore, I will not have it unless I keep it now,” and value a good highly. The unendowed individual, however, may think, “why would I buy this good now? I would not otherwise buy it; therefore, I have no reason to purchase it now,” causing him to place a low value on the good. This inconsistent reasoning occurs most frequently with goods for which we do not well-practiced judgments or with goods for which we have strong mental budget constraints. Thus, goods that are farther from an individual’s *consumption bundle* (CB) tend to produce the largest endowment effects.

For all goods complete *familiarity to the consumption bundle* is defined as the extreme of three characteristics, all of which exist on a continuum.<sup>20</sup>

i) *Full accessibility*: for goods familiar to the consumption bundle, the mental positions of owning or not owning the good are equally and easily accessible no matter the reference point. With full accessibility, both owners and non-owners evaluate the good with knowledge of the perspective of owning and of not owning the good. If the perspective of ownership is not accessible, intuitive judgments become reference-dependent because the un-endowed individual values the good without the non-accessible ownership perspective.

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<sup>20</sup> While “familiarity to the consumption bundle” is admittedly added to the research ad hoc, it is certainly in the spirit of the work, particularly that of Thaler (1999).

- ii) *Bi-conditional reference valuation*: for goods familiar to the consumption bundle, the individual has a practiced default mental “reference value” for the good both in the condition of ownership and non-ownership. For most goods we purchase regularly, our reference value for the good is equal to (or relatively near) the market price. Because we favor the reference value, accurate reference values equate to informed valuations. Bi-conditional reference valuation of a good implies that conditions of ownership and non-ownership have the same reference values and thus will not evaluate a good differently.
- iii) *“Un-booked” expenditures*: for goods familiar to the consumption bundle, the expense of purchasing the good is not “booked” into the mental accounting budget constraint. Heath and Soll (1996, p. 42) describe “booking” as the first stage of mental accounting where expenses enter the accounting system. This is the most crucial and indicative of the three conditions for CB familiarity and often encompasses the other two. Thaler (1999, p. 255) gives coffee or lunch at the workplace as examples of non-booked purchases. For un-booked goods, the purchase of the good does not enter into the mental account and thus does not affect other spending decisions (assuming no liquidity constraints); the individual does not consider the opportunity costs of the un-booked purchase and thus it does not change the mental reference point of the individual.

#### *Consumption Bundle Driven Predictions of WTA-WTP Disparities*

In the neo-classical framework, all goods are treated as exchange goods with complete fungibility. Exchange goods behave in accordance with the neo-classical paradigm and are absolutely familiar to the CB because for example, for any particular dollar, the mental state of owning that dollar does not differ from the mental state of not owning that particular dollar. Goods that are not CB familiar facilitate mental perceptions that differ based on the condition of ownership versus non-ownership, predicting an endowment effect as follows:

*Full accessibility* While from the ownership condition (WTA) one can always intuit both owning and not owning a good, the ownership perspective on a non-CB good may not be accessible to un-endowed (WTP) individuals. Loewenstein and Adler (1995) confirm that un-endowed individuals do significantly underestimate how much they will value a good once they possess it. Thus, for non-CB goods the lower accessibility of ownership leads to these underestimations which drag down WTP and create WTA–WTP gaps.

*Bi-conditional reference valuation* For goods outside of the CB the default value is unclear and may tend toward zero because we often do not pay for these items (for example, how much do you currently pay for your private jet? how much for cleaner air?). The conditions of ownership and non-ownership for these goods therefore differ in that in the non-ownership condition we lack a realistic reference value for the good. Because our valuations reflect our reference value, the unrealistic WTP valuation will likely fall short of the more accurate WTA, creating an endowment effect.

*Un-booked Expenditures* Thaler (1999, p. 257) provides an excellent demonstration of how mental accounting influences preferences and leads to endowment effects for goods outside the CB. He considers a couple who enjoys drinking wine with dinner but cannot afford to spend too much money per night on alcohol. To prevent over-spending, they decide that they will never buy wines that cost more than \$20 a bottle (maximum WTP). However, as Thaler states, “this policy might not be optimal in the sense that an occasional \$30 bottle of champagne would be worth more than \$30 to them [that is, the champagne’s value once they have it is over \$30;  $WTA \geq \$30$ ] (1999, p. 257).” Thus, the couple understands the value of the non-CB wine to be greater when they own a bottle than when they do not.<sup>21</sup> “Booked” goods have internalized budget constraints that limit how much

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<sup>21</sup> One can imagine that for a \$50 bottle of wine the difference may have been even more pronounced because the WTP, limited by a self-imposed mental budget constraint, would probably not increase.

we would spend on a good (WTP) but do not limit how much we would enjoy a good (WTA). The limits are stronger for non-CB goods, thus the disparity between WTA and WTP may be larger. Un-booked goods, however, avoid such cognitive restrictions and therefore  $WTA = WTP$ .

### **3 Literature Review**

This literature review focuses on WTA/WTP ratios for experiments using real exchanges of market goods. It excludes literature that elicits endowment effects with contingent valuation techniques (hypothetical questionnaires) because of the continued controversy over this method (Horowitz and McConnell, 2000).<sup>22</sup> Unlike past literature reviews, I isolate the incidence of the endowment effect in cases most similar to this paper's experiment, and thus obtain a better sample than would be possible with a wider net. Despite this, I review 102 trials and 7044 subjects in various experimental designs (several studies were reviewed but excluded). I examine three specific hypotheses regarding the observed WTA-WTP disparities: 1) trials using endowment goods that are not familiar to the CB will report high WTA/WTP ratios 2) trials using exchange goods and endowment goods familiar to the CB will report no endowment effect and 3) subject misconceptions and other confounds in study designs have inflated previously reported WTA-WTP gaps.

I find promising support for the importance of CB familiarity in two ways: 1) I break the body of studies into categories which increase in WTA/WTP ratio as they are less familiar to the CB and 2) I compare valuations of similar goods within and between studies and again find that CB unfamiliarity also tends to increase WTA/WTP ratio. This second section also explains why potential confounds do not undermine the revealed significance

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<sup>22</sup> Additionally, contingent valuation is used for non-market goods that are hard to analyze relative to the CB as defined in section 2.2. Thus, neither the design nor the good in these studies is applicable here.

of CB familiarity in previous work. The third section considers recurrent flaws in study methodology that may explain the endowment effect findings in the framework of neo-classical preferences. Further, because it analyzes crucial elements of study designs, this third section lays the foundation for the study performed in this paper.

#### *Desirability of Good Condition*

As frequently noted, exchange goods produce the lowest endowment effects. List (2003, p. 493) states that to elicit true values, the endowment good needs to be valued for its consumption utility, not for resale value. For goods with relatively costless exchange (which, thanks to eBay, may soon include essentially all goods), the exchange value of the good increases to the reasonable resale value of the good. Thus, for non-desirable goods (indicated by WTA and WTP dramatically below the good's market price), exchange value may exceed consumption value, causing both maximum WTP *and* minimum WTA to converge on their lower bounds –the good's exchange (resale) value which is not reference-dependent – pushing the WTA/WTP towards 1. Thus, trials with WTA and WTP less than 25% of market price do not satisfy this “desirability of good condition” and are excluded. Especially as the cost of exchange continues to drop, future experiments should consider this condition in interpreting WTA/WTP findings for non-desirable goods.

#### 3.1.1 General Trends Supporting the Importance of CB Familiarity

The introduction of CB familiarity to the analysis of WTA/WTP ratios does not conflict with (and in fact may explain) the previously postulated endowment effect patterns. The most prominent existing finding is that public, non-market goods (health and safety for example) have the highest WTA/WTP ratios which decrease as the endowed good becomes

Table 3.1  
WTA/WTP Comparisons Based on CB Familiarity of Endowment Good  
Degree of Consumption Bundle Familiarity

	Exchange Goods	Familiar to the Consumption Bundle	Unfamiliar to the Consumption Bundle
<i>n</i>	359	1294	3319
Mean WTA	3.87	0.36 <sup>b</sup>	6.07 <sup>c</sup>
Weighted mean WTA	3.88	0.38 <sup>b</sup>	6.51 <sup>c</sup>
Mean WTP	3.82	0.34 <sup>b</sup>	2.74 <sup>c</sup>
Weighted Mean WTP	2.09	0.37 <sup>b</sup>	2.97 <sup>c</sup>
Mean WTA/WTP	1.02	1.07	2.54
Weighted mean WTA/WTP	1.02	1.07	2.45
Percent of trials using incentive compatible design	100%	100%	94%
Mean practice rounds per trial	0.7	1.8	3.9 <sup>d</sup>
Percent of trials using real payments	25%	100%	100%
Percent of trials controlling for income effects	0%	74%	21%
Percent of trials using choice-based response	100%	45%	71%

<sup>a</sup> Four experiments were excluded from the CB familiarity sample groups. In order to keep the sample consistent, Coursey, Hovis and Schelze (1987) and the second trial of Boyce et al. (1992) were excluded because they do not use a market good (subjects pay to avoid tasting a bitter substance and to save the life of a pine-tree). For both studies, ratios are consistent with other goods not in the CB (WTA/WTP > 2.3). The trials for binoculars performed by Kahneman (1990) are excluded because of the desirability of good condition described in section 2 (WTA was 25% of market value). Adamowicz (1993) uses an expensive good that does not have universal appeal (collectible ticket stubs and hockey game tickets). Although valuations in Adamowicz (1993) are (barely) permissible in the desirability condition, the further presence of an uncontrolled for income effect with the relatively expensive endowment good makes the findings dubious. Both studies had WTA/WTP ratios of approximately 2.

<sup>b</sup> Excludes results from Nayga et al. (2005) because no WTA and WTP were reported. These values would have been several dollars, much closer to the values for the other conditions. For obvious reasons, CB normal goods tend to be lower priced.

<sup>c</sup> Excludes several studies from Kahneman et al. (1990) where WTA and WTP are not reported.

<sup>d</sup> This excludes several studies that use training (e.g., Bateman et al, (1997)) and that have a varied but not reported number of practice rounds (Nayakankuppam & Mishra, 2005); thus, this should be taken as a lower bound on the actual mean of practice rounds per trial. Further, this does not make the important distinction between practice rounds and non-anonymous (i.e. question and answer) training on the market mechanism.

more like a typical market good (Sayman and Onculer, 2005). Classification based on CB familiarity clearly fits this trend; the non-market goods are almost certainly farthest from the CB.<sup>23</sup> Further, CB familiarity accommodates Hanemann's (1991) theory that the non-

<sup>23</sup> These types of goods are especially far from the familiar CB good on the conditions of full accessibility and bi-conditional reference valuation.



availability of substitutes for the endowed good amplifies the income effect and boosts WTA/WTP ratios. A lack of substitutes suggests a rare, likely not CB familiar good.<sup>24</sup>

Studies reporting a WTA and WTP for market goods especially endorse classification by CB familiarity; thus, the reviewed trials were broken into three classifications: “exchange goods” for induced-value tokens (tokens that could be exchanged for a fixed cash amount and have no non-monetary value) which are totally CB familiar,<sup>25</sup> CB familiar goods and non-CB familiar goods. In data analyses, WTA/WTP ratios based on the mean and median ratios are pooled.<sup>26</sup> In accordance with Horowitz and McConnell (2002), WTA/WTP ratios are weighted by  $\sqrt{n}$  to give larger sample sizes more weight but at a decreasing rate.

The exchange goods category included 7 trials and 359 subjects. The weighted mean WTA/WTP ratio was 1.02, confirming the common belief that exchange goods do not induce endowment effects. The CB familiar goods were low priced chocolates and ground beef (the subjects were at a supermarket, about to purchase ground beef (Nayga et al, 2005)).<sup>27</sup> The presence of the ground beef in this sample is especially important because it extends the finding for the inexpensive chocolates onto a higher priced good with similar CB relevance. The CB familiar condition included 11 trials and 1294 subjects for which the weighted mean WTA/WTP ratio was 1.07, confirming the hypothesis that CB familiar goods would elicit small ratios, similar to exchange goods. Finally, there were many

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<sup>24</sup> These results corroborate the earlier finding that subjects are more likely to value higher priced goods irrationally, particularly via overvaluation (Horowitz and McConnell, 2000). High elasticity of substitution may be a good proxy for (but is not equivalent to) CB familiarity.

<sup>25</sup> Thus, the value of an induced-value token is explicit, simple and objective.

<sup>26</sup> Horowitz and McConnell (2002) report a tremendous disparity between ratios based on mean and median values. That relationship is not replicated here. Their finding likely came from mean values pulled by unrealistically high valuations especially common in contingent valuation questionnaires (where extreme responses occur regularly) that inflate means.

<sup>27</sup> At this moment, the beef is CB familiar because it satisfies the first two conditions and the expenditure has already been incorporated into the mental account, making the purchase un-booked.

different non-CB familiar goods.<sup>28</sup> For a sample of 55 trials and 3319 subjects, the weighted mean WTA/WTP ratio was 2.45, evidencing a strong endowment effect. The WTA/WTP and other characteristics of each category are shown in Table 3.1.

### 3.1.2 Specific Comparisons of CB Familiarity and WTA/WTP Ratios

Although no prior study directly compares two similar goods that differ only in their familiarity to the CB, two studies elicit WTA/WTP ratios for two similar goods where degree of CB familiarity can be assumed. Further, six studies elicit WTA and WTP for chocolate, permitting comparisons between CB (cheaper) chocolates and more expensive (non-CB) chocolates.<sup>29</sup> Both approaches reveal higher WTA/WTP ratios for non-CB goods.

Table 3.2:  
Within Study Comparisons Based on Consumption Bundle Familiarity

Condition	Good	Experimenter	<i>n</i>	Mean WTA	Mean WTP	Mean WTA/WTP
More familiar to CB						
	Norfolk Island Pine tree	Boyce et al. (1992)	56	8	4.81	1.66
Less familiar to CB						
	Norfolk Island Pine tree and prevention of destruction of tree	Boyce et al. (1992)	59	18.43	7.81	2.36
More familiar to CB						
	Lesser pen compared to superior pen	Nayakankuppam and Mishra (2005)	47	1.51	1.09	1.39
Less familiar to CB						
	Superior pen compared to lesser pen	Nayakankuppam and Mishra (2005)	47	3.84	1.93	1.99

Nayakankuppam and Mishra (2005) conducted an experiment in which subjects were shown two pens, a “superior” and a “lesser” pen, and then reported WTA and WTP

<sup>28</sup> The experiments in this condition are as follows: higher priced chocolates (Bateman et al, 1997; Brown, 2005; Knetsch, 1989), specialty mugs (Brown, 2005; Franciosi, Kujal, Michelitsch, Smith and Deng, 1996; Kahneman et al, 1990; Morrison, 1997; Nayankuppam and Mishra, 2005), premium pens (Kahneman et al, 1990; Nayakankuppam and Mishra, 2005), sporting event tickets (Adamowicz, Bhardwaj and Macnab, 1993), sports memorabilia (List, 2004), movie-tickets (Adamowicz, et al, 1993), 4-packs of premium soda (Bateman et al, 1997), small pine-trees (Boyce, Brown, McClelland, Peterson and Schulze, 1992) and notebooks (Brown, 2005). These goods may vary in CB familiarity; however, none satisfy the three conditions posited in section 2.2.

<sup>29</sup> While this clearly does not apply universally, the largely college student sample almost certainly finds a Snickers bar more CB familiar than more expensive chocolates.

valuations. In one trial, subjects (having seen both pens) reported values for the better pen; in a second trial, a different set of subjects (also having seen both pens) reported values of the lesser pen. Subjects who reported values of the lesser pen would logically view their good as more familiar to the CB than subjects in the second trial, who reported values of the superior pen. Accordingly, the WTA/WTP ratio for the superior pen (1.99) was 1.43 times the ratio for lesser pen (1.38).

Boyce et al. (1992) corroborate this result when comparing WTA/WTP for a Norfolk Island Pine tree to WTA/WTP for the same tree plus the life of the tree.<sup>30</sup> Moral judgments (or emotional judgments) tend to raise the WTA/WTP ratio (Boyce et al, 1992). Individuals would likely not have a reference price for moral well-being; thus, this usually non-market “good” is clearly outside of the individual’s CB. Again, the endowment effect is more pronounced for the tree plus its life (WTA/WTP = 2.36) than for the tree alone (WTA/WTP = 1.66). Because morality is less CB familiar than pens, this finding extends the example of Nayakankuppam and Mishra (2005). Table 3.2 presents both findings.

Of the goods used in multiple experiments, chocolate goods have the widest price distribution and chocolate’s CB familiarity is relatively well revealed by price. Various quality chocolates differ almost exclusively on the dimension of CB familiarity. Chocolates are again broken into “more familiar to the CB” and “less familiar to the CB” categories. The first group includes only candy bars priced well below \$1.00 while the weighted mean price of chocolates in the second group is \$3.95. The CB chocolates barely evidence any effect (WTA/WTP = 1.07), while the more expensive chocolates do elicit large WTA/WTP ratios (WTA/WTP = 2.37). Table 3.3 presents these results.

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<sup>30</sup> The experimenter stated that after the experiment, unpurchased trees would be disposed of.

Condition	Price range <sup>a</sup>	Number of trials	<i>n</i>	Weighted mean WTA	Weighted mean WTP	Weighted Mean WTA/WTP
More familiar to CB						
Inexpensive chocolates	\$.50-\$1.00	10	810	0.38	0.37	1.06
Less familiar to CB						
Premium chocolates	\$1.75-\$6.80	4	451	9.37	4.46	2.36

<sup>a</sup> Conversions from Great British pounds (from Bateman et al, 1997) to dollars computed at 1997 exchange rate of 1.7:1.

### 3.1.3 Treatment of Experimental Design Conditions in CB Familiarity Comparisons

This literature review’s findings suggest the use of familiarity to the CB as a yardstick for measuring the expected degree of WTA/WTP disparity. While all experiments lack some crucial controls,<sup>31</sup> the trends revealed in this literature are not due to experimental design differences. The lower portion of Table 3.1 presents treatment of several key experimental design characteristics.<sup>32</sup> The following is a brief summary of common experimental design elements and why they do not drive the result that confirms the importance of CB familiarity in previous studies.

*Incentive Compatibility*      Incentive compatible designs are experimental procedures in which each participant’s strictly dominant strategy is to always report his true valuation of the good. Incentive compatible designs elicit more realistic preferences, have an uncertain effect on WTA/WTP ratio and are used in most experiments (including this one).<sup>33</sup>

*Market Experience*      Practice rounds theoretically increase participant understanding of the market valuations mechanism and, if anything, should reduce the WTA/WTP ratio (Sayman and Onculer, 2005). Trials in the CB familiar condition have, on average, more

<sup>31</sup> For example, many studies use the non-neutral language such as “buy” and “sell” which may have preconceived notions (e.g. “buy low, sell high”) associated with it (Franciosi et al, 1996).

<sup>32</sup> Incentive compatible design, number of practice rounds, use of real exchanges, control for income effects and the response mode are presented. Because this is a relatively new sample, most experiments incorporate past criticisms and thus at least employ fundamental controls, such as incentive compatibility.

<sup>33</sup> Horowitz and McConnell (2002) assert that incentive compatibility tends to yield marginally higher WTA/WTP ratios while Sayman and Onculer (2005) contradict this finding.

practice rounds than those with goods less familiar to the CB. This difference, however, actually biases the results away from the current finding; thus this difference in market experience does not drive the revealed trends.<sup>34</sup>

*Income Effect Compensation* Income effect compensation would logically tend to shrink the WTA/WTP ratio. Income effects, however, are largely considered to be negligible for inexpensive objects (e.g. Kahneman et al, 1990). Some experimenters do control for income effects by using the EL and EG<sup>35</sup> valuations (e.g. Knetsch, 1989) or supplying the non-endowed group with the mean WTA from the endowed group (e.g. Morrison, 1997). The familiar to the CB group has more studies compensating for income effects; however, for all classifications, WTA/WTP does not differ based on income effect compensation, as would be expected for goods in this price range.

### 3.2 Experimental Design Flaws

Proponents of neo-classical theory often criticize the incomplete set of controls used by experiments corroborating the endowment effect. Plott and Zeiler (2005, p. 537) illustratively declare, “our analysis of the literature reveals that no one experiment designed to study WTP-WTA gaps implements a complete set of controls.” Plott and Zeiler (2005) replicate Kahneman et al.’s (1990) experimental design with the original controls and then with their own more extensive controls and training. In the first condition, they replicate the original high WTA/WTP ratios. In the second, enhanced control condition the authors report WTA approximately equal to (and often below) WTP, prompting the authors to claim that they can “turn on and off” Kahneman’s endowment effect. An analysis of experimental conditions reveals the importance of several design flaws common to all or

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<sup>34</sup> It is essential to note that this does *not* imply that subject misunderstanding of the valuation technique plays no role in the WTA-WTP disparity (the very prominent role is described in the next section); rather, this confirms that the role of practice, whether adequate or not, is approximately equal in both CB conditions.

<sup>35</sup> EL and EG refer to equivalent loss and equivalent gain, measures of valuation similar to WTA and WTP; they are explained fully in section 1.1.

most of the studies included in the literature review. The study presented in the next section pays particular attention to these experimental controls:

*Market Experience and Training* Authors frequently disagree upon the importance of market experience in reducing the endowment effect.<sup>36</sup> The disagreement is well explained by a central idea of Plott and Zeiler (2005): “practice rounds” and subject training are very different. Subjects arrive completely unfamiliar with the valuation mechanism and techniques, and therefore many participants may initially be confused by complicated experimental procedures used to ensure incentive compatibility.<sup>37</sup> Thus, some of the reported valuations may be based on misconceptions about the market mechanism rather than true values. While a high number practice rounds may provide opportunity (or even be a decent proxy) for learning, ensuring subject understanding is absolutely essential for conclusive results. Practice rounds without training (or at least opportunity for question and answer) do not guarantee this.

*Signaling Language* Most studies do not account for the countless conditioned responses which trigger automatic reactions that govern behavior. Cues in language elicit particularly strong conditioned responses. Terms such as “buy” and “sell” likely produce conditioned cognitive responses that suggest the strategic nature of the transaction such as the “buy low, sell high” paradigm, even when an individual might be willing to pay more (accept less) than this paradigm would suggest (Franciosi et al, 1996).<sup>38</sup> Without eliminating the

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<sup>36</sup> For example, Morrison (1997) and Kahneman et al. (1990) find no significant effect for market experience while Coursey et al. (1987) and List (2004) find that market experience lowers the WTA-WTP disparity.

<sup>37</sup> Although no studies provide any data or observational analysis of this, in the study conducted here, a significant number of participants asked questions. Participant understanding of the market mechanism and its incentive compatibility increased visibly with increased explanation (participant expressions and gestures were very telling, though for obvious reasons not worth more than a supporting footnote).

<sup>38</sup> “Classical conditioning” applies to language, especially descriptive language. For example, consider an individual who received congratulations for selling above the market price, making him feel good. The good feeling would then become paired with selling above the market price, even in the absence of congratulations (and even in situations where the good feeling might not be merited rationally). The individual has a “conditioned response” of feeling good to selling at a high price. Thus, descriptive word “sell” elicits the

potential influence of automatic responses to idiomatic cues, one cannot separate the presence of a disparity in true valuation of the good from disparities caused by automatic responses that may or may not represent preferences.

*Anonymity* None of these studies preserve the anonymity of subject preferences. Some researchers posit that non-anonymous decision responses reflect a concern over how others view them (Fremling and Posner, 2001). In this context, subjects may want to appear to be “good bargainers” thus causing them to skew WTA valuations upward and WTP valuations downward, inducing a WTA-WTP disparity based on desired presentation.

#### **4 Experimental Design**

As articulated in the previous section, each study’s specific experimental design contributed to the WTA/WTP ratio it found. Because of this, the present experiment implements extensive controls to eliminate (as far as possible) any potential confounds in the trial. It is designed to test explicitly three hypotheses, the first two of which attempt to manipulate the mental framing conditions that create endowment effects:

*Hypothesis 1:* Compared to goods that are more familiar to the CB, endowment goods that are less familiar to the CB will produce a larger endowment effect.

*Hypothesis 2:* Goods that are defined as completely (or near completely) familiar to the CB will reveal no evidence of endowment effects; that is,  $WTA=WTP$ .

In order to test hypotheses 1 and 2, endowment effect experiments were conducted for two endowment goods believed to differ significantly and almost exclusively in CB familiarity. Experiment 1 used gift certificates for a sandwich at Schwemm’s Gourmet Coffee House (“Schwemm’s”), the on campus café at Amherst College, where the average sandwich costs approximately \$4.50. Experiment 2 used gift certificates for a sandwich at the Black Sheep Deli (“the Black Sheep”), a small sandwich shop a short walk from

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classically conditioned response to sell high to gain good feeling, without regard to whether it is in line with the individuals true preferences.

campus where the average sandwich costs approximately \$6.50. The sandwich at Schwemm's represents a CB familiar good while the sandwich at the Black-Sheep was intended to be non-CB familiar. Thus, a comparison of endowment effects between goods addresses hypothesis 1 and an evaluation of experiment 1 alone addresses hypothesis 2. Confirmation of hypotheses 1 and 2 implies that *the endowment effect is conditional upon the CB unfamiliarity of the endowment good*.

*Hypothesis 3:* With comprehensive experimental controls, the size of the revealed endowment effect will be smaller than reported in previous trials with incomplete experimental controls, though still significant.

Overall WTA/WTP ratios are compared to those found in the literature review for both CB familiar and unfamiliar goods. The study used the modifications proposed by previous authors to enhance the predictive validity of the results<sup>39</sup>. Practice and non-anonymous training (Brown, 2005; Plott and Zeiler, 2005), anonymity (Plott and Zeiler, 2005), neutral language (Franciosi et al, 1996) and a subject misconceptions test<sup>40</sup> are all additions to the ordinary set of experimental controls.

#### 4.1 Methods:

In each experiment, participants spread out in a large lecture hall at Amherst College. Subjects initially received two packets. The experimenter asked participants to open the first packet and fill in a four-digit identification number, age and gender. Then the experimenter read from a script giving both instructions and numerical examples. The instructional paragraphs read:

You are about to participate in six markets for various goods. The first two are for practice; the last four involve real goods. You may start with the good, in which case you will have the opportunity to exchange the

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<sup>39</sup>Much of the actual instructional text is adapted from Kahneman et al. (1990), which has served as the paradigm for much of the existing research. This does not compromise the experimental controls of this study because the adaptations reflect well the complete design controls applied in this study.

<sup>40</sup> For an explanation of this test, see section 4.2.2.



good for cash. If you do not start with the good, you will have the opportunity to exchange cash for it. *Any exchanges will be anonymous.*

- If you start with the good, for a series of values, you will be asked if you would be willing to exchange the good for that much cash.
- If you do not start with the good, for a series of values, you will be asked if you would be willing to exchange that much cash to receive the good.

After you have answered these questions, the experimenter will select a value at random and this will be the market price. Your answers at this value will determine whether or not you make an exchange. You cannot influence the market price, thus, *it is in your best interest to answer these questions with your true preferences. That is, for each value, it is in your best interest to report the option that you truly prefer.*

The experimenter then asked subjects to turn the page to the response form for one of the two practice markets, listing exchange options for values from \$0.50 to \$11.00 in the form below. For each participant, one of the two practice markets represented the ownership role (shown below) and the other the non-ownership role.

At a price of \$0.50,  
I will exchange my token for cash \_\_\_\_\_  
I will not exchange my token for cash \_\_\_\_\_

At a price of \$1.00,  
I will exchange my token for cash \_\_\_\_\_  
I will not exchange my token for cash \_\_\_\_\_

The experimenter then explained that if the randomly selected value was \$2.00, for example, then the option selected for that price (exchange or not exchange) would represent their preference and, in later trials, be carried out with a real good and real cash.<sup>41</sup>

The experimenter then took questions for several minutes, taking care to respond with neutral language.<sup>42</sup> Participants read the following instructions for the ownership condition (those in the non-ownership condition had corresponding instructions):

In this market the objects being traded are tokens. You now have a token, which you own that has a value to you of \$3.00. The token has

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<sup>41</sup> Participants were told that credit was available, if necessary. No questions were raised about this.

<sup>42</sup> It is essential to note that many of the participants asked questions reflecting misunderstandings about the study design. The first question and answer period lasted nearly ten minutes.

this value to you because the experimenter will give you this much money for it. A market price for the tokens will be determined at random later; you can have no effect on the market price. For each of the prices listed below please indicate if you would prefer to: 1) exchange your token for this much cash and receive the market price or 2) Keep your token and cash it in for \$3.00. For each price, please indicate your decision by marking an X in the appropriate column.

Once participants had filled out responses, the experimenter picked a market price out of a hat, explained again why the responses at any price should reflect true preferences, and again took questions. Participants then input responses for the second practice market, which was identical to the first with reversed ownership conditions (owners in the first trial were non-owners and vice versa) and the experimenter again selected a random market price.

Next, participants turned to the second packet and input ID numbers. The experimenter explained that the next four markets were similar to the practice markets, except with a real good “which half of you now own.” Those assigned to the ownership condition had a gift certificate (to Schwemm’s or the Black Sheep in experiment 1 or 2) in their packet.<sup>43</sup> The experimenter reemphasized that participants should report true values and that of the four markets, one of them would be randomly chosen and, for that trial’s market price, the reported exchange option would be anonymously carried out. After the experimenter answered questions, participants turned the page to the first real market trial. The instructions were nearly identical to those in the practice markets, with the important clarification that when a subject ended up with a good, it was his to take home. Subjects filled in preferences for prices from \$0.50 to \$11.00 and the experimenter selected a market price for trial 1. The experimenter took questions a final time after which subjects reported preferences and the experimenter announced a random market price in each of trials 2, 3

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<sup>43</sup> The experimenter guaranteed the authenticity of the gift certificates which were redeemable for “one sandwich” rather than a dollar amount. Questions about the dollar amount were answered “please respond based on your own opinion of the good.”

and 4. The experimenter then “randomly” selected a trial and told subjects to look back and remember what their preferences were for that trial’s market price.<sup>44</sup>

The experimenter then collected all of the packets and handed out a survey and an envelope containing five one-dollar bills, the compensation for participating. Subjects labeled their envelope with their ID number. The experimenter then instructed all participants to either 1) if they indicated that they would trade, to put the gift certificate [the market price in dollars] into the envelope and close it or 2) if they indicated they would not trade, simply leave the envelope empty and close it. Participants were informed that the experimenter would make the exchanges immediately and then lay all of the envelopes on a table to be picked up on the way out.<sup>45</sup>

Finally, subjects filled out a survey about the sandwich in their condition. Questions assessed perceived price of the sandwich (and how confident they were about that perceived price), non-price knowledge of the sandwich and the number of times per two months the subject consumed the sandwich. The following two additional questions tested CB familiarity in the Schwemm’s condition (1 represents low consideration or low normality):

How much do you consider other possible uses of the money before purchasing a sandwich (on a scale of 1-5)? \_\_\_\_\_

How normal is it for you to have a Schwemm’s sandwich (on a scale of 1-5)? \_\_\_\_\_

Subjects turned in surveys and picked up envelopes on their way out.

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<sup>44</sup> Because each subject received \$5.00 compensation, the “randomly” selected trial always had a market price at or below \$5.00 to allow convenient exchanges.

<sup>45</sup> Whether or not subjects followed their reported preference was not explicitly checked; however, the effects of any subjects who did not cancelled out; the number of gift certificates and amount of cash given out matched what was predicted by the reported preferences.

#### 4.2.1 Endowment Good Considerations

The two goods compared here are either “one sandwich” at Schwemm’s or at the Black Sheep (via gift certificates).<sup>46</sup> These goods were chosen for several reasons. First, college students do not make as many purchases as most consumers and will thus have fewer goods that satisfy the three CB familiarity conditions (especially the un-booked expenditure condition). Food, however, is something that everyone consumes regularly and the convenience and (relatively) reasonable pricing of Schwemm’s make it a common place for students to eat. The Black Sheep was chosen because it offers premium sandwiches and is an optimal distance from campus. While still not so far that its sandwiches become undesirable or unfamiliar, the ten minute walk to the Black Sheep makes it a less frequent destination than Schwemm’s.<sup>47</sup> Further, the two goods have an essentially identical set of available substitutes.<sup>48</sup> Because many studies have corroborated Hanemann’s (1991) suggestion that availability of substitutes may drive WTA/WTP ratio size (e.g. Adomowicz, 1993), it was especially important to control for this.

No explicit price information was given for either gift certificate. The actual price of the sandwich could certainly have acted as a signal for how subjects “should” value the good, influencing personal preferences (Plott and Zeiler, 2005, p. 539). The small and unlikely benefits of an income effect compensated design are outweighed by the risk of a “house money effect.” Supplying the non-endowment group with funds would cause their preferences to shift based on the acquisition of cash outside of their normal income (Thaler,

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<sup>46</sup> The use of a gift certificate does not affect findings versus the actual good. Bateman, Kahneman, Munro, Starmer and Sugden (2005) specifically address this point. Further, Bohm et al. (1997) and Bateman et al. (1997) both corroborate this with experiments.

<sup>47</sup> The exit survey assessed both goods to ensure that each represented the intended CB familiarity condition.

<sup>48</sup> The wording on each gift certificate, “one sandwich,” focuses the participant on the sandwich in particular. Thus, while a meal at Schwemm’s may have different substitutes from a meal at the Black Sheep, one sandwich at Schwemm’s and one sandwich at the Black Sheep are certainly substitutes for each other, implying a near identical set of available substitutes.

1999).<sup>49</sup> Plott and Zeiler (2005), for example, provided their sample with money prior to eliciting values, allowing a significant alternative interpretation of their  $WTA = WTP$  findings.

#### 4.2.2 Experimental Design Considerations

The experimental design here carefully addresses the confounding factors raised by previous authors as well as the following three common controls reported in the literature review section. The Becker-DeGroot-Marschak mechanism (BDM) in which the market price is selected at random is used in order to ensure incentive compatibility (Becker, 1964). Real exchanges occur for a random trial, creating real incentives indistinguishable from those with exchanges in every round (e.g. Horowitz and McConnell, 2002; Morrison, 1997). All response options are dichotomous choices, which best limits strategic considerations (Bateman et al, 2005, p. 1571).

While the aforementioned experimental controls are common, this study includes several key elements poignantly absent in previous literature. Because of the originality of some of these methods, they are discussed in more detail.

*Market Experience and Training* Although nearly all studies give participants “practice rounds” to learn how the market mechanism works, these offer no guarantee that participants understand how to report true valuations.<sup>50</sup> Following the suggestion of Plott and Zeiler (2005), I provide several numerical examples, give a thorough explanation of why reporting true values is the dominant strategy and answer extensive questioning. Further, code numbers allow subject understanding to be evaluated using the following “subject misconceptions test.” Before the real market trials, each subject participates in

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<sup>49</sup> Plott and Zeiler (2005, p. 541) explain that the “house money effect” influences WTP and WTA differently, inflating only WTP and thus reducing the WTA/WTP ratio.

<sup>50</sup> The BDM and other common mechanisms (e.g. Vicory Auction) that use a randomly selected “market price” to ensure incentive compatibility appear complicated and thus are especially susceptible to subject misconceptions (e.g. experiment 5 Kahneman et al, 1990).

two practice market trials for a hypothetical token with an explicitly stated worth of \$3.00 and no non-monetary value. The experimenter invited any questions about the procedure before and between the market trials; thus, if a participant reported a value other than \$3.00 for the good in the final practice trial, his valuations likely reflect misconceptions about the experimental design and are excluded (Bateman et al. (1997) use a similar test).<sup>51</sup>

*Signaling Language* This study completely avoids the words “buy” and “sell” which likely trigger a “strategic reaction” when considering value (Plott and Zeiler, 2005, 537). Further, the words value and price were used interchangeably in order to offset any possible effects of either word, which, if they exist, would certainly be small.<sup>52</sup>

*Anonymity* The anonymous method of exchange here, using coded envelopes, prevents peer influence which is likely prevalent in college samples. When preferences are reported, participants are ensured of an anonymous exchange mechanism. Thus, valuations reflect the mindset of total anonymity.

*Exit Survey* The exit survey allows the experimenter to check for confounding differences in the nature of the WTA and WTP groups. Further, CB familiarity is subjective and will differ between individuals; thus, this measure ensures that the participants have the predicted beliefs about each good (Schwemm’s is CB familiar and the Black Sheep is not).

## **5 Results**

The results from the trials conducted here illuminate two central aspects of the WTA-WTP gap from previous literature. First, consistent with expectations, the WTA/WTP ratios are significantly high only in cases where the good was not familiar to

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<sup>51</sup> This assesses understanding of the market mechanism by asking for WTA and WTP for a token worth exactly \$3.00 that is explicitly explained to have no value aside from \$3.00 cash. The WTA and WTP should equal \$3.00 because the token, whose value is in dollars, can only be exchanged for dollars; therefore no endowment effect would occur because one would never lose the endowment good, dollars.

<sup>52</sup> “Price” may induce strategy similar to that expected with “buy” and “sell” while “value” may incite interpretations of increased worth, caused by the word value’s connotations of high worth (for example, the sentence, “This good is something that I value” reflects a high worth of the good, not a neutral evaluation).

the consumption bundle. Second, the rigid and comprehensive experimental design controls in this study do prevent subjects who misunderstand the market mechanism from affecting results. These design conditions reveal a reduced WTA/WTP ratios compared to some of the striking findings of previous studies,<sup>53</sup> but do not eliminate its significance.

### 5.1 Participants

One hundred and twenty-seven students (females: 87; males: 40; mean age: 19.2), were recruited via e-mail solicitation at Amherst College. Conditions of ownership and non-ownership of gift certificates for various sandwiches were assigned randomly. All participants were paid for their participation. In the trials for the Black Sheep Gift Certificate, of 73 participants, 54 passed the subject misconceptions test ( $n = 54$ ; females: 33; males: 21; mean age: 19.3). In the trials for the Schwemm's gift certificate, of 54 participants, 44 passed the subject misconceptions test ( $n = 44$ ; females: 31; males: 13; mean age: 19.2).

### 5.2 Endowment Effects Conditional upon CB Familiarity

The WTA values for both the Black Sheep and Schwemm's trials each reflect values slightly below the actual dollar price of the good with standard deviations of approximately 1. The WTP values for both goods are lower, but still reflect a desire for the good. Neither the mean WTA nor WTP varies by more than 0.4 between trials.

Importantly, the perceived actual price of the good reported in an exit survey did not differ significantly between the WTA and WTP groups in any condition. Further, participants in the Black Sheep and Schwemm's samples reported nearly identical levels of knowledge of

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<sup>53</sup> Kahneman et al. (1990, p. 1335), for example, report a median WTA/median WTP ratios of 5 and 6 using pens as the endowment good and a non-incentive compatible experimental design.

the good.<sup>54</sup> Thus, the following results are not driven by differences in the preexisting perceptions of the WTA and WTP samples.

The first statistical test evaluates the WTA-WTP disparity in each trial and is reported in Table 5.1.<sup>55</sup> For the Black Sheep gift certificates, the ratio is significant at the

	<i>n</i>	Trial				Mean
		1	2	3 <sup>a</sup>	4 <sup>a</sup>	
		H <sub>0</sub> : WTA = WTP		H <sub>1</sub> : WTA > WTP		
<b>BLACK SHEEP DELI</b>						
Mean WTA	28	6.47	6.11	6.22	6.17	6.31
(Standard Deviation)		(1.05)	(1.06)	(1.06)	(1.07)	(1.83)
Mean WTP	26	4.62	4.75	4.90	4.85	4.78
(Standard Deviation)		(1.04)	(1.01)	(1.01)	(1.04)	(1.27)
<b>WTA/WTP</b>	54	<b>1.40</b>	<b>1.29</b>	<b>1.27</b>	<b>1.27</b>	<b>1.32</b>
t statistic		4.40 ****	3.27 ****	3.30 ****	2.90 ***	3.85 ****
(Standard Error)		(0.41)	(0.42)	(0.41)	(0.46)	(0.38)
<b>SCHWEMM'S COFFEE HOUSE</b>						
Mean WTA	21	4.76	4.50	4.79	4.90	4.74
(Standard Deviation)		(1.00)	(0.99)	(0.99)	(1.00)	(0.95)
Mean WTP	23	4.24	3.93	4.07	4.00	4.06
(Standard Deviation)		(1.04)	(1.03)	(1.05)	(1.05)	(1.52)
<b>WTA/WTP</b>	44	<b>1.12</b>	<b>1.14</b>	<b>1.18</b>	<b>1.23</b>	<b>1.17</b>
t statistic		1.33 *	1.55 *	1.81 **	2.17 **	1.85 **
(Standard Error)		(0.38)	(0.35)	(0.39)	(0.41)	(0.36)
		H <sub>0</sub> : WTA <sub>Black Sheep</sub> - WTP <sub>Black Sheep</sub> = WTA <sub>Schwemm's</sub> - WTP <sub>Schwemm's</sub>				
		H <sub>1</sub> : WTA <sub>Black Sheep</sub> - WTP <sub>Black Sheep</sub> > WTA <sub>Schwemm's</sub> - WTP <sub>Schwemm's</sub>				
<b>BLACK SHEEP WTA/WTP</b>	98	1.25	1.12	1.08	1.04	1.13
<b>SCHWEMM'S WTA/WTP</b>						
F <sub>(1, 94)</sub> statistic		5.24 **	2.12 *	1.21	0.49	1.53
p value		0.012	0.074	0.1373	0.2424	0.109

<sup>a</sup> *n* = 27 for Black Sheep WTA; one observation is excluded for illegibly reported preferences.  
 \**p* < 0.1; \*\**p* < 0.05; \*\*\* *p* < 0.01; \*\*\*\* *p* < 0.001

<sup>54</sup> Participants reported an average of 2.4 out of 5 for knowledge of the good other than the price in the Black Sheep condition and of 2.5 out of 5 in the Schwemm's condition.

<sup>55</sup> All statistical significance calculations compare the difference between means with using a regression containing all responses and dummy variables for each condition. Thus, the coefficient of the dummy in a regression of each trial's valuations is the difference between the means of the conditions and the t statistic articulates its significance, testing  $h_0$ : WTA=WTP (in which case WTA/WTP = 1). The tests comparing WTA-WTP disparities use a regression including data from both samples and three dummy variables, for the base case plus three conditions (WTA and WTP for each endowment good). Then, using an F test, I test the null hypothesis that the difference between the WTA-WTP for the different endowment goods is 0. Despite this, in order to maintain consistency with all of the previous literature, this paper often refers to about WTA/WTP ratio and WTA-WTP disparity as pseudo-synonyms.



99% confidence level in every case. The mean (for each subject, the mean of his valuations over the four trials) WTA/WTP was 1.32 ( $p < 0.001$ ) and the mean t-statistic was 3.85. In the final trial, when participants had maximum market experience, the mean WTA exceeded WTP by \$1.32 (WTA/WTP = 1.27,  $p < 0.01$ ), confirming an endowment effect.<sup>56</sup>

Subjects with Schwemm's gift certificates report a smaller difference between WTA and WTP relative to those with Black Sheep gift certificates, as predicted. Despite this, the four trials can reject the null  $WTA = WTP$ , two each at the 90% (trials 1 and 2) and 95% (trials 3 and 4) confidence level. The mean WTA/WTP ratio is 1.17 ( $p < 0.1$ ) and the t statistic is 1.85, smaller than those for the Black Sheep.

Despite the presence of endowment effects for some of the Schwemm's trials, the difference between the Black Sheep WTA/WTP and the Schwemm's WTA/WTP reaches statistical significance in the first two trials. Still, the WTA-WTP gap in the Schwemm's trials suggests much more of an endowment effect than predicted. Schwemm's sandwiches were originally considered to be nearly CB familiar and thus were not expected to produce a significant endowment effect.

In the survey results assessing CB familiarity, subjects report eating at Schwemm's more often, on average, than at the Black Sheep Deli (3:1.4). Contrary to experimenter expectations, however, about half of the participants (22 of 42; 52%) in the Schwemm's sample do not eat there regularly and responded that eating at Schwemm's was a 1 on a scale of 1 to 5 where 5 indicated total familiarity.<sup>57</sup> Thus, half of those in Schwemm's condition (intended as the familiar to the CB condition) did *not* find the good CB familiar

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<sup>56</sup> Some studies interpret valuations from the final round of valuations as the most accurate valuations. Given the practice rounds and exclusion test, I find little reason for that to be true here; however, because of its place in the current literature, final round valuations are noted.

<sup>57</sup> Two subjects did not fill out the familiarity questionnaire.

Table 4.2: WTA/WTP Comparisons by Consumption Bundle Familiarity

	<i>n</i>	Trial				Mean
		1	2	3	4	
CONSIDER SCHWEMM'S FAMILIAR TO CB						
Mean WTA	12	4.63	4.25	4.63	4.50	4.46
(Standard Deviation)		(0.64)	(0.65)	(0.74)	(1.00)	(0.71)
Mean WTP	8	4.64	4.36	4.61	4.29	4.47
(Standard Deviation)		(1.10)	(1.15)	(1.29)	(1.35)	(1.13)
<b>WTA/WTP</b>	20	<b>1.00</b>	<b>0.98</b>	<b>1.00</b>	<b>1.05</b>	<b>1.00</b>
t statistic $H_1: WTA > WTP$		-0.042	-0.240	0.040	0.390	0.060
(Standard Error)		(0.43)	(0.45)	(0.50)	(0.55)	(0.44)
CONSIDER SCHWEMM'S NON-FAMILIAR TO CB						
Mean WTA	8	4.83	4.75	4.96	5.08	4.91
(Standard Deviation)		(1.23)	(1.06)	(1.05)	(1.00)	(1.04)
Mean WTP	14	3.63	3.25	3.19	3.50	3.39
(Standard Deviation)		(2.00)	(1.67)	(1.81)	(2.15)	(1.85)
<b>WTA/WTP</b>	22	<b>1.33</b>	<b>1.46</b>	<b>1.56</b>	<b>1.45</b>	<b>1.45</b>
t statistic		1.683 *	2.474 **	2.770 ***	2.233 **	2.355 **
(Standard Error)		(0.72)	(0.34)	(0.64)	(0.71)	(0.35)
$H_0: WTA_{\text{non-normal}} - WTP_{\text{non-normal}} = WTA_{\text{normal}} - WTP_{\text{normal}}$ $H_1: WTA_{\text{non-normal}} - WTP_{\text{non-normal}} > WTA_{\text{normal}} - WTP_{\text{normal}}$						
CONSIDER SCHWEMM'S:						
<b>Unfamiliar WTA/WTP</b>	42	<b>1.34</b>	<b>1.50</b>	<b>1.55 **</b>	<b>1.38 *</b>	<b>1.45 **</b>
<b>Familiar WTA/WTP</b>						
$F_{(1, 38)}$ statistic		2.24 *	4.67 **	4.76 **	2.37 *	3.77 **
p value		0.0716	0.0186	0.0178	0.066	0.0298
$H_0: WTA_{\text{Black Sheep}} - WTP_{\text{Black Sheep}} = WTA_{\text{normal}} - WTP_{\text{normal}}$ $H_1: WTA_{\text{Black Sheep}} - WTP_{\text{Black Sheep}} > WTA_{\text{normal}} - WTP_{\text{normal}}$						
<b>BLACK SHEEP WTA/WTP</b>	74	<b>1.41</b>	<b>1.32</b>	<b>1.26</b>	<b>1.21</b>	<b>1.33</b>
CONSIDER SCHWEMM'S FAMILIAR WTA/WTP						
$F_{(1, 72)}$ statistic		6.47 ***	4.05 **	3.28 **	1.85 *	4.54 **
p value		0.007	0.024	0.037	0.089	0.018

at all. Thus, I break the Schwemm's sample up into two groups: those who report a 1 on the familiarity question (non-CB familiar) and those who do not, implying familiarity. Based on this division, the CB familiar group should logically have more consistent values, and accordingly the standard deviations of the familiar group are lower than those for the unfamiliar group. Thus, the sample that finds Schwemm's CB familiar represents an excellent control group for CB familiarity comparisons. Full data is reported in Table 5.2.

No participants found the Black Sheep gift certificate totally familiar; thus, corresponding analysis is inapplicable.<sup>58</sup>

The group for whom Schwemm's is unfamiliar reports WTA/WTP ratios strikingly larger than reported by the group for whom Schwemm's is CB familiar. Despite small sample size, the WTA/WTP ratios were statistically different from 1 at the 95% level for two trials and for mean valuations (significant at 90% for the other two), corroborating the endowment effect found using the Black Sheep gift certificate. The WTA/WTP ratio decreases from Black Sheep, Schwemm's unfamiliar, to Schwemm's familiar, as CB familiarity decreases. Further, while the mean WTA/WTP ratio of the unfamiliar subjects rejects the null hypothesis  $WTA - WTP = 0$  ( $p < 0.05$ ), the mean WTA in the familiar sample was within 0.01 of the WTP ( $t \text{ stat} = 0.06$ ). This dichotomy substantiates the importance of CB familiarity in the endowment effect and suggests the WTA-WTP disparity may depend on the unfamiliarity of the endowment good.

### 5.3 Study Design Effects

This study uses the most comprehensive controls possible in order to eliminate the influence of experimental design. Although this study's design applies a more complete set of controls than did Plott and Zeiler (2005) who eliminate endowment effects with experimental controls,<sup>59</sup> it provides solid, though tempered, statistical evidence of an endowment effect. As predicted, all WTA/WTP ratios found here are significantly below 2.45, the weighted mean ratio of the reviewed studies.

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<sup>58</sup> Only three included subjects in the Black Sheep condition who filled out familiarity questionnaires reported somewhat familiar preferences. Although data in this CB-familiar group does not reflect an endowment effect, the small sample size prevents fruitful analysis.

<sup>59</sup> Plott and Zeiler (2005) replicated Kahneman et al's (1991) experiment near identical (high) WTA/WTP ratios. Then, running a separate trial with a full set of controls added to the experimental design, they found no endowment effect.

In addition to reporting a conditional endowment effect, the experiment also evidences the particular role of controls for subject misconceptions. While the contribution of controls such as anonymity and neutral language is unquantifiable, the valuations of the excluded group give insight into subject misconceptions and their influence on the endowment effect.

Initially, in order to test their understanding of the market mechanism subjects reported WTA and WTP valuations of a token which had a clear value of \$3.00. Of the 29 subjects whose results are excluded for reporting an incorrect valuation in their final trial, 15 (52%) report a WTA larger than their WTP and 23 (79%) are endowment effect prone, either reporting a WTA higher than their WTP, a WTA above \$3.00, or a WTP below \$3.00. Additionally, variances in excluded valuations for the real trials ranged wildly, implying that many of these subjects do not understand the valuation mechanism.<sup>60</sup> Further, less than half (48%) of the excluded participants report valuations within a \$1.00 range.<sup>61</sup> The participants who did not (52%) often report values that changed dramatically between trials, often from extremes above and below the mean value.<sup>62</sup> Despite the above confirmation that excluded subjects misunderstood the valuation mechanism, their WTA and WTP in real trials do not differ significantly from the included values.<sup>63</sup>

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<sup>60</sup> For example, for the eleven excluded WTA valuations of Black Sheep gift certificates, the variance in the first trial is .91 while in the fourth trial it is 5.79.

<sup>61</sup> Because there is no difference between trials, changes of more than \$1.00 in valuation almost certainly represent a severe misunderstanding of the market mechanism. It is reasonable to assume a degree of stability of utility such that the value of the good would not change drastically in the ten minute span of experiment. These participants are not consistently “overvaluing” or “undervaluing” the good, but rather swing between the two.

<sup>62</sup> In the included sample, only 15 of 98 participants (15%) had values that changed by more than \$1.00. Of these, the vast majority were changes of only \$1.50. Of those who failed the initial test for understanding, even those who reported consistent preferences were excluded.

<sup>63</sup> The WTA/WTP ratios in each trial do not change significantly when the excluded participants are added back into the data set and sometimes increase the significance level. Despite this, they are excluded based on the possibility that even though their valuations may not reflect true preferences even if they corroborate the notions of the rest of sample. The ratio, t-stat, (standard deviation) for the Black Sheep condition in the four trials are: trial 1: 1.38, 7.38, (0.24); trial 2: 1.26, 5.29, (0.24); trial 3: 1.27, 5.35, (0.24); trial 4: 1.30, 8.47, (0.25) and for the Schwemm’s condition: trial 1: 1.12, 1.622, (.31); trial2: 1.11, 1.13, (0.30); trial 3: 1.19, 2.39,

Further, the impact of practice rounds with experimenter explanation was confirmed. Of the 33 participants who incorrectly valued the \$3.00 token in the first round, 14 valued the token correctly in the second round. Further, 10 of these 14 participants reported values for the gift certificate that ranged by \$1.00 or less; thus, those who learned the valuation mechanism during practice rounds showed continued understanding during the real market trials.

## **6 Discussion**

The results of the experiment provide compelling support for the three hypotheses. *Hypothesis 1:* Hypothesis 1 postulates that WTA–WTP gaps will be smaller when the endowment good is more familiar to the CB. The comparison between the WTA-WTP disparities of Black Sheep and Schwemm’s conditions provides encouraging though inconclusive support for this hypothesis.<sup>64</sup> This comparison was based, however, on the experimenter’s incorrect assumption that the Schwemm’s sandwich would be CB familiar. When Schwemm’s responses were split into those who regularly ate at Schwemm’s (CB familiar) and those who did not (CB unfamiliar), two convincing endorsements of this hypothesis became clear. First, the difference between the Black Sheep group and the familiar Schwemm’s group was tremendously significant. Further, a comparison of WTA-WTP disparity of those who regularly ate at Schwemm’s to the disparity shown by those who did not confirmed that the CB unfamiliar group reported significantly larger endowment effects. Thus, in each possible comparison, the CB unfamiliar good produced

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(0.31); trial 4: 1.21, 2.68, (0.31). In the familiar and unfamiliar samples, the WTA/WTP ratios remain strikingly similar, and the t statistics often increase. Thus, the exclusion of those individuals who may have had misconceptions actually challenged the findings rather than enhanced the results.

<sup>64</sup> In no case did endowment (WTA) and non-endowment (WTP) samples differ significantly in perceived price of the sandwich or knowledge of the good; thus, this study does not have to apologize for possible confounding differences between samples.

a larger WTA/WTP ratio, offering excellent evidence of the predicted relationship between CB familiarity and endowment effects.

*Hypothesis 2:* Hypothesis 2 conjectures that when the endowment good is very familiar to the CB,  $WTA = WTP$ . Because the Schwemm's sample, intended to represent CB familiarity, did not universally consider a sandwich at Schwemm's CB familiar, this study relied on the exit survey to divide participants into those who found the endowment good CB familiar and those who did not. This division was corroborated by the relatively lower standard deviations in the CB familiar group, probably indicative of better informed valuations, as expected with the full accessibility of CB familiar goods. In the most familiar sample, for each trial and the mean, the WTA/WTP ratio was outstandingly close to 1, strikingly similar to the expected outcome of trials using an exchange good. CB familiarity depends on the cognitive framing of the good, so perfect evaluations of CB familiarity may not exist; however, the equivalence of WTA and WTP for this (at least) near-CB familiar good suggests that goods framed as CB familiar will not evidence endowment effects. Thus, the mere presence of a loss does not lead to endowment effects, as previously thought; rather, the endowment effect is conditional upon the reference-dependent mental framing of the endowment good.

*Hypothesis 3:* Hypothesis 3 asserts that with the comprehensive controls utilized here, the WTA/WTP ratio would fall short of those reported by previous studies. Because CB familiar goods tended to show minimal WTA-WTP disparities analysis of the non-CB familiar samples is most informative. A review of comparable studies for non-CB familiar endowment goods found a WTA/WTP ratio markedly higher than reported here, as predicted. The importance anonymity and neutral language cannot be numerically evaluated but should not be overlooked.

Although the excluded sample's WTA/WTP ratios barely differed from those of the included group, close analysis points to the exclusion as an important cause of the diminished effect. Perhaps many of the excluded individuals report true valuations with a similar mean. A more viable explanation, however, is that values tend to swing around the mean, allowing the possibility for randomly large endowment effects. Two pieces of evidence support the second reason; the large standard deviations (as high as 2.5 for a mean of 4.2) and the non-convergence of standard deviations – standard deviations actually tend to increase in later trials – which implies a lack of learning.<sup>65</sup> Thus, studies that do not test for understanding of the market mechanism may well include subject valuations that do not represent actual preferences but do affect WTA and WTP findings.

Moderating the WTA-WTP gap may actually enhance the viability of reference-dependent preferences as a caveat to the neo-classical utility maximizing model. Kahneman et al.'s (1990) result that individuals value a pen *six times* more when they own it than when they do not should be viewed with healthy skepticism.<sup>66</sup> Since then improved iterations of the study design have begun to return lower and likely more accurate (certainly more credible) endowment effects. While I do not replicate Plott and Zeiler's (2005) complete abrogation of the WTA-WTP gap, my results fit nicely with the established ability of comprehensive experimental controls to lessen unrealistic disparities.

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<sup>65</sup> This reflects subject misconceptions uninfluenced by practice because values are more dispersed rather than more centered around what should be a stable value.

<sup>66</sup> Doubters were especially merited for this example. The authors did not use an incentive compatible design, provided neither WTA and WTP valuations (and one has to be curious with this high ratio) nor any statistical tests (Kahneman et al, 1990). Further, although at least 23% of participants in this trial report incorrect values for an exchange token that are endowment effect prone (reporting a WTA over the market price or a WTP below it) in their misevaluations of an induced value token, no participants are excluded. In other trials, the authors report more reasonable WTA/WTP ratios, but still conspicuously exclude standard deviations and statistical tests with the one graph showing no clustering of values around a mean (p.1333). While this footnote chastises the initial over-enthusiasm of Kahneman et al. (1990), it is also worth noting that Kahneman received the Nobel Prize in economics in 2002 for related work.

### *Distinguishing Features*

In order to prevent potentially confounding differences from the experimental design that Plott and Zeiler (2005) used to “turn off” the endowment effect, their controls for anonymity, avoidance of strategic language and numerical training were replicated. This study not only gives practice rounds with extensive explanations, but is the first to report on the improvement of participants, numerically verifying participant learning. Further, while incentive compatibility (and anonymity, to a smaller extent) was indispensable to the experimental design, they required a relatively complicated market mechanism. In conducting the experiment, the necessity for an exclusion condition became visibly apparent and a comparison of the excluded and included samples’ valuations in real markets corroborated this. Thus, these results need to make minimal apology for possible subject misconceptions.

The present study is the first endowment effect test to give an exit survey to ensure equivalence between WTA and WTP groups. Importantly, the survey results disprove attributions of the WTA–WTP gap to differences in the perception of the market price between the groups; thus, this study solidly confirms that WTA exceeds WTP even though the two samples understand the good to have the same market price. Further, the exit survey showed that the Schwemm’s gift certificate did not cleanly represent the intended condition of CB familiarity. The ability of the present experiment to break down the evaluation of the Schwemm’s good was central to demonstrating hypotheses 1 and 2. Further, the results of a familiarity comparison with the Schwemm’s sandwich directly support the singular importance of CB familiarity, because testing the same good in two different samples controls for nearly everything other than the distinguishing factor between the samples.



### *Real World Implications of CB Familiarity's Role in the Endowment Effect*

The subjective nature of CB familiarity makes it difficult to connect to typical findings of real world endowment effects. This paper corroborates with little specificity the role of loss aversion in the equity premium puzzle (Camerer, 1998) and in the tendency of individuals to hold on to losing stocks for too long (Odean, 1998). Equities, however, may be less CB familiar than bonds which closely resemble simple commercial bank interest.<sup>67</sup> Thus, if loss aversion applies more to the CB unfamiliar equities, their higher price may reflect compensation for this loss aversion.

The most appropriate application of CB familiarity the real world, however, explains a familiar puzzle of economics: the preference for gift certificates and unique gifts over cash. Thaler (1999) points out that individuals limit their purchases with mental accounts rather than true financial constraints. In doing so, individuals ascribe WTP below the market price for all goods they do not purchase. If the WTA exceeds WTP, it may also exceed the market price of the good. In this scenario, mental accounting prevents the individual from maximizing utility for the specific good and creates an endowment effect ( $WTA > WTP$ ).<sup>68</sup> Thus, when the market price of a good is between the reference-dependent values of WTP and WTA, receiving the good as a gift brings more utility than the market price in cash. Gift certificates often force an individual to go outside his mental account budget constraint at a given store, choosing a good for which the WTA exceeds the market price. Gift certificates to stores with primarily CB familiar goods – supermarkets, gas stations or post offices, for example – are uncommon and perhaps an illustration of the  $WTA=WTP$  for CB familiar goods.<sup>69</sup>

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<sup>67</sup> This CB unfamiliarity applies to the owner of the shares, not to the broker who trades them.

<sup>68</sup> Mental framing likely maximizes utility over a larger time span by, for example, encouraging savings.

<sup>69</sup> Similar implications are visible in exchange based societies such as Papua New Guinea where large “gifts” between tribes are an essential component of society. Exchanges of more than expected or considered

This paper illustrates that the endowment effect exists conditional upon on a mental frame that creates reference-dependent preferences only for goods that are not CB familiar. Given this, hyperbolic discounting appears as a promising alternative to distaste for losses in explaining the endowment effect. Hyperbolic discounting would explain both the high WTA and low WTP given their reference points. Our pronounced preference for immediate consumption creates a high WTA while an internalized protection against this overweighting of today constrains the WTP. For CB familiar goods, the mental constraints are less binding and thus, would not yield endowment effects. Further research should explore the validity of hyperbolic discounting as the root cause of the endowment effect.

## **7 Concluding Remarks**

While this thesis does not blindly celebrate the preponderance of evidence for the endowment effect, it does corroborate its conditional existence. Although it was not the initial intention of this paper, the confirmation of all three hypotheses compellingly suggests an “unobtrusive endowment effect.” This effect does not suggest a generalized or universal overweighting of losses, but rather a mental framing paradigm that sometimes creates a disparity between WTA and WTP. I find here that the endowment effect occurs only for CB unfamiliar goods; thus, this particular conditionality of reference-dependence implies that individuals will *rarely* deviate from neo-classical preferences. In most of our judgments, we do behave as rational utility maximizers; however, this study found that we also occasionally evaluate goods that are not as common to us with mental frames that differ depending on our reference point. This tempering of the endowment effect anomaly may be enough to make it (somewhat) more palatable to neo-classical theorists and simultaneously more descriptive of human preferences.

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feasible are especially valuable. For example, gifts include rare birds and other non-useful items but never include sweet potatoes, the staple food for the region (Strathern, 1971).

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