1. Introduction

The purpose of this article is to contribute to understandings of the endowment effect and to provide possible explanations for its occurrence and variation in specific circumstances. We examine some characteristics of specific decisions that may lead to an endowment effect. Our investigation uses a factorial, scenario based approach, which facilitates analysis of specific characteristics rarely considered in experimental procedures. It also features a design in which both a selling and buying price are collected from each participant, allowing the calculation of a 'within-subject' endowment effect. Our findings suggest that the endowment effect may be highly dependent on specific scenario characteristics. This suggests that the extent to which the endowment effect can be overlooked in discussions of consumer behavior needs to be investigated and clearly articulated in economic research.

Since Kahneman and Tversky's (1979) development of prospect theory and the subsequent discussion of an endowment effect, a range of survey and experimental methods have elicited WTA-WTP gaps and they have been described as a "robust" finding (Strahlivetz and Loewenstein, 1998). However, these data and findings have been undertaken in a context where there is some ambiguity about the definition of the "endowment effect". In this article we start with the proposition that WTA-WTP gaps can be labeled an "endowment effect" and this effect may result from a range of contributing causes. We investigate possible influences, including relational sources, uniqueness, monetary value and buyer identity on stated WTA-WTP gaps.

2. Potential contributory causes to an endowment effect

Our study is based on the argument that market transactions take place in contexts where at least four general areas of variation might influence the existence and size of an endowment effect: market structure (including access to information); characteristics of the good being traded; characteristics of the individuals considering a trade; and the social context of the trade, including relationships between buyers and sellers. Most studies have focused on aspects relevant to the first two areas which are relatively amenable to some degree of manipulation within a laboratory or classroom experiment.

However, in a relatively unique study, McGraw, Tetlock and Kristel (2003) used scenario experiments to examine the significance of 'relational source' on participants'

willingness to sell a particular good. Their contribution was based on the insight that the ownership of goods can derive from different types of social relationships, defined using Fiske's' relational schema, and that this has important implications for the way in which owners value those goods and the associated distress in decisions to trade (Fiske, 1991, 1992). A further contribution of their study was the use of scenario experiments as a method of examining potentially key features of a decision context, such as relational schema, that cannot readily be accommodated in the trading experiments often used to study the endowment effect.

McGraw and Tetlock (2005) further contributed to research on relational framing through a series of scenario experiments designed to specifically examine the importance of relational source for the degree of distress experienced in a proposed trade off. In particular, they found that some trade- offs are considered to be "taboo trade-offs". Their finding has important implications for both the design and the implications of our study which are further considered below.

In this study we build on the scenario experiment method (McGraw, Tetlock and Kristel, 2003) and discussion of relational framing (McGraw and Tetlock, 2005) to extend discussion of the endowment effect using a factorial survey design. Factorial designs have been constructively employed in the sciences for a century and social sciences for some decades but appear to be under utilized in business and economic research (Wallander, 2009). We propose five advantages to our approach. Firstly, this method allows comparison of data collected in response to different scenarios, while at the same time holding constant any potential incentive effects that may arise through data collection. If any incentive effects arise, we expect that they are similar across all survey participants and that differences in findings between contrasting scenarios can be attributed to the characteristics of variables specified in different scenarios. Secondly, the factorial survey design allows us to consider decision scenarios that are difficult to integrate into an experimental design. Thirdly, it allows the ranking of the significance of specific variables within purposefully designed decision scenarios. This effectively allows us to combine the investigation of four different variables within one study rather than investigating each variable in a separate experiment. Fourthly, interaction effects between factors can be investigated to determine whether the influence of one factor

depends on the value of another factor. This also improves generalizability of conclusions because effects of an independent variable are estimated for many combinations of other independent variables without any multicollinearity issues. Finally, it allows within-subject comparisons of WTA and WTP prices. This is important because between subject designs require the comparison of WTA prices with WTP prices from different individuals and this can significantly reduce the precision of estimates since between subject variability is added to the error term. This is the same principle of why the paired t-test (within subject design) is preferable to the independent samples t-test where two treatments are applied to different individuals (between subject design).

3. Theory

Previous research on the endowment effect suggests a wide range of possible contributory causes. In this study we examine four possible causes that are difficult to investigate using trading experiments.

3.1 Relational Source

Using Fiske's relational schema, McGraw, Tetlock and Kristel (2003) defined four relational sources: market pricing; equality ranking; authority ranking; and communal sharing. In order to examine the possible sentimental attachment we may have to a particular good, we used two relational sources: a raffle prize and a gift from someone very close. These specific sources were selected to represent the two most different relational sources. The first is labeled as a market relationship, implying that it is relatively straight forward to value a good in terms of its exchange for other goods or money. The second is a communal sharing relationship and valuing goods from this source is expected to contain an affective or moral dimension. In our study, the sources were chosen so that all survey participants, regardless of relational source, could assume they had not paid for the watch and initial costs need not be recovered (Strahlevitz and Loewenstein, 1998).

3.2 Approximate Value

In the context of this study, in which we consider relational source, Johar's question is particularly relevant: "is the norm activated by a relationship [is] the same when the exchange offer is a pen valued at $50 versus a house valued at $1 million?" (Johar, 2005). To address this question we used two contrasting 'market values' for the

watch: A$100 and A$10,000. In August 2008, pre-tax average weekly ordinary time earnings for adults working full-time in Australia were approximately A$1,145 (Australian Bureau of Statistics, 2008). Thus an A$100 purchase might be considered a relatively low value item, although at almost nine percent of weekly earnings it is non-trivial. In comparison, an A$10,000 item has substantial value.

3.3 Duplicate

The existence of substitute goods is a factor that has been empirically shown as relevant to trading decisions but is rarely considered in the context of goods with similar relational source (Chapman, 1998). In half of the scenarios the antique watch represented the only asset that had been acquired from the specified relational source. In the other half, survey participants were told they had acquired both an antique watch and some jewelry from the same source. The addition of some jewelry allowed the construction of scenarios in which participants could choose to sell their watch but retain an item with similar meaning in terms of its relational source.

4.4 Relationship between Traders

One of the aims of this study is to consider whether the relational source of the watch has a greater effect on selling decisions than the relationship between seller and buyer. To investigate this issue, in half the scenarios we posit a trading situation in which a friend wished to buy or sell the watch, while half nominated a jeweler as a potential buyer or seller. Again, this is a factor that is difficult to integrate into a laboratory experiment setting but is a potential social feature of market transactions.

4. Method

We use a 2^4 factorial survey design that allows us to investigate the following possible influences on a decision to sell or buy a good: the good's relational source; value; uniqueness; and the identity of a potential buyer. We use a within-subject design for estimating the endowment effect by collecting both buying and selling prices from each participant. Average endowment effects for each scenario are achieved using a between subject comparison. For the purposes of our scenario experiments, the good was defined as a "nice antique watch". This asset was chosen as plausibly representing an item that could vary considerably in value and source; the word 'nice' was used to imply that survey participants could reasonably assume they liked the watch and would not

wish to dispose of it instantly. We now motivate the four factors that may affect people's decisions about pricing and then describe the 16 survey scenarios resulting from different combinations of these four factors.

4.1 Scenarios

Our initial survey design consisted of 16 scenarios formed by combinations of these four factors outlined above. Reverse ordering, described below, gave a total of 32 scenarios. Participants were provided with one randomly selected scenario based on combinations of one of each pair of phrases within the square brackets:

[Someone very close to you gave you/ As a prize in a raffle you won]

[a nice antique watch / a nice antique watch and some jewelry].

Similar watches are worth about [$100 / $10,000].

A [friend / jeweler] is interested in buying the watch from you.

Participants were asked for the minimum price they were willing to accept ($). Participants were then told they had lost the watch and that it was now in the possession of a friend/jeweler who was interested in selling the watch back to them. Participants were then asked for the maximum price they were willing to pay ($).

The WTA and WTP questions were manipulated to allow reverse ordering in half of the survey instruments for each scenario. This was done to eliminate possible bias that may arise from asking every participant for a selling price first. To accommodate the reverse ordering it was necessary to slightly change the wording of some scenarios. Thus half the participants were informed they had lost the watch immediately after they were told the circumstance in which they had received it. After being asked how much they were willing to pay to regain possession, they were then told they had not lost the watch but had been approached by a friend or jeweler who offered to buy it. For these participants, WTP prices were obtained first, followed by WTA prices. Thus our study involved 32 separate survey instruments and strictly speaking is a 2^5 design. For the remainder of this discussion, however, we ignore the reverse ordering of WTP and WTA questions and speak of the study in terms of 16 scenarios. The reverse ordering of questions was not hypothesized to influence the endowment effect and our results confirmed this assumption.

Following McGraw and Tetlock (2005) participants were also asked how they would *feel* about selling the watch using five distress items: *(a)* I would reject the idea as completely inappropriate, *(b)* I would be happy to sell the watch at the right price, *(c)* I would find the request strange or out of the ordinary, (d) I would be insulted by the offer to buy the watch, and *(e)* I would find it difficult to sell the watch at the right price.

Pilot testing with a group of twelve participants revealed that some people found it difficult to give a dollar value to the WTA price question. As a result, some participants left the space blank while others wrote "no sale" or "nil" or even "0" to the request for a WTA price because they did not want to sell the watch. This is consistent with the trade-off taboo discussed by McGraw and Tetlock (2005) and suggested we required some method of distinguishing between participants willing to part with the watch, even for no monetary compensation, and those who did not wish to consider parting with the watch at all. We also needed a method of interpreting potentially ambiguous responses to the WTP price question. We therefore included additional items: *(f)* I would refuse to sell the watch at *any* price/ *(f)* I would refuse to accept the watch even if it was free. This item was not intended to measure distress but was included to assist interpret ambiguous responses to the WTA and WTP price questions. Responses to questions *(a)* to *(f)* were measured on a seven point scale from Disagree (-3) to Agree (3).

4.2 Measuring WTP and WTA prices

Participants who agreed in the strongest way possible with item *(f)* but did not provide a numerical dollar value were inferred to have an infinite WTA price and zero WTP price respectively. Written comments provided by participants were examined separately by each author to infer a WTA price. In most cases the intention of the participant was clear from phrases such as "no sale". When both authors agreed, infinite values were inserted. In the few cases of ambiguity, a final decision was made after discussion. Using a similar approach for the WTP questions, "no sale" was inferred as a zero price.

We do not use the term infinite in its strict mathematical sense here but to indicate a very large value: so high that participants could not comfortably write such a value. As demonstrated in McGraw, Tetlock and Kristel (2003) and McGraw and Tetlock (2005)

some participants respond with very high dollar values that indicate distress or a general unwillingness to participate in a market transaction rather than a meaningful price.

The presence of infinity has some implications for our analysis; we do not calculate means due to the presence of infinite values. Instead, we calculate transformed prices defined as the ratio of WTA price to market value (of $100 or $10,000) when this ratio is less than or equal to 1, and as 2 minus the reciprocal of the ratio when the ratio is larger than 1. This transformed price has several desirable properties. It is on a scale from 0 (no value) to 2 (infinite value), with a midpoint of 1 (market value) and it interprets multiplicative deviations from market value in a similar way if the deviation is above or below market value. For example, values of half or double market value have a transformed price of 0.5 and 1.5 respectively, equally distant from the midpoint of 1. Values one tenth or ten times market value have a transformed price of 0.1 and 0.9 respectively. On this scale, transformed prices of 1.99 and 1.9999 are considered close to each other and to 2 (transformed price when the WTA price is infinity) even though the ratio of WTA price to market value are 100 and 10,000 respectively. This is realistic because in both cases the participant is indicating they do not want to sell and are pricing the watch as high as they feel is necessary to avoid a sale rather than giving a precise price. Finally, transformed prices equal the ratio of selling price to market value when this ratio is at most 1. Since this is the case for the majority of the data this assists interpretability of the transformed price scale.

While the survey included the five questions used by McGraw and Tetlock (2005) concerning how participants *feel* about selling the watch, this paper focuses on the WTA and WTP prices used in definitions of the endowment effect.

4.3 Participants

In order to obtain a diverse range of survey responses (Bekkers, 2010) written invitations were extended to a range of community organizations based in Perth, the capital city of Western Australia. Funding was provided by Curtin University of Technology to allow the researchers to pay community groups a donation of A$10 per completed survey in return for organizing survey participation by their members at a time and place of their choosing. Survey distribution, administration and collection were undertaken by the researchers at the agreed time and venue. Participation was

forthcoming from the parents and teachers at three primary schools, the members of two book clubs, a soroptimist club, a lawn bowling club and a rowing club. Participants were given a three page survey document that took approximately ten minutes to complete. Surveys were randomly allocated to participants with each scenario equally replicated for each organization to avoid confounding. During this process we collected 325 responses that were sufficiently complete to calculate a within-subject endowment effect and form the basis of the following analysis.

4.4 Statistical Analysis

Endowment effects are defined as the transformed selling price (WTA) minus the transformed buying price (WTP) for each participant. An important feature of our design is that these endowment effects can be calculated on a 'within-subject' basis for each participant. Once these endowment effects are calculated for each participant statistical analysis proceeds with a between subject design (since each participant provides one endowment effect for only one scenario). The size of the endowment effect was summarized with mean endowment effects for each of the 16 scenarios. We also report the percentage of participants, for each scenario, with positive (WTA > WTP) and negative (WTA < WTP) endowment effects.

Regression analysis was used to investigate the statistical significance and relative importance of the four independent variables: source of watch, presence of duplicates, value of watch and trader. The regression model is:

$$E = \beta_0 + \beta_1 S + \beta_2 D + \beta_3 V + \beta_4 T + \varepsilon$$

where:

E is the endowment effect, transformed WTA price – transformed WTP price,

S equals 1 if the watch was received from someone close, and 0 if as a raffle prize,

D equals 1 if the watch was received with additional jewelry and 0 if it was not,

V equals 1 if the watch has a market value of $10,000 and 0 if the value is $100,

T equals 1 if the watch is traded with a friend, and 0 if traded with a jeweler, and

ε equals the error term.

Since the endowment effect is a difference in buying and selling prices, the above regression was repeated using transformed WTA selling prices and WTP buying prices to investigate the extent to which differences in endowment effects are due to differences in selling or buying prices. Interaction effects involving *S*, *D*, *V* and *T* were also tested with ANOVA corresponding to the 2^4 factorial design described above. Multicollinearity was absent due to the factorial design ensuring all independent variables are uncorrelated and transformations ensure other regression assumptions are satisfied. Finally, the above regression was expanded to test for effects due to the reverse ordering of the buying and selling questions in half the surveys, gender and community organization of the participant.

5. Results

Approximately one-quarter of participants did not provide a numerical answer to the minimum selling price question but included a response in words. Examples of such comments include: "nil"; "not at any price"; "would not sell"; "peeved"; "N/A would not sell regardless of price". One participant wrote "Infinity, I would not sell it all". In these cases we inferred an infinite value from the written comments. A further 22 participants did not give a value or comment but selected the strongest agreement possible to "I would refuse to sell the watch at *any* price" and these participants were inferred to have infinity as their WTA price. We also changed 15 "0" answers to infinity in cases where they had also selected the strongest response to this item. These changes are consistent with expectations from pilot testing that participants who do not wish to sell are reluctant to write infinite or very large prices to a question requesting a dollar numerical value.

For WTP prices, 39 numerical answers were inferred from comments such as "would not buy" or "nil", in which case a price of $0 was recorded. There was one comment of "market price", where we inferred a price of $100, which was the price indicated in the relevant scenario. A further comment stated that they would pay the price of the relevant raffle ticket, in which case we used the negligible WTP price of $10. This resulted in a sample size of 325 participants for which both WTP and WTA prices were available.

Table 1 presents the mean endowment effect for each of the 16 scenarios. Consistent with the proposition commonly found in discussions of the endowment effect (that WTA prices exceed WTP prices) all sixteen mean values are significantly greater than zero (p < .01). However, the mean values differ considerably between scenarios, varying from a maximum of 1.2 in the case of a high value watch received with some jewelry in a raffle and traded with a friend to 0.25 for the scenario in which a low value watch (and no jewelry) was received from someone close and traded with a friend.

Table 1: Mean endowment effect for the 16 scenarios

		Jeweler		Friend	
		$100	$10,000	$100	$10,000
No jewelry	Raffle	0.69	0.93	0.62	0.65
	Someone close	0.32	0.39	0.25	0.40
Jewelry	Raffle	0.39	0.97	0.52	1.20
	Someone close	0.42	0.55	0.56	0.70

Note: standard error for each mean is approximately 0.09

Although the means in Table 1 are all significantly greater than zero not all participants report a positive endowment effect. Table 2 shows the percentage of participants that report a positive or negative (positive/negative) endowment effect for each of the 16 scenarios. For example, when trading with a friend a $100 watch (without jewelry) from someone close only 44% of the participants reported a positive endowment effect (24% report a negative endowment effect, leaving 32% reporting equal buying and selling prices). Similarly, only about half the respondents report a positive endowment effect for the other scenarios involving a $100 watch from someone close. Almost no participants reported negative endowment effects (buying price exceeds selling price) for the $10,000 watch, and none did so when trading with a friend, but this was relatively common (9% to 25% of participants) when trading the $100 watch.

Table 2: Participants reporting a positive/negative endowment effect (%) for each scenario.

	Jeweler	Friend

		$100	$10,000	$100	$10,000
No jewelry	Raffle	70 / 10	78 / 6	67 / 10	71 / 0
	Someone close	52 / 17	57 / 0	44 / 24	74 / 0
Jewelry	Raffle	55 / 25	81 / 6	68 / 11	80 / 0
	Someone close	57 /10	76 / 6	57 / 9	95 / 0

Table 3 contains regression results for the endowment effect. By definition of the dummy variables for the independent variables the constant is the average endowment effect when trading with a jeweler a $100 watch received as a raffle prize without additional jewelry. This combination of variables forms the closest scenario to the type of transaction considered in most literature in which a good is of relatively low value with no duplicates and there are few emotional ties regarding where the watch came from or between traders. The regression coefficients for S, D, V and T correspond respectively to the additional endowment when the watch is from someone close, received with some jewelry, worth $10,000 or traded with a friend.

Table 3: Regression coefficients for the endowment effect, WTA and WTP transformed prices

	Endowment effect		WTA price		WTP price	
	B (s*tandard error*)	P	B (*standard error*)	P	B (*standard error*)	P
Constant	0.276 *(0.082)*	0.000	0.923 *(0.065)*	0.000	0.643 *(0.054)*	0.000
S	0.292 *(0.076)*	0.000	0.589 *(0.060)*	0.000	0.299 *(0.050)*	0.000
D	0.138 *(0.076)*	0.068	0.076 *(0.060)*	0.208	-0.038 *(0.050)*	0.447
V	0.246 *(0.076)*	0.001	-0.214 *(0.060)*	0.000	-0.441 *(0.050)*	0.000
T	-0.033 *(0.076)*	0.663	-0.186 *(0.060)*	0.002	-0.173 *(0.050)*	0.001

Note: Constant refers to the base scenario where of a $100 raffle prize without additional jewelry traded with a jeweler. Dummy variable *S* refers to the relational source being someone close, *D* refers to receiving jewelry in addition to a watch, *V* refers to similar watches being worth $10,000, *T* refers to the trader being a friend.

From Table 3 the source of the watch had the highest influence on the endowment effect, estimated to be 0.292 higher when the watch is from someone close ($p < 0.001$). The value of the watch has a slightly lower but still highly significant effect ($p < 0.001$), with endowment 0.246 higher when the watch is worth $10,000. The presence of

additional jewelry has a smaller effect of 0.138, not quite statistically significant (p = 0.068) while the relationship with the trader has a negligible effect on endowment (p = 0.663). Each of these effects is discussed in the next section. This discussion also includes consideration of the WTA and WTP regressions presented in Table 3, since endowment is a simple difference between the WTA and WTP transformed prices.

Statistical analysis of the full 2^4 factorial design (Table 4) revealed no statistically significant interaction effects between the variables *S, D, V* and *T*, confirming the additive regression model for endowment described above. Thus our conclusions concerning the effect of each variable hold generally for all combinations of other variables. For example, the higher endowment effect by 0.246 when trading a $10,000 rather than a $100 watch applies consistently irrespective of whether or not the watch was from someone close, came with additional jewelry or was potentially traded with a friend. Thus the endowment effect of 0.276 for the baseline scenario triples to 0.276 + 0.292 + 0.246 = 0.814 when a $10,000 watch from someone close is traded.

Table 4: ANOVA table for the 2^4 factorial design of the endowment effect

Source	df	SS	MS	F	Sig.
Constant	1	114.369	114.369	248.872	0.000
S	1	7.239	7.239	15.752	0.000
D	1	1.397	1.397	3.041	0.082
V	1	5.136	5.136	11.175	0.001
T	1	0.067	0.067	0.147	0.702
S * D	1	0.599	0.599	1.303	0.255
S * V	1	1.384	1.384	3.011	0.084
S * T	1	0.066	0.066	0.144	0.705
D * V	1	1.414	1.414	3.076	0.080
D * T	1	1.417	1.417	3.084	0.080
V * T	1	0.000	0.000	0.001	0.979
S * D * V	1	1.155	1.155	2.513	0.114
S * D * T	1	0.175	0.175	0.380	0.538
S * V * T	1	0.056	0.056	0.123	0.726
D * V * T	1	0.079	0.079	0.171	0.679
S * D * V * T	1	0.183	0.183	0.399	0.528
Error	309	142.001	0.460		
Total	325	272.574			

Furthermore, the order in which buying and selling prices were obtained was not statistically significant (p = .204), nor were any interactions between this order and the other variables. Therefore our conclusions hold independently of the order of the buying and selling price questions in the survey. Similarly the community organization to which the participant belonged was not statistically significant (p = 0.462), nor any interactions involving this variable. Therefore our conclusions hold across all community groups surveyed.

We found significant evidence that the effect of the source of the watch on the endowment effect is different for men and women (p = 0.004) but all other interaction effects involving sex were insignificant. Table 5 gives the effect of the source of the watch on the endowment effect, WTA and WTP prices for men and women separately. For men, the source of the watch has an insignificant effect on endowment (p = 0.951). When the watch is from someone close, men assigned significantly higher buying and selling prices but these relatively higher prices cancelled, leaving no additional endowment effect compared a watch received as a raffle prize. The endowment effect is significantly higher for women when the watch is from someone close compared to a raffle prize (p < 0.001). Women also assign significantly higher prices to the watch when it is received from someone close but compared with men they assign significantly higher selling prices and slightly lower buying prices.

Table 5: Relational source (close friend) effects for men and women

	Endowment effect		WTA		WTP	
	B (*standard error*)	P	B (*standard error*)	P	B (*standard error*)	P
Men	-0.008 *(0.133)*	0.951	0.380 *(0.106)*	0.000	0.389 *(0.087)*	0.000
Women	0.461 *(0.093)*	0.000	0.699 *(0.075)*	0.000	0.240 *(0.061)*	0.000

Note: B refers to the regression coefficient for the independent variable *S*, equaling 1 when the watch is from someone close and 0 when as a raffle prize.

6. Discussion

Since insignificant interaction effects mean the influence of each factor on endowment holds irrespective of the three other factors we discuss each of the four factors separately. We do so in order of importance for endowment: relational source,

value, duplicate and relationship between traders. We then turn from our consideration of mean endowment effects to the presence or absence of endowment effects for individual participants.

6.1 Relational Source

Of the four variables manipulated in our scenarios, relational source was the most statistically significant. The endowment effect is significantly higher when the relational source of the watch is someone close rather than the relatively anonymous source of a raffle prize. On average, survey participants responded with both higher WTA and WTP prices when the watch was received from someone close, however WTA prices increased by a relatively higher amount, giving a higher endowment effect.

An unexpected aspect of the significance of relational source on the endowment effect was that it was due entirely to the premium placed by women on the watch that was received from someone close.

While gender has been considered and found insignificant in a study on framing effects (Gächter, Orzen, Renner, and Starmer, 2009), potential gender differences relevant to the endowment effect remain a neglected issue in the literature. However, the existence of a significant difference that depends on a demographic characteristic may have implications for data collection that relies on student populations that are unrepresentative in terms of gender. Few studies disaggregate data by gender, although the results of this study suggest it may be an area for further investigation.

We can only speculate as to the reason that the endowment effect for the watch from someone close was significantly higher for women. One suggestion may be that women are traditionally more reliant on shared assets or household transfers as sources of wealth or income and that the norms activated by the receipt of a gift are somewhat different. This survey was not designed to investigate gender effects and therefore further research is recommended in this area before definitive conclusions are made.

6.2 Value

The second most significant result was obtained in response to the approximate values attached to the watch in different scenarios. The endowment effect is significantly larger for a $10,000 watch compared to the $100 watch. Both buying and selling prices, as a ratio of the market value, are lower when the watch is more valuable. Survey

participants give a bigger discount in terms of price for the more highly valued watch and this discount was significantly higher when buying the watch than when selling it.

The finding of a significantly larger effect for a higher value good has implications for the generality of findings derived from data collected solely with reference to relatively low value goods, such as from typical classroom or laboratory experiments. Simple classroom experiments cannot typically investigate high value goods. This suggests there is scope for further investigation of the endowment effect using methods that facilitate data collection and analysis relevant to high value items.

6.3 Duplicates

The endowment effect is higher when duplicates are present, but the difference is not significant ($p = 0.068$). It should be noted that the term duplicate in this study refers to a second good obtained from the same relational source as the watch; it is not a duplicate in terms of being a second, identical good. This was done to increase the plausibility of the scenario presented to participants, however, it may also explain why the duplicate variable is not statistically significant in our results. It is likely that different results would have been achieved in scenarios with identical duplicates.

6.4 Relationship between traders

Despite the fact that trading with a friend might be socially unusual, the endowment effect is not significantly different depending on whether the transaction is with a friend or a jeweler. Both prices are significantly lower when transacting with a friend rather than a jeweler, indicating that discounts are both extended to and expected from a friend. The expectation of a discount from a friend may have been particularly important because, in this particular scenario, survey participants were asked to consider a situation in which they had previously been in possession of the watch. The giving and receiving of discounts, however, is not significantly different when buying or selling, and so cancels out, meaning that the endowment effect for this variable is not significant.

This suggests that the relationship between buyer and seller may influence buying and selling prices but does not influence the endowment effect. The relatively lower WTA prices are consistent with Mandel's suggestion of generosity on the part of sellers and that buyers expect generosity from sellers who are friends (Mandel 2006: 590).

In our study the effect of both lower WTA and WTP cancels out, so that the endowment effect is insignificant. This is different from previous studies in which it is suggested that friendship should result in a reduced or negative endowment effect (Mandel, 2006; Halpern, 1994, 1997). This suggests that characteristics related to the good being traded influences the endowment effect to a greater extent that relationships between traders. Again, we suggest that this is an area worthy of further investigation.

6.5 Endowment effect for individuals

Within subject comparisons of WTA and WTP prices are possible due to the design of our data collection method. As shown in Table II, this makes it possible to examine the proportion of survey participants who reported a positive endowment effect, compared with those who reported no effect or a negative effect (that is they proposed a WTP price that exceeded their WTA price). In some scenarios a quarter of participants gave responses that indicated a negative endowment effect. This was considerably more common with scenarios specifying the relatively low value watch, suggesting again that further studies that consider high value trades is required to further understand the circumstances in which particular patterns of an endowment effect are likely to occur. It is also an appropriate reminder to the literature that the presence of positive endowment effects, on average, should not be misinterpreted as all participants displaying an endowment effect.

Brown's study of WTA – WTP for three different goods also showed that the number of participants providing a negative endowment effect or equal WTP and WTA responses varied between goods. In one case two of 21 participants gave a WTP exceeding WTA, and in another case six participants gave responses where WTA and WTP were equal (Brown, 2005). Our results also suggest that not only are average endowment effects likely to differ according to specific scenario characteristics but that the percentage of participants who respond with WTA – WTP gaps will vary also. Using within subject designs to calculate and investigate the presence or absence of endowment effects for different individuals in different circumstances requires further research.

7. Conclusions

This study uses a factorial survey design to investigate the statistical significance of four independent variables on the endowment effect and to rank these variables in order of significance. The four independent variables are: relational source; value; duplicates; and relationship between traders. Relational source was the most statistically significant variable, followed by value. In addition, the higher endowment effect due to the relational source of the watch was due entirely to the responses given by women participants, suggesting that gender may be an important variable in studies of the endowment effect. The existence of duplicates was marginally outside the range of results considered statistically significant, while the relationship between traders had a significant effect on buying and selling prices but not on the endowment effect.

The within subject design for calculating the endowment effect demonstrates not only that the average endowment effect differs between scenarios but that the proportion of responses consistent with a positive WTA – WTP gap varies considerably. In some scenarios up to a quarter of participants gave responses consistent with a negative endowment effect and only half gave positive endowment effects. Our study suggests that a good's relational source and value can be significant contributory causes to the observation of an endowment effect. There is considerable scope for further investigation of these variables and for potential gender effects to be included in future studies.

The factorial survey design employed in this study provides a complementary approach to investigating endowment effects. Classroom or laboratory experiments are often claimed to involve real trades, however they occur in an artificial environment and are not amenable to investigating some situations of importance, such as trades of non-trivial value or between different types of traders than students. In practice it is not unusual for people to consider WTA and WTP prices during real transactions and factorial surveys applied to a variety of scenarios will complement the experimental approach more commonly found in the literature.

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