

Dagen då ägande-effekten försvann

The Day the Endowment  
Effect Went Missing

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# The Day the Endowment Effect Went Missing

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nce upon a time, a researcher found that people valued goods higher if they owned them than if not. The researcher named this phenomenon “the endowment effect”. The endowment effect became well-studied and appeared in many different contexts. The effect was as famous as it was feared as it contradicted normative economic theories. That was until the day it was suddenly nowhere to be found...

*The endowment effect, that people tend to value goods higher if owning them than if not, conflicts central economic principles. A new theory explains this price disparity by uncertain sellers’ and buyers’ strategic reliance on opposite borders of a spectrum of possible utilities of a good. Through a review of concurrent theories, this paper highlights the superiority of the new uncertain utilities theory compared to the loss aversion, bad deal aversion, psychological ownership, and attribution sampling bias explanations of the endowment effect. Despite this, five pilot studies testing the uncertain utilities theory employing the increasing information paradigm fail not only at supporting the theory’s hypotheses but also at finding proper endowment effects altogether. Two successful replications of earlier endowment effect studies using the valuation and exchange paradigms hint to the final theory of the endowment effect: experimental artefacts. The seven studies include nine different goods (mugs, t-shirts, falafel wraps, art prints, chocolate bars, diseases/cures, movie tickets, bananas, and apples) and 422 unique participants. The results suggests that the endowment effect may to some extent be an experimental artefact. The discussion highlights the importance of context to endowment effect study participants and argues for endowment effect theories acknowledging humans as information seeking and processing individuals.*

## 1 The Endowment Effect

People tend to value goods more if they own them than if they do not (Kahneman, Knetsch, & Thaler, 1990). The value induced into goods in one’s endowment has been coined *the endowment effect* (Thaler, 1980). The tendency is observed with private goods (e.g. Loewenstein & Adler, 1995) as well as public goods (e.g. Brookshire & Coursey, 1987), children (e.g. Harbaugh, Krause, & Vesterlund, 2001) as well as adults (e.g. Knetsch & Sinden, 1984), students (e.g. Adamowicz, Bhardwaj, & Macnab, 1993) as well as laymen (e.g. Rowe, D’Arge, & Brookshire, 1980), civilians (e.g. Bowker & MacDonald, 1993) as well as specific professions (e.g. Brookshire, Randall, & Stoll, 1980), in laboratory experiments (e.g. Coursey, Hovis, & Schulze, 1987) as well as in the wild (e.g. Bishop & Heberlein, 1979), and for humans across cultures (e.g. Maddux et al., 2010) as well as chimpanzees (Brosnan et al., 2007) and Capuchin monkeys (Lakshminarayanan, Chen, & Santos, 2008). The endowment effect is used as a scapegoat when people to keep their postal service are only willing to pay a fourth of what they would require to

part with it (Banford, Knetsch, & Mauser, 1980). It is the excuse for hunters’ six times higher valuations of existent goose hunting permits over possible new permits (Bishop, Heberlein, & Kealy, 1983). It is used to explain students doubling valuations of mugs when selling them as opposed to buying them (Morrison, 1997). It is the story accounting for card traders’ reluctance to trade cards at their market value (List, 2003) and basketball game ticket holders’ reluctance to trade their tickets at face value (Carmon & Ariely, 2000). It is the logic when explaining students’ lack of loss aversion when selling lotteries rather than buying them (Kechelmeier & Shehata, 1992). Finally, it is used to account for students’ preference for candy if they have that, but mugs if that is what is in their endowment (Knetsch, 1989). These many instances of the endowment effect only further perplex the lack thereof in the pilot studies of this paper.

The endowment-dependent disparity between goods that people own and goods that people do not own is traditionally measured using one of two paradigms: the exchange or the valuation paradigm. In the exchange paradigm, participants are endowed with one of two goods and asked if they want to trade it for the other. The endowment effect is observed as an exchange asymmetry where people tend to prefer their original endowment independently of whether it is the one or the other (e.g. Harbaugh et al., 2001; Knetsch, 1989; Plott & Zeiler, 2007; Van Dijk & Van Knippenberg, 1998). In the valuation paradigm, participants are asked to price goods that they are either selling or buying. Here, the endowment effect is observed as a valuation gap between participants’ monetary willingness to pay (WTP) for acquiring an item and their monetary willingness to accept (WTA) for selling the same item, often measured as a ratio between the two (e.g. Bishop & Heberlein, 1979; Kahneman et al., 1990; Knetsch & Sinden, 1984; List, 2003). In a review of 337 experiments from 76 studies, Tunçel & Hammitt (2014) find an average WTA/WTP-ratio of 3.28 for all types of goods. In other words, on average, sellers value goods more than three times higher than buyers. Note that the valuation paradigm is theoretically a variation of the exchange paradigm with money as one of the goods exchanged (but see Svirsky, 2014). By using money as numéraire, the valuation paradigm allows cross-good comparison both within participants (e.g. Adamowicz et al., 1993) and between participants (e.g. List, 2003). Many studies employ methods to ensure truthful valuations, such as the Becker-DeGroot-Marshack method (Becker, Degroot, & Marschak, 1964). In the Becker-DeGroot-Marshack method, a random

price is drawn at the end of the trial. If a buyer's WTP is higher than the drawn price, she buys the good at this price. If her WTP is lower, no transaction occurs. Similarly, if a seller's WTA is lower than the drawn price, she sells the good at this price. If her WTA is higher than the drawn price, no transaction occurs. For an overview of research in the field of the endowment effect, see Horowitz & McConnell (2002), Tunçel & Hammitt (2014), Ericson & Fuster (2014), and Morewedge & Giblin (2015).

While unproblematic (and maybe even well-reasoned) to laymen, the endowment-dependent valuation violates an important economic theory: the Coase theorem. Coase (1988) argues that in a setting with no transaction costs or income restraints, rights to goods ought to be traded to their optimal distribution independently of their initial assignment. In other words: the initial endowment should not affect how people value goods. Actors in a market ought to trade goods to their optimal distribution in terms of the actors' individual valuations of the goods in question. Thus, in economically optimal settings (as experiments often are), researchers should not observe a disparity between owners' and non-owners' valuations of goods. This, however, is exactly what research on the endowment effect suggests and the effect persists outside the laboratory (e.g. Banford et al., 1980; Bowker & MacDonald, 1993; Brookshire & Coursey, 1987).

The endowment effect furthermore hints non-reversibility of indifference curves (Knetsch, 1989). This is a fundamental aspect of the controversy of the endowment effect, as reversibility of indifference curves is another central assumption of microeconomic decision theory. Indifference curves refer to preferences between alternatives. Imagine that you prefer Coke over Pepsi and that you and a friend each holds a can of either or. In case you have the can of Pepsi, you would always prefer to trade it for the can of Coke. In case you have the can of Coke, you would always prefer not to trade it for the can of Pepsi. The keyword here is *always*. If your preference between Coke and Pepsi depends on which you hold, your difference curves are non-reversible. While this contradicts microeconomic choice theory, as stated above, research appears to find

just this. Hanemann (1991) and Shogren, Shin, Hayes, & Kliebenstein (1994) show how it *is* possible to infer non-reversibility for goods without perfect substitutions. However, even with readily substitutable goods (such as chocolate bars, money lotteries, mugs, and pens), the endowment effect persists (e.g. Kahneman, Knetsch, & Thaler, 1991). Neoclassical economic theory (e.g. von Neumann & Morgenstern, 1953) allows no room for the endowment effect, but it is natural to prospect theory (Kahneman & Tversky, 1979). Thus, when first coined, Thaler (1980) used the endowment effect to strengthen the claim of prospect theory as an appropriate theory for decision making under risk and an example of one of its key elements: loss aversion.

As will be examined in the next section, later findings challenge the loss aversion account of the endowment effect (e.g. Gal & Rucker, 2018; Plott & Zeiler, 2007). This has led to the development of new theories, such as Gärdenfors' (2018) uncertain utilities account central to this paper. In the next section will follow a review of concurrent theories explaining the endowment effect. Through a brief comparison of the ambitions of economics and the cognitive, it is emphasised how the uncertain utilities account appears most attractive to cognitive scientists. This leads to a section discussing how to test the uncertain utilities account ending with two hypotheses tested in the following seven pilot studies. For each pilot study, a brief introduction explains the development of the study and its method in relation to prior findings. The overall finding is a general lack of endowment effect in the results of the pilot studies employing the increasing information paradigm. This leads to a discussion of the nature of the endowment effect as maybe being more of an experimental artefact than previously accepted.

### Glossary

When introducing the endowment effect, Thaler (1980) used it to "refer to underweighting of opportunity costs" (p. 44). In other words: over-valuing the good already in one's endowment in comparison to its alternatives. This definition implies

## Glossary

<b>Endowment Effect</b>	Collective term for valuation gaps and exchange asymmetries
<b>Exchange Asymmetry</b>	Peoples' inertia to trade their initial good causing preferences to be skewed depending on which good is initially endowed. Measured in the exchange paradigm.
<b>Exchange Paradigm</b>	Experimental procedure to test for exchange asymmetries
<b>Coase Theorem</b>	Without income restraints or transaction costs, goods should distribute optimally no matter the initial distribution
<b>Increasing Information Paradigm</b>	The experimental procedure to test the uncertain utilities account used in this paper. Illustration 5 on page 7 depicts this.
<b>Loss Aversion</b>	The tendency for losses to affect people more than equivalent gains
<b>Opportunity Costs</b>	Foregone benefits of alternatives not chosen
<b>Prospect Theory</b>	Theory of decision making under risk in which actors compare alternatives based on a reference point that include expectations about the future
<b>Retention Paradigm</b>	Experimental procedure eliminating the endowment effect by disentangling buying and selling from action and inertia
<b>Valuation Gap</b>	The gap between a higher WTA than WTP in the valuation paradigm
<b>Valuation Paradigm</b>	Experimental procedure to test for valuation gaps
<b>Willingness to Accept (WTA)</b>	Sellers' minimum requested (monetary) compensation to part with a good
<b>Willingness to Pay (WTP)</b>	Buyers' maximum (monetary) value prepared to pay to acquire a good

its explanation by loss aversion. In later literature, the endowment effect has come to refer to the measured disparity between WTA and WTP rather than the over-/under-valuation (e.g. List, 2003; Maddux et al., 2010). In this paper, the term endowment effect will collectively denote exchange asymmetries favouring the initial good in the exchange paradigm and valuation gaps between higher average WTA than average WTP in the valuation paradigm. As mentioned by Plott & Zeiler (2007), Ericson & Fuster (2014) and Gärdenfors (2018), it may be more appropriate to adopt the term *reference effect*. However, the endowment effect is a well-established term in the literature and neither encompass later inconsistent findings. Moreover, the notion of a reference effect is easily confused with the umbrella term of reference-dependent preferences covering both prospect theory, loss aversion, the endowment effect, and the status-quo bias (Kőszegi & Rabin, 2006). Finally, the endowment effect literature relies heavily upon economic terms, which might be challenging for non-economists. For your convenience, I have included a small glossary with the most important terms.

## 2 Explaining the Endowment Effect

Thaler (1980) introduced the endowment effect and used it to strengthen the claim of prospect theory's loss aversion (Kahneman & Tversky, 1979). Many studies have since found endowment effect results in accordance with the loss aversion account (e.g. Heberlein & Bishop, 1986; Kahneman et al., 1990; Knetsch & Sinden, 1984). There are, however, experimental findings inconsistent with the loss aversion account of the endowment effect (e.g. those of Coursey et al., 1987; Reb & Connolly, 2007; Weaver & Frederick, 2012). Reviews by Gal & Rucker (2018), Morewedge & Giblin (2015), and Gärdenfors (2018) suggest alternatives to the loss aversion account for the endowment effect. Furthermore, experimental results by Plott & Zeiler (2007) and Gal & Rucker (2018) suggest that prior findings implicating the endowment effects may be misinterpreted. Below, I offer a list of alternative accounts aiming to explain the endowment effect. The list is by no means exhaustive as the literature on the endowment effect is vast. The list is construed of contributions that appear to have gained traction enough to be deemed relevant by other scholars (see e.g. Gal & Rucker, 2018; Gärdenfors, 2018; Morewedge & Giblin, 2015). The list begins with the classic loss aversion account and moves gradually further away from the concept of loss aversion concluding with an account based on misinterpreted experiment results.

### *Loss Aversion*

Kahneman & Tversky (1979) find that peoples' preferences depend on whether a choice is framed as a loss or a gain relative to a reference point. Markowitz (1952) suggests that it is changing levels of wealth that drives utility change rather than final, absolute levels of wealth. When framed as a loss, people react more strongly to a change in wealth than when framed as a gain. Kahneman & Tversky (1979) label this behavioural pattern *loss aversion*. Thaler (1980) implicates loss aversion as the cause for the endowment effect. If losses have greater psychological impact gains, people value goods included in their endowment higher than goods not in their endowment because parting with the good is perceived a loss while the addition of the good to their initial endowment is regarded a gain (Tversky & Kahneman, 1991).

### *Bad Deal Aversion*

An alternative to loss aversion as the explanation of the endowment effect is that rather than an aversion to losses, people possess an aversion for bad deals (Weaver & Frederick, 2012). This explanation is attractive as it follows the same kind of logic as that of loss aversion but narrows the focus to losses in possibly bad deals rather than in all transactions. Supporting this explanation are findings suggesting that lowering the risk of bad deals reduce the endowment effect. Such findings include showing that the more a good is like a market good, the lower the endowment effect (Hanemann, 1991; Horowitz & McConnell, 2002; Shogren et al., 1994), that revealing moderate reference prices lowers the WTA/WTP-ratio (Weaver & Frederick, 2012), and that fixed-value exchange tokens show no endowment effect (Kahneman et al., 1990; van Dijk & van Knippenberg, 1996). Indirectly, this view is also supported by Kogler, Kühberger, & Gilhofer's (2013) suggestion that it might be the fear of regret driving the endowment effect or Drouvelis & Sonnemans' (2017) notion of optimism driving the endowment effect in game settings. Another supporting finding is that in small, co-dependent, egalitarian hunter-gatherer societies, the lack of personal ownership removes the possibility of bad deals and, thus, the endowment effect (Apicella, Azevedo, Christakis, & Fowler, 2014). Furthermore, this account may draw support from the suggestion that evolution favours people good at striking superior deals (Huck, Kirchsteiger, & Oechssler, 2005). The bad deal aversion account is also supported by findings showing that during repeated trials, the endowment effect diminishes as participants become familiar with the market (Coursey et al., 1987; List, 2003), and findings showing that if goods are labelled as exchange goods, they show no endowment effect (Svirsky, 2014). The notion that certainty of value should remove the endowment effect is not compatible with the loss aversion account, as any good should be valued higher if owned than if not.

### *(Psychological) Ownership*

In the loss aversion account, it is the parting with a good that causes the endowment effect. In the bad deal aversion account, it is the risk of not knowing the market value of the parted good. In both cases, the focus is giving up the good. In a clever experiment, Morewedge, Shu, Gilbert, & Wilson (2009) disintegrate owning from selling and not-owning from buying. By asking owners of a good to purchase an additional one and by introducing brokers (not-owning sellers), they show that sellers' higher WTA is due to *owning* rather than *parting with* a good. In the loss aversion account, losses loom larger than gains, but according to the ownership effect account, ownership looms larger than losses (Morewedge et al., 2009). This account is partly supported by findings suggesting that the longer the ownership, the higher the valuation (Nash & Rosenthal, 2014; Strahilevitz & Loewenstein, 1998). Challenging the ownership account are the two also often confounded concepts of *ownership* and *possession*. Reb & Connolly (2007) disentangle the two and show that merely possessing and *feeling* ownership of a good is enough to spur an endowment effect. This challenge is enforced by findings showing that even brief physical contact with a good increases the endowment effect (Knetsch & Wong, 2009; Strahilevitz & Loewenstein, 1998). In an attempt to reconcile these findings, Morewedge & Giblin (2015) introduce the concept of psycho-

logical ownership to the endowment effect literature. The psychological ownership account adapts Belk's (1988) idea of possessions extending the self. Belk's (1988) theory emphasises consumption over ownership when incorporating the good into the self. Morewedge & Giblin's (2015) psychological ownership account is thus compatible with the findings of Reb & Connolly (2007), Knetsch & Wong (2009), and Strahilevitz & Loewenstein (1998) as the focus is not on legal ownership but on the psychological ownership of consumption. The psychological ownership account is incompatible with the loss aversion and bad deal aversion accounts as they imply the parting with an item to elicit the endowment effect. In the psychological ownership account, the driver of value lies not in the exchange, but solely in the experience of consumption.

#### *Attribute Sampling Bias*

Morewedge & Giblin's (2015) introduction of the psychological ownership account is a part of their review leading of their development of the attribute sampling bias account. The attribute sampling bias account describes how your role as either buyer or seller of and status as either possessing or not-owning a good affects what attributes of the good you recollect and how easily. As opposed to the other account for the endowment effect presented above, the attribute sampling bias account comes close to explaining most of the inconsistent findings and is per se not incompatible with any of them. Instead of stating simple rules for behaviour, Morewedge & Giblin's (2015) six frames aim at explaining the cognitive logic behind the behaviour described in the previous accounts. However, Morewedge & Giblin's (2015) attribute sampling bias account becomes rather complex in their attempt to account for all empirical instances.

#### *Uncertain Utilities*

Gärdenfors (2018) presents an alternative and simple new explanation for the observed endowment effect also explaining all of the reported inconsistent findings. Gärdenfors (2018) points out that in order to calculate the utility (or expected value) of a good, one needs complete knowledge. In suboptimal settings (such as reality) consumers rarely have complete knowledge. As a means to reconcile findings inconsistent with the other accounts, he suggests a new theory for decision making under risk in which consumers integrate possible new knowledge into their considerations. The new knowledge may alter their utility of the good, but as consumers take this into account, their expected value falls within a range and not a point. This range of possible values he calls uncertain utilities (UU). UU create a spectrum bordered by a maximum expected utility ( $\max_u$ ) and a minimum expected utility ( $\min_u$ ) of a given good. In a decision situation with incomplete knowledge, the rational strategy adhering to this account explains many of the shortcomings of existing theories and contradicting experimental results (Gärdenfors, 2018). Uncertain about the buyer's utility of the good, the seller will choose to price the good according to  $\max_u$ , in order not to cheat herself of a better deal. Conversely, uncertain about her own utility of the good, the buyer will only offer  $\min_u$ , in order not risking cheating herself either. The UU account is not per se incompatible with the loss aversion, bad deal aversion, or the psychological ownership accounts, but they function on different levels. Unlike the loss aversion, bad deal aversion, and the

psychological ownership account, the UU and attribute sampling bias accounts account for the cognitive logic behind the behaviour described by the other accounts.

#### *Experimental Artefacts*

Another element of the endowment effect possibly confounded is that action versus inaction. Gal & Rucker (2018) argues that many of the findings used to argue in favour of the endowment effect (e.g. Kahneman et al., 1991, for status quo bias and loss aversion) are better explained as inertia to act. According to Gal & Rucker's (2018) review, losses and gains in status quo bias (Samuelson & Zeckhauser, 1988), endowment effect (Kahneman et al., 1990), and loss aversion (Tversky & Kahneman, 1991) studies are confounded with *action* and *inaction*. Using a new retention paradigm, Gal & Rucker (2018) separate gaining and losing from the status quo and eliminate the endowment effect. By eliminating the WTA measure and separating WTP into WTP to obtain and WTP to retain, they make it the default, non-action outcome to end up without the good in question. In both the WTP-obtain and WTP-retain condition, the participant is to pay to end up with the good. If loss aversion was at play, WTP-retain should exceed WTP-obtain. Gal & Rucker (2018) find that it does not and that implementing their retention-paradigm eliminates the endowment effect in both valuation and exchange paradigm experiments.

Supporting this view are Plott & Zeiler's (2007) experiments showing how controlling for a set of variables (e.g. the language used when endowing subjects, the location of the endowed good at the time of choice, and whether to reveal choices publicly) in the exchange paradigm completely eliminates the endowment effect. Plott & Zeiler (2005) furthermore argue that the methodology often employed in endowment effect studies to elicit truthful responses, such as the Becker-DeGroot-Marshack method, is misunderstood by the participants. Important in this regard is also Lichtenstein & Slovic's (1971, 1973) research on the effect of different elicitation techniques on peoples' preferences. They find that preferences are reversed depending on whether participants are to choose between options or price them. These findings warrant caution for the endowment effect, as the two main elicitation techniques used in endowment effect studies employing the valuation paradigm are open-ended stating of WTP or WTA and choosing between a monetary value or a good. The experimental artefact account of the endowment effect is not so much incompatible with the other accounts as it is questioning the very existence of the endowment effect as a cognitive bias.

### **3 What to Expect from a Theory of the Endowment Effect**

Up until this point, research on the endowment effect has gained special attention from economists (e.g. Richard H. Thaler, Jack L. Knetsch, and Charles R. Plott to name a few). After all, its attraction is based on its violation of economists' expectations. Only recently, cognitive accounts have emerged (e.g. Gärdenfors, 2018; Morewedge & Giblin, 2015). The need for a cognitive account stems from the different research aims within economics and the cognitive sciences. Both disciplines are interested in people and their behaviour, but their ends are different. Economists describe human behaviour to construct economic "laws". Cognitive scientists describe human behaviour to "understand" the underlying logic. None of these ends

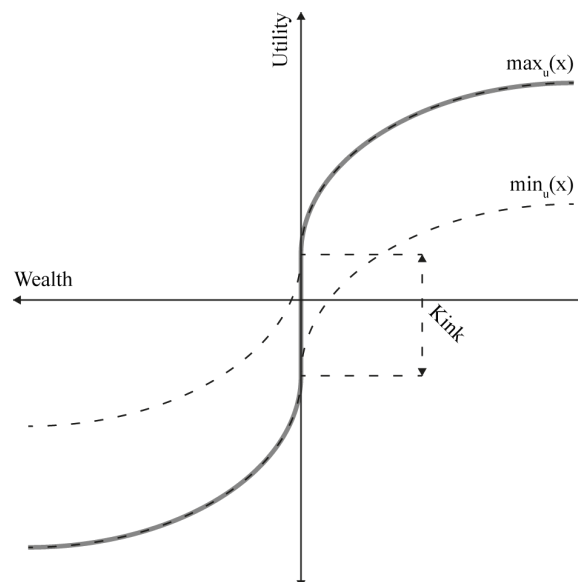
is more right than the other, but their intents and requirements differ. As noted by Thaler (1980) and Friedman & Savage (1948) a positive theory within economics should be judged by its predictive powers. Normative economic models are based in the art of logic. When confronted with statistics contradicting logic, economists alter their models accordingly. However, when modelling and manipulating data, economists care not so much for why it is as for how it is. Economists might argue that humans are the centrepiece of their research domain, but their reliance on aggregate statistics strips humans of any agency in economic models.

Students of cognition are not necessarily better than economists at researching humans, but they focus differently. Economists' goal with research is often to formulate economic laws. To an economist, empirically grounded stylised facts are enough to create laws. Unlike in the natural sciences, a single case might contradict a law, without the law surrendering its status as law. To name a few such laws: the law of supply and demand, the law of diminishing returns, the law of marginal utility, the law of one price, and the pizza principle. Regarding human behaviour as an example of a complicated information seeking and processing system, cognitive scientists seek the logic behind its workings (Clark, 2014). It is not enough to state that those and those kinks in externalities cause these and these effects. One needs to pay attention to why it is that those externalities cause these effects. Furthermore, where economists focus on aggregate level effects, cognitive scientists focus on the information processing aspect, be it a brain-based (e.g. Miller & Cohen, 2001) or electronic system (e.g. Turing, 1950), an embodied (e.g. Streeck, 2015), situated (e.g. Roth & Jornt, 2013) or distributed (e.g. Hutchins, 1995) system.

### Cognitive Accounts

With the above distinction between the goals of economics and the cognitive sciences, it becomes clear that the different accounts for the endowment effect presented earlier cater to different disciplinary aims. Studies finding behaviour persistently contradicting sound logic cater to economists' requirements (e.g. loss aversion and bad deal aversion accounts). Studies viewing the actor as an information processing system cater to cognitive scientists' requirements (e.g. attribute sampling bias and UU accounts). To cognitive scientists, the attribute sampling bias and UU account for the endowment effect are superior solely by their stronger focus on human cognition. An important aspect of Gärdenfors' (2018) UU account and to Morewedge & Giblin's (2015) attribute sampling bias account is their level of description. The loss aversion, bad deal aversion, and psychological ownership accounts just describe the observed. Furthermore, loss aversion and the endowment effect are often used both to explain and as proofs of one another. They are compromised by the circularity of their definition and proofs (Gal & Rucker, 2018). The UU and attribute sampling bias accounts go one step deeper. Instead of merely stating observed behaviour, they offer an account for the cognitive logic behind it. What makes Gärdenfors' (2018) UU account attractive compared to Morewedge & Giblin's (2015) attribute sampling bias account is its relatively simpler logic.

Morewedge & Giblin's (2015) attribute sampling bias account relies on six frames to explain the observed behaviour. Gärdenfors' (2018) UU account uses only one logic to do the same (and more). The UU account elegantly explains the gap between buyers and sellers in situations with limited

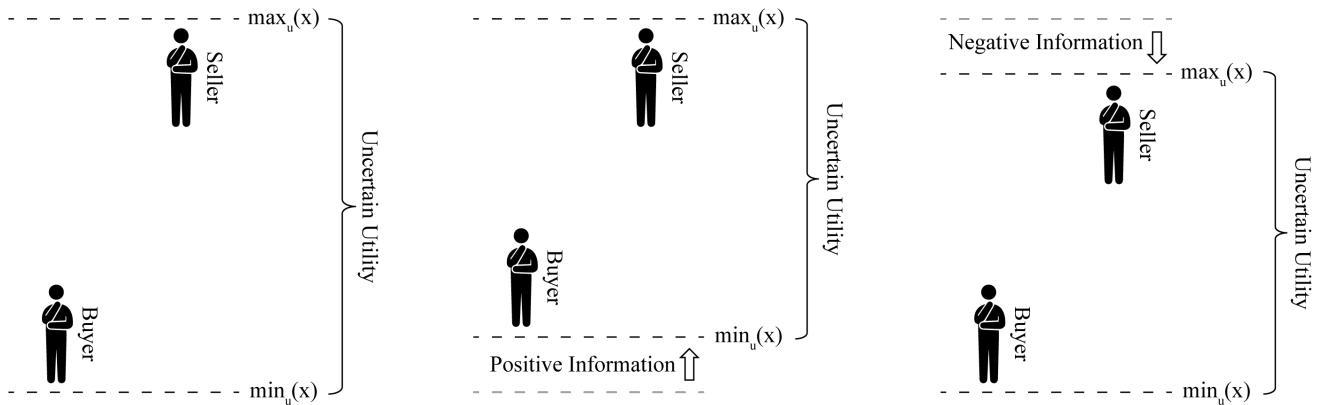


**Illustration 1.** The reliance described by the UU account on either  $\min_u$  or  $\max_u$  depending on whether the good is bought or sold derives the kink of loss aversion around the reference point when presented graphically in a fashion similar to utility curves.

knowledge about the good as a result of rational decision making subject to uncertain utilities (Gärdenfors, 2018). The more information the buyer and seller have about the good, the market, and the utility of the good to the buyer, the smaller the spectrum of possible utilities. In the case of absolute knowledge, the gap should effectively disappear. This explains why market information (Weaver & Frederick, 2012) or trading experience (Coursey et al., 1987; List, 2003) reduce the WTP/WTA-gap. It explains why fixed-value tokens (such as money) show no endowment effect (Kahneman et al., 1990; van Dijk & van Knippenberg, 1996). It explains why there is no big difference between results of endowment effect studies using actual versus imaginary goods (Horowitz & McConnell, 2002). It even beautifully derives the kink of loss aversion around the reference point when plotted graphically. Take two utility curves placed above each other as to border the spectrum of UU for a given good and consumer. If a seller relies on  $\max_u$  and a buyer on  $\min_u$  for pricing the good, the result is a kink around the reference point the size of the UU spectrum. Illustration 1 depicts this relation. Thus, the UU account elegantly bridge the gaps of the loss aversion account, explains the bad-deal aversion account and the psychological ownership account, and simplifies the attribution sampling bias account.

### Gärdenfors' Predictions Under Uncertain Utilities

As noted by Gigerenzer (1996), theories explaining human behaviour must go beyond meticulous descriptions and offer falsifiable predictions. Contrary to the other accounts, the UU account describes a cognitive logic preceding the observed behavioural pattern and allows for falsifiable hypotheses. The experiments testing these hypotheses must, however, be different from prior experiments as these are, as shown above, already explainable with existing accounts as well as compatible with the UU account. Furthermore, for the UU account to gain traction, the results of the experiments must be explainable only by the UU account. Thus, a new set of experimental procedures are necessary to show the UU account's superiority. The



**Illustration 2.** Uncertain about their exact utility, buyers rely on the minimum expected utility and sellers on the maximum expected utility when pricing a good.

**Illustration 3.** Additional positive information eliminates inferior possible utility levels, drives up the minimum expected utility, and increases the buyer’s willingness to pay, but leaves the seller’s willingness to accept unchanged.

**Illustration 4.** Additional negative information eliminates superior possible utility levels, drives down the maximum expected utility, and decreases the seller’s willingness to accept, but leaves the buyer’s willingness to pay unchanged.

logic of Gärdenfors’ (2018) UU account for the endowment effect is that sellers use  $\max_u$  as their price indicator, while buyers use  $\min_u$ . This reliance on the opposite borders of the UU spectrum creates the foundation for testing the UU account’s predictive power: buyers and sellers should react differently to information affecting  $\min_u$  and  $\max_u$ .

Imagine a good,  $x$ , a seller, and a buyer. The buyer is uncertain of her utility of  $x$ . However, both the buyer and the seller have a hunch about the buyer’s minimal expected utility of  $x$ ,  $\min_u(x)$ , and maximal expected utility of  $x$ ,  $\max_u(x)$ . Rationally, the seller will price  $x$  towards the monetary equivalent of  $\max_u(x)$ . Accepting a lower price could result in the seller fooling herself and not maximising her gain in case she accepts a price lower than the buyer’s actual utility of  $x$ . Conversely, the buyer will price  $x$  towards  $\min_u(x)$ . Accepting a higher price could result in the buyer fooling herself by paying too high a price for a good offering a lower utility. Illustration 2 depicts these pricing strategies. Now imagine that the buyer and seller receive a piece of positive information about  $x$ . This changes the uncertain utilities interval as it eliminates a range of possible expected utilities, driving up the lower border,  $\min_u(x)$ , while leaving the upper border,  $\max_u(x)$ , unchanged. This results in the buyer of  $x$  to increase her WTP, while the WTA of the seller stays (practically) unchanged. Illustration 3 depicts this scenario. Conversely, had the information about  $x$  been negative, the opposite happens, leaving the seller with a lower WTA and the buyer with an unchanged WTP. Illustration 4 depicts this scenario.

Thus, Gärdenfors’ (2018) UU account for the endowment effect gives two hypotheses about how additional positive and negative information affects sellers and buyers under the assumption that the endowment effect exists:

**H1:** additional positive information affects buyers’ WTP more than sellers’ WTA.

**H2:** additional negative information affects sellers’ WTA more than buyers’ WTP.

Implicitly, these two hypotheses include the expectation that additional information will decrease the gap between sellers’ WTA and buyers’ WTP. This decrease in endowment effect is also expected by the bad deal aversion account and is

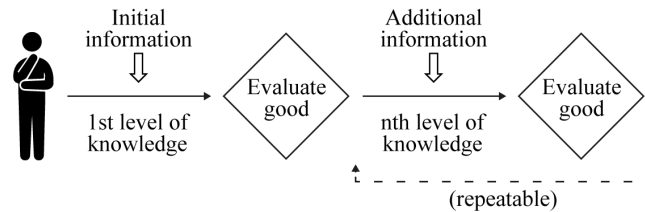
thus not unique to the UU account. Consequently, this paper focuses primarily on the two hypotheses above.

## 4 Pilot Studies

Classic endowment effect studies use either the valuation or the exchange paradigm for eliciting the endowment effect (e.g. Kahneman et al., 1990; Knetsch, 1989). When testing alternative explanations for the endowment effect, other experimental paradigms are necessary (e.g. Gal & Rucker, 2018’s retention paradigm). To test the above hypotheses, the majority of the pilot studies presented below implements a new experimental paradigm focusing on the addition of new knowledge (pilot studies 1a, 1b, 1c, 2a, 2b, 4a, 4b, 5, and 7). The increasing information paradigm is inspired by Kahneman et al.’s (1990) original valuation paradigm. In the valuation paradigm, participants are randomly given the role as either seller or buyer and asked to price a good. The endowment effect appears as sellers price the good higher than buyers. The increasing information paradigm differs from the valuation paradigm in that it asks the participants for their WTA (if sellers) and WTP (if buyers) at multiple levels of knowledge adding new information between these. Illustration 5 outlines this increasing information paradigm. Note how the step of adding new information and requesting the participants’ evaluation of the good can be repeated for implementations with multiple increments of information.

As the hypotheses based on the UU account focus on the effect of positive and negative information on sellers’ WTA and buyers’ WTP, an indication of participants’ evaluation of the added information is necessary. This can be done by asking participants about how the new information affected their view of the good in question (as in pilot studies 1a, 1b, and 1c). Alternatively, it can be done by asking participants about their opinion of the good and compare their responses before and after the newly added information (as in pilot studies 2a, 2b, 4a, 4b, 5, and 7). This latter comparative evaluation of participants’ view of the good has the benefit that it is not the researcher, but the participant who decides what knowledge to take into account when evaluating the good. The repetitive valuation of the same good inhibits the increasing information paradigm to use incentive-compatible elicitation techniques such as the Becker-DeGroot-Marshack method. According to





**Illustration 5.** In the increasing information paradigm, participants evaluate the good at multiple knowledge levels adding new information between these. The process of adding new information is repeatable, resulting in multiple knowledge level increments.

Horowitz & McConnell's (2002) review, this might cause a slightly lower endowment, but Tunçel & Hammitt's (2014) updated review challenges this effect.

In the experiments testing the increasing information paradigm reported upon in this paper (pilot studies 1a, 1b, 1c, 2a, 2b, 4a, 4b, 5, and 7), the participants stated their WTA and WTP in a web-based survey platform developed specially for these studies. The surveys included a concluding section with questions regarding their age, gender and educational background. The supplementary material includes hyperlinks to all survey materials.

In the following, I present seven pilot studies testing the UU account's hypotheses. Experience from former pilot studies is continuously included to enhance the experimental design. Each pilot study holds its own description of participants, method, results and designated discussion. Generally, the pilot studies implementing the increasing information paradigm fail in finding a proper endowment effect (pilot studies 1a, 1b, 1c, 2a, 2b, 4a, 4b, 5, and 7). This is the reason for the inclusion of two successful replications (pilot studies 3a, 3b, and 6). After this reporting on pilot studies follows a general discussion of the questions arising from the lacking endowment effect in the increasing information paradigm based pilot studies.

## 4.1 Pilot Studies 1a, 1b, and 1c

The first set of pilot studies tests the hypotheses of the UU account implementing the increasing information paradigm. With the idea that the endowment effect would appear as surely as the sun sets, these pilot studies are based on a naïve idea of how simple endowment effect studies ought to be.

Horowitz & McConnel's (2002) and Tunçel & Hammitt's (2014) reviews suggest that there is limited difference between results of endowment effect studies using real versus hypothetical goods and between experiments with students and laymen. Shogren et al.'s (1994) experiments confirm Hanemann's (1991) mathematical proof suggesting that the more a good is like a market good, the smaller the endowment effect. Horowitz & McConnell's (2002) review also find this relationship. Brasel & Gips (2014) find that the endowment effect also shows in screen-based surveys. Hence, based on prior literature, it appeared fair to conduct pilot studies with students interacting with a screen-based survey regarding hypothetical goods of varying degree of market good status.

### Participants

For pilot study 1a, I recruited 112 individual participants ( $M_{age} = 23.65$ ,  $SD_{age} = 2.46$ , 48.67% female) at my dormitory in central Copenhagen on May 19<sup>th</sup>, 2018. You can only live at the dormitory when you attend university, are below 30 years old, have no children, and have a grade point average from high school above the equivalent of a Danish "7". Due to the results

discussed below, I conducted two follow-up studies (pilot studies 1b and 1c). For pilot study 1b, I recruited 52 individual participants ( $M_{age} = 27.06$ ,  $SD_{age} = 5.02$ , 61.54% female) at the humanities campus of University of Copenhagen on January 25<sup>th</sup>, 2019. For pilot study 1c, I recruited 17 individual participants ( $M_{age} = 28.47$ ,  $SD_{age} = 9.07$ , 52.94% female) in a local train from Copenhagen to a nearby province on January 23<sup>rd</sup> and 27<sup>th</sup>, 2019. All participants signed an informed consent form before participating and received a small piece of wrapped chocolate as a thank you for participating.

### Method

This pilot study implements a single-iteration variation of the increasing information paradigm repeated for four different goods (a neutral white mug, a neutral grey t-shirt, a falafel wrap, and a modern art print). The levels of knowledge for each good was 1) an image of the good, plus 2) a piece of either positive or negative information about the good (e.g. the mug being unbreakable or unfit for machine wash). Participants were asked to use their (own) preferred digital device to access the survey platform. The participants were encouraged to ask questions if something was unclear to them. After pricing all four goods, the participants evaluated both the pieces of information they received and the corresponding positive or negative pieces of information that they did not receive for each good. The participants were asked to rate the information on how it affected their view on the good on a scale going from "very positively", over "positively", "neutrally (it does not)", and "negatively" to "very negatively".

As noted above, I conducted two follow-ups to pilot study 1a (pilot studies 1b and 1c). The methodology of pilot study 1b and 1c were identical to that of the pilot study 1a.

### Results

Table 1 presents the results of pilot studies 1a, 1b, and 1c. For each good are presented the initial mean WTP of the sellers, the initial mean WTA of the buyers and the ratio between these two. Under these are the same measures after the participants received additional positive or negative information. Below each good are four additional measures showing how participants evaluating the information received as changing their view on the good either positively or negatively averagely changed their WTP (if buyers) and WTA (if sellers). Participants evaluating their changed view "very positively" are included in the "positive" category. Participants evaluating their changed view "very negatively" are included in the "negative" category. Participants evaluating their changed view "neutrally (it does not)" are not included in either. For pilot study 1a, two responses are excluded leaving the number of participants at 110. One was removed, as it became clear during the experiment that the participant was heavily intoxi-

cated. The other was removed due to a technical error challenging the validity of the response. The endowment effect is calculated as the ratio between sellers' WTA and buyers' WTP. A ratio above 1 means that sellers value the good higher than buyers. A ratio above 2 is normal and a ratio below 1 is uncommon.

### Discussion

The most interesting observation from pilot studies 1a, 1b, and 1c is the general lack of an endowment-dependent disparity between sellers' and buyers' pricing of the goods. For pilot study 1a carried out at my dormitory, the average initial WTA/WTP-ratio is 0.74. This population showed a reversed endowment effect meaning that sellers on average priced the goods *lower* than buyers. Prior findings suggest that culture influence trading behaviour. Such findings include Apicella et al. (2014) reporting on isolated Hadza Bushmen of Northern Tanzania being less willing to trade if exposed to modern society. Another example is Maddux et al. (2010) finding that people of European descent tend to show higher endowment effects than people of Asian descent. At the dormitory, there is a very active culture of buying and selling used goods between residents and many residents know many of the other 390 residents. In such a place, it might be culturally inappropriate to price goods too high when selling to each other as to not appear greedy. This led to the two follow-ups to ensure that the initial lack of endowment effect was not due to me partially knowing the participants or the participants first thinking of

other dormitory residents as buyers of their goods. For the participants in the follow-up studies 1b and 1c, the average initial WTA/WTP-ratio is 1.15. This ratio, however, only persists as long as the art print is included. Without it, even these populations show an overall reversed endowment effect. For all the goods and participants in pilot studies 1a, 1b, and 1c, the average initial WTA/WTP-ratio is 0.90. These numbers are rather surprising as a recent review found an average ratio across studies of 3.28 (Tunçel & Hammitt, 2014).

The next observation from pilot studies 1a, 1b, and 1c is the lacking support for Gärdenfors' (2018) UU account. When looking at all the observations of pilot studies 1a, 1b, and 1c combined, only participants' reactions to new information about the falafel wrap follow the two hypotheses presented earlier. Buyers rating the added information about the falafel wrap positively increase their WTP more than sellers rating the added information about the falafel wrap positively increase their WTA. Sellers rating the added information about the falafel wrap negatively decrease their WTA more than buyers rating the added information about the falafel wrap negatively decrease their WTP. For the other goods, participants' changed valuations are either mixed or contradicting the hypotheses.

A finding in accordance with earlier studies is that the closer the inquired good is to be a market good, the lower the endowment effect. The commonly traded mugs, t-shirts, and falafel wraps show a lower initial WTA/WTP-ratio than the less frequently traded good of an art print (weighted by partic-

**Table 1.** Results of pilot studies 1a, 1b, and 1c testing the increasing information paradigm with a mug, a t-shirt, a falafel wrap, and an art print. Under each good is presented how participants evaluating the additional information as affecting their view on the good either positively or negatively affected their WTP (if buyers) and WTA (if sellers). Amounts in DKK ( $\approx$  €7.45).

	Pilot Study 1a (N = 110)			Pilot Study 1b (N = 52)			Pilot Study 1c (N = 17)		
	Mean WTP (N = 52, 63, 51, 54)	Mean WTA (N = 58, 47, 59, 56)	WTA /WTP	Mean WTP (N = 29, 27, 22, 26)	Mean WTA (N = 23, 25, 30, 26)	WTA /WTP	Mean WTP (N = 7, 9, 10, 8)	Mean WTA (N = 10, 8, 7, 9)	WTA /WTP
Mug	37.77	15.72	0.42	43.62	16.83	0.39	35.71	45.70	1.28
+ info	46.69	62.69	1.34	45.41	30.65	0.67	55.71	61.30	1.10
Positive	+38.58 (N = 24)	+102.22 (N = 27)		+29.55 (N = 11)	+30.67 (N = 12)		+30.00 (N = 5)	+30.20 (N = 5)	
Negative	-23.35 (N = 20)	-1.17 (N = 18)		-30.33 (N = 9)	-7.50 (N = 6)		-5.00 (N = 2)	+1.67 (N = 3)	
T-shirt	111.73	57.00	0.51	106.93	100.40	0.94	173.11	70.63	0.41
+ info	146.43	102.77	0.70	116.81	143.40	1.23	149.78	78.13	0.52
Positive	+106.48 (N = 31)	+79.20 (N = 25)		+48.36 (N = 14)	+110.91 (N = 11)		+133.33 (N = 3)	+17.00 (N = 5)	
Negative	-49.77 (N = 22)	+9.50 (N = 18)		-62.22 (N = 9)	-12.08 (N = 12)		-122.00 (N = 5)	-12.50 (N = 2)	
Falafel	51.25	33.05	0.64	46.95	31.10	0.66	55.40	44.00	0.79
+ info	56.94	39.07	0.69	56.05	34.93	0.62	48.90	52.14	1.07
Positive	+12.71 (N = 24)	+11.61 (N = 31)		+25.83 (N = 6)	+10.71 (N = 14)		-8.00 (N = 5)	+9.50 (N = 6)	
Negative	-1.00 (N = 5)	-6.20 (N = 5)		+15.00 (N = 3)	-7.00 (N = 5)		-12.50 (N = 2)	-0.00 (N = 1)	
Art print	267.98	375.98	1.40	279.42	585.77	2.10	241.00	894.44	3.71
+ info	683.59	1,174.55	1.72	501.77	3,020.38	6.02	159.75	428.89	2.68
Positive	+1,442.72 (N = 18)	+2,782.35 (N = 17)		+755.45 (N = 11)	+4,393.33 (N = 15)		-33.33 (N = 3)	+775.00 (N = 2)	
Negative	-173.14 (N = 21)	-122.50 (N = 22)		-127.38 (N = 8)	-187.50 (N = 4)		-183.33 (N = 3)	-1,148.00 (N = 5)	

ipant count averaging at 0.49, 0.62, and 0.66 respectively versus 1.81). This finding is strengthened by earlier studies finding that the endowment effect tends to decrease with repeated trials (Coursey et al., 1987; List, 2003). The art print was always the fourth good evaluated but still shows an endowment effect. This does not, however, explain the reversed endowment effect observed, as earlier studies consistently found endowment effects even for market goods (Horowitz & McConnell, 2002; Tunçel & Hammitt, 2014).

A common question from the participants in all populations was the context of the trades. “Am I to think that I am hungry”? “Do I need the mug”? “When during the day is it”? “What are the other options”? Two faculty members in pilot study 1b regarding the falafel wrap even asked: “Are my kids with me and are they hungry”? In all cases, participants were told to base their answers on their current context in the moment of questioning. These questions hint the relevance of the context which will be a topic of the discussion concluding the paper.

The rating of additional information in this implementation of the increasing information paradigm was included to secure that whether the participants received positive or negative information relied on their personal evaluation of these pieces of information and not my personal normative ideas about what constitute positive and negative attributes for e.g. a neutral white mug. This may be another source for the missing link between positive and negative information and the change in price. Nisbett & Wilson (1977) find that when asked directly, participants may be unaware of the fact that their opinion on a topic has changed and what caused this change. Furthermore, questioning participants about new information requires the researcher to define the new information, and in the case of pilot studies 1a, 1b, and 1c: inventing it. Both the positive and negative pieces of information of the goods in pilot studies 1a, 1b, and 1c were rather controversial (e.g. the mug being unbreakable or unfit for machine wash). In Gärdenfors’ (2018) UU account, the borders of the UU interval is actors’ maximum and minimum *expected* utility. Thus, the added information should be somewhat anticipated. For a theory of uncertain utilities due to the inclusion of possible future knowledge, naturally appearing information may be more adequate. It might also be more accurate to question participants about their feelings towards the good in question before and after adding new information than asking participants about how the information affects their opinion of the good. This comparative process of evaluating participants’ evaluations of additional natural information will be implemented in the following pilot studies.

## 4.2 Pilot Studies 2a and 2b

The second set of pilot studies tests the hypotheses of the UU account implementing the increasing information paradigm with physical goods. Based on the experience from pilot studies 1a, 1b, and 1c showing no endowment effect, inspiration was drawn from earlier studies to increase the chance of a proper endowment effect.

Horowitz & McConnel (2002) and Tunçel & Hammitt (2014) conclude that there is only a small difference between studies with hypothetical and actual trades occurring and Brasel & Gips (2014) find that the endowment effect is also elicited with goods shown only on a screen. However, to rule out that it was not the solely screen-based appearance of goods in

pilot studies 1a, 1b, and 1c causing the lack of endowment effect, physical goods are introduced in pilot studies 2a and 2b. As pilot study 1c with non-students also failed at finding an endowment effect, university students appear as an appropriate pool of participants. The above discussion of the nature of the added information warrants a test of naturally appearing information. With this in mind, pilot studies 2a and 2b test students interacting with a screen-based survey regarding a physical good, naturally occurring pieces of information, emphasised ownership status, and asks for their liking of the good prior to and after adding new information instead of asking participants to rate the information itself. Inspired by former endowment effect studies (Bateman, Munro, Rhodes, Starmer, & Sugden, 1997; Kahneman et al., 1990; Knetsch, 1989; Morrison, 1997), the physical good chosen was a chocolate bar.

### Participants

For pilot study 2a, I recruited 40 individual participants ( $M_{age} = 25.03$ ,  $SD_{age} = 4.53$ , 30.00% female) amongst students at the IT University in Copenhagen. Due to the results discussed below, I conducted a follow-up study excluding international students, vegans, lactose intolerant people, and people allergic to nuts (pilot study 2b). For pilot study 2b, I recruited 20 individual participants ( $M_{age} = 26.10$ ,  $SD_{age} = 5.59$ , 45.00% female) also amongst students at the campus of the IT University in Copenhagen. All participants signed an informed consent form before participating and received a chocolate bar as a thank you for participating.

### Method

Pilot study 2a implements a single-iteration variation of the increasing information paradigm with the levels of knowledge being 1) an unidentifiable chocolate bar, plus 2) the chocolate bar revealed. Pilot study 2b implements a dual-iteration variation of the increasing information paradigm with the levels of knowledge being 1) an unidentifiable chocolate bar, 2) the chocolate bar revealed, plus 3) tasting the chocolate. Participants’ liking of the chocolate bar was indicated on a continuous sliding scale with a sad emoticon face in the one end and a happy emoticon face in the other end. The survey platform covertly quantified the liking on a scale from 0 to 100.

To test for a possible effect of the price of the good, two different chocolate bars were used. The one was a cheap private-label brand from a discount supermarket and the other a pricier organic, premium brand. Both chocolate bars were milk chocolate and weighted 100 grams. The chocolate bars were initially wrapped in white printing paper leaving them identical and generally unidentifiable. In pilot study 2b, only the cheap chocolate bar was included.

To emphasise the roles, I explicitly told the sellers that “Here is a chocolate bar. It is now *your* chocolate bar” and placed the wrapped chocolate bar in front of them at their side of the table. When given the role of the buyer, I told them “Here is a chocolate bar. It is *not your* chocolate bar. Maybe it is mine. Maybe it belongs to a friend of yours or is in the store. In either case, the important aspect is that it is not yours” and placed the bar in front of me at my side of the table. Furthermore, I strategically placed the mobile device at which the participants were to note their answers. For sellers, I placed it between me and the chocolate bar. For buyers, I placed it between them and the chocolate bar. Both sellers and buyers

were allowed to touch the bar and otherwise examine it, although nothing but the weight could be assessed through the wrapping paper. In pilot study 2b, additional emphasis was put on the sellers' ownership of the chocolate both orally and by making them sign a paper stating their receipt of the chocolate bar. Emphasis was also put on making sure that the participants rated their liking of the unknown chocolate bar and not its clinical wrapping. A transcript of the recruitment and introduction speech is included in the supplementary material.

### Results

Table 2 presents the result from pilot studies 2a and 2b. For each good are presented the initial mean WTP of the sellers, the initial mean WTA of the buyers and the ratio between these two. Furthermore, the same measures are presented after the participants received additional information. Below the subsequent knowledge levels are four additional measures showing how participants changing their liking of the chocolate bar either positively or negatively changed their WTP (if buyers) and WTA (if sellers). The endowment effect is calculated as the ratio between sellers' WTA and buyers' WTP. A ratio above 1 means that sellers value the good higher than buyers. A ratio above 2 is normal and a ratio below 1 is uncommon.

### Discussion

Pilot study 2a found a proper endowment effect for the unwrapped cheap chocolate bar. It is noteworthy, however, that this endowment effect only appears for the cheap chocolate bar. As the two bars looked and felt identical when wrapped, one should expect an equal initial endowment effect for the cheap and expensive chocolate bars. Generally, the cheap bar created a higher endowment effect. Looking closer at the data, a few responses pop out. Three participants priced the chocolate bar either wrapped or unwrapped at DKK 60 or above. This is a very high price for a standard sized chocolate bar – especially for a student. Taking out the three responses above DKK 60 reduce the WTA/WTP-ratio to 1.02 and 0.86 for the cheap chocolate bar when wrapped and unwrapped respectively and to 0.70 and 0.72 for the expensive chocolate bar. When looking at the results without these outrageous prices,

they show the same tendency as the results of pilot studies 1a, 1b, and 1c: no or a reversed endowment effect. In other words, it does not change my findings to test with physical goods rather than on-screen images of goods. I continue to find scarce or reversed endowment effects for hypothetical exchanges.

It is worth noticing that some of the participants forming this sample were international students. Several of them noted, how "I don't know the price of a chocolate bar". It may be that they are less aware of the Danish chocolate bar market (including brands and prices). A certain level of knowledge about the market in question may be necessary for participating in endowment effect studies. Generally, collecting data for pilot study 2a highlighted multiple flaws in the design. Apart from international students pricing chocolate bars outrageously highly, a vegan took part in the study without stating herself that she was unable to eat the chocolate and thus would most likely evaluate it accordingly. A few participants signalled that they took into account the white paper when evaluating the chocolate bar (e.g. by saying how "this paper is not very attractive"). A few participants acting as sellers did clearly not understand that it was *their* chocolate bar, as they handed it to me after finishing the experiment. This is the reason for the exclusion of international students, vegans, lactose intolerant people, and people intolerant to nuts and the additional signing of an official looking paper stating their receipt of the chocolate bar in pilot study 2b. The results suggest that this exclusion was somehow "successful" as the results of pilot study 2b generally show lower endowment effects for the cheap chocolate bar than pilot study 2a.

Pilot study 2b finds an endowment effect and a development of the WTA/WTP-ratio in accordance with the UU account. The more knowledge participants have about the chocolate bar, the smaller the endowment effect. When going from the knowledge level of knowing the chocolate bar details to the knowledge level of tasting it, participants even act accordingly to the two hypotheses presented earlier. Buyers increasing their liking of the chocolate bar generally increase their WTP more than sellers increasing their liking increase their WTA. Sellers decreasing their liking of the chocolate bar generally decrease their WTA more than buyers decreasing the liking decrease their WTP. However, the ratios observed here are too small to be very robust with this few participants.

**Table 2.** Results of pilot studies 2a and 2b testing the increasing information paradigm with neutrally wrapped, revealed, and tasted cheap and expensive chocolate bars. Under each good is presented how participants increased and decreased their liking of the good changed their WTP (if buyers) and WTA (if sellers). Amounts in DKK ( $\approx$  €7.45).

	Pilot Study 2a (N = 40)			Pilot Study 2b (N = 20)		
	Mean WTP (N = 10, 10)	Mean WTA (N = 10, 10)	WTA /WTP	Mean WTP (N = 10)	Mean WTA (N = 10)	WTA /WTP
Wrapped Expensive Chocolate	22.20	15.40	0.69			
Unwrapped Expensive Chocolate	30.10	21.90	0.73			
Positive (N = 7, 7)	+9.57	+5.43				
Negative (N = 1, 2)	-0.00	+7.50				
Wrapped Cheap Chocolate	8.80	10.60	1.20	11.60	12.50	1.08
Unwrapped Cheap Chocolate	11.10	29.10	2.62	9.70	9.90	1.02
Positive (N = 5, 4, 6, 4)	+3.40	+49.50		+0.17	+2.50	
Negative (N = 4, 4, 3, 6)	+0.25	-3.25		-6.67	-6.00	
Tasted Cheap Chocolate				11.70	10.70	0.91
Positive (N = 5, 6)				+4.00	+1.83	
Negative (N = 3, 1)				-0.00	-5.00	

While heavily inspired by Kahneman et al.'s (1990) valuation paradigm, the increasing information paradigm employed here have a few differences. Unlike Kahneman et al. (1990), I conduct no trades at the end of the experiment. This lack of exchange might cause the participants to behave less in accordance with their true opinions. However, Horowitz & McConnell (2002), Sayman & Öncüler (2005), and Tunçel & Hammitt (2014) find that the actualisation of the trade has only a limited effect. Another difference is that Kahneman et al. (1990) ask the participants to indicate whether they want to sell the mug or not at specific prices presented to them. In my version, I ask open-ended WTA questions. The possible influence of different elicitation techniques will be a topic of the concluding discussion section of this paper. This is, however, not the first study to find only small endowment effects with chocolate bars. Through a series of five trials, Morrison (1997) finds a mean WTA/WTP-ratio for chocolate bars of just 1.08.

### 4.3 Pilot Studies 3a and 3b

The third set of pilot studies replicates two experiments showing substantial endowment effects. This aim was due to the marginal WTA/WTP-ratios found in pilot studies 1a, 1b, 1c, 2a, and 2b. The studies chosen for replication are one of Thaler's (1980) original endowment effect-eliciting questions and a study of Adamowicz et al. (1993). Thaler's (1980) questionnaire was chosen as it is one of the examples introducing the endowment effect. Adamowicz et al.'s (1993) study design was chosen as it shows an endowment effect with purely hypothetical exchanges of market goods.

Thaler (1980) asks participants what they would be willing to pay for a cure for a caught disease with a 0.001 chance of painless mortality within a week. As counter-question, participants are asked for their minimum compensation, if they were to be exposed to the disease as part of medical research. Thaler (1980) reports no statistics, but state that responses "differ by an order of magnitude or more! (A typical response is \$200 and \$10,000)" (p. 44).

Adamowicz et al. (1993) present a scenario to participants about a movie screening, being the only of its kind, but with the title also being available on video cassette. The participants are also given a short introduction to the movie before asked what they are willing to pay in order to go to this screening. Following this, the scenario is prolonged into a situation where just before the participant is about to go to the screening, the theatre telephones and asks the participant, if it may buy back the ticket due to overselling and the participant is

asked for his or her WTA. Adamowicz et al. (1993) find an average WTA/WTP-ratio of 1.95.

#### Participants

For pilot study 3a, I recruited 25 individual participants ( $M_{age} = 24.48$ ,  $SD_{age} = 2.65$ , 48.00% female) amongst students at the Humanities Campus of University of Copenhagen on February 13<sup>th</sup> and 14<sup>th</sup>, 2019. Due to the results discussed below, I conducted a follow-up study (pilot study 3b). For pilot study 3b, I recruited 40 individual participants ( $M_{age} = 22.98$ ,  $SD_{age} = 2.20$ , 60.00% female) at the Humanities Campus of University of Copenhagen on February 19<sup>th</sup>, 2019. All participants signed an informed consent form before participating and received a small piece of wrapped chocolate as a thank you for participating.

#### Method

Pilot study 3a used a translated version of one of Thaler's (1980) original questions regarding disease exposure and a translated and updated version of Adamowicz et al.'s (1993) movie ticket study. The originals can be found in Thaler (1980, pp. 34–44) and in Adamowicz et al. (1993, p. 426) and are outlined above. The translated (into Danish) version of Thaler's (1980) questionnaire and the localised and modernised version (in Danish, with Netflix instead of video cassette equipment, and a current movie title) of Adamowicz et al.'s (1993) movie ticket study design is included in the supplementary material. In their original version, Adamowicz et al. (1993) used access to personal screening devices as a control variable. In my version, access to Netflix as a streaming service offering the title in question is used instead. Participants randomly received a questionnaire in which the movie ticket questions or the disease research questions were presented first. For both the movie ticket questions and the disease-research questions, participants first stated their WTP first and afterwards their WTA. The participants noted their responses directly on the paper-based surveys.

In the pilot study 3b questionnaire, the disease research question was omitted, and the movie ticket questions changed slightly. Firstly, it was randomised whether participants were buyers or sellers first.. Secondly, in the selling condition, the framing was changed so that sellers had not just bought the ticket but had just won it instead. Thirdly, the time of selling was changed. Instead of selling the ticket just before leaving for the theatre, the sellers were asked for their WTA at the same hypothetical time as buyers were asked for their WTP

**Table 3.** Results of pilot studies 3a and 3b replicating two earlier valuation paradigm endowment effect studies with a disease/cure and a movie theatre ticket. For the movie ticket is presented how various control variables affect the WTP (if buyers) and WTA (if sellers). Amounts in DKK ( $\approx$  €7.45).

	Pilot Study 3a (N = 25)			Pilot Study 3b (N = 40)		
	Mean WTP (N = 25)	Mean WTA (N = 25)	WTA /WTP	Mean WTP (N = 20)	Mean WTA (N = 20)	WTA /WTP
Disease (and cure)	100,080.00	41,296,680.00	412.64			
Movie ticket	88.60	195.40	2.21	109.25	134.50	1.23
<i>Has Netflix access (N = 21, 31)</i>	85.00	201.19	2.37	101.77	127.42	1.25
<i>No Netflix access (N = 4, 8)</i>	107.50	165.00	1.53	144.38	178.75	1.24
<i>Buying first (N = 10, 10)</i>				107.00	127.00	1.19
<i>Selling first (N = 10, 10)</i>				111.50	142.00	1.27

(approximately half a week before the screening). This altered questionnaire is also included in the supplementary material.

## Results

Table 3 presents the results of pilot studies 3a and 3b. For each good are presented the initial mean WTP of the sellers, the initial mean WTA of the buyers and the ratio between these two. Furthermore, the mean WTP and mean WTA are presented divided by subgroups: participants stating access to Netflix, participants stating no access to Netflix, and for the follow-up: participants buying first and participants selling first. One participant in pilot study 3b did not answer the Netflix question but is included in the other measures. The endowment effect is calculated as the ratio between sellers' WTA and buyers' WTP. A ratio above 1 means that sellers value the good higher than buyers. A ratio above 2 is normal and a ratio below 1 is uncommon.

## Discussion

The most apparent result of pilot study 3a is that it was indeed possible to replicate the results of Thaler (1980) and Adamowicz et al. (1993). In both cases, my results actually exceed the original results with a WTA/WTP-ratio of 412.64 versus 50.00 and 2.21 versus 1.95 respectively. Interestingly, the WTA/WTP-ratio is more or less constant in pilot study 2b independently of whether participants sold or bought their tickets first or had access to Netflix or not, even though the underlying buying and selling prices change. Selling first results in both higher selling and buying prices on average than buying first. This may be due to some element of anchoring by the first price indicated. Access to Netflix lowers both buying and selling prices, but relatively, as the endowment effect remains unchanged. Crossing the results of participants acting first as sellers and participants acting first as buyers results in a WTA/WTP-ratio of 1.33.

Independently of the confirming results of pilot study 3a, I think that it is fair to criticise both of the original study designs. In the case of Thaler's (1980) disease experiment, I question whether the results truly reflect an endowment effect or merely risk aversion. I do not presume diseases and their cures goods to be traded in the same terms as ordinary market goods as Thaler (1980) does. In Thaler's (1980) questionnaire, not buying a cure is interpreted as the same as allowing the exposure. Gal & Rucker (2018) would argue that Thaler's (1980) study design confounds its results with inertia to act. Instead, the question should be framed so that the outcome is the same if no action is taken. For example by asking for participants' WTP for obtaining access to the cure and WTP for retaining access to the cure. Furthermore, using statistics to indicate likelihood may well confuse participants. Much research has shown that (even well-educated) people have difficulties grasping statistics (e.g. Kahneman, 2011). Finally, it appears as a slightly unethical question to force volunteering participants to ponder, as it effectively asks them to price their own life. These points of critique led to the disease question being omitted from pilot study 3b.

Adamowicz et al.'s (1993) study design shows an endowment effect, but again, I want to question whether it is truly an endowment effect. Unlike with Thaler's (1980) disease experiment, there is no questioning of movie tickets as a fair example of a market good. If the results are to be interpreted as an endowment effect, one must imply that what the buyers buy

and what the sellers sell is indeed the same good. In Adamowicz et al.'s (1993) experiment, participants are first buyers and just before leaving for the theatre, they become sellers. This means that when they buy the ticket, they buy the experience of a movie screening. When they sell the ticket, however, they sell not only the experience of a movie screening but also the hassle of having to make a last minute change of plans. Moreover, in the selling condition, it is emphasised how "Assume also that you fully intend on going and do not have any other prior commitments" (Adamowicz et al., 1993, p. 426). In the buying condition, it is unclear whether the participants are to think that they would like to. During the response collection, multiple participants asked exactly this: "Am I to assume that I want to see the movie"? These considerations led to the changes of framing and timing in pilot study 3b. In pilot study 3b the selling and buying of tickets happened at the same point in time, sellers had won and not bought the ticket, and participants were themselves to figure out if they intended to go or not. These changes led to a smaller endowment effect (1.23) compared both to my replication results (2.21) and Adamowicz et al.'s (1993) original results (1.95). While smaller in the altered experiment design, movie tickets still appear as an appropriate good for testing endowment effect theories. However, the framing of the questions posed might be important, as the change of the framing and timing of the selling condition in pilot study 3b lowered the endowment effect.

## 4.4 Pilot Studies 4a and 4b

The fourth set of pilot studies tests the hypotheses of the UU account implementing the increasing information paradigm with physical goods and a common market understanding.

A central element of the UU account is buyers and sellers taking into consideration possible new knowledge about goods when evaluating them. This requires participant to have an idea about what constitutes possible new knowledge. The effect of lacking market information was seen amongst exchange students pricing the chocolate bars outrageously in pilot study 2a. A possibly unaccounted element in the experimental design of pilot studies 2a and 2b is participants taking into consideration what they think to be possible chocolate bars in a student-run experiment when pricing the unidentifiable chocolate bar. If participants do not expect expensive chocolate bars, an expensive chocolate bar might be just as controversial information as an unbreakable mug (as in pilot studies 1a, 1b, and 1c). Based on this, pilot studies 4a and 4b induce simple market knowledge.

### Participants

For pilot study 4a, I recruited 20 individual participants ( $M_{\text{age}} = 25.45$ ,  $SD_{\text{age}} = 4.91$ , 70.00% female) amongst students at the Humanities Campus of University of Copenhagen on February 21<sup>st</sup>, 2019. Due to the results discussed below, I conducted a follow-up study (pilot study 4b). For pilot study 4b, I recruited 20 individual participants ( $M_{\text{age}} = 24.30$ ,  $SD_{\text{age}} = 5.09$ , 85.00% female) amongst students at the Law, Theology, and Humanities Campus of University of Copenhagen on March 4<sup>th</sup>, 2019. All participants signed an informed consent form before participating and received a chocolate bar as a thank you for participating.

## Method

Pilot studies 4a and 4b both implement a triple-iteration variation of the increasing information paradigm. For pilot study 4a, the levels of knowledge are 1) an unidentifiable chocolate bar, 2) market information, 3) the chocolate bar revealed, plus 4) tasting the chocolate. For pilot study 4b, the levels of knowledge are 1) an unidentifiable chocolate bar with market information, 2) the chocolate bar revealed, 3) tasting the chocolate, plus 4) knowing its retail price. Participants' liking of the chocolate bar was indicated on a continuous sliding scale with a sad emoticon face in the one end and a happy emoticon face in the other end. The survey platform covertly quantified the liking on a scale from 0 to 100.

To induce market information, the participants were shown a page showcasing all chocolate bars being part of the experiment with information about their brand and weight as well as an overall price range. This sheet is included in the supplementary material. To facilitate this induced market, 10 different chocolate bars were used to add more divergent information when revealed. The chocolate bars ranged in quality and price (from DKK 7.95 to DKK 31.95). As with pilot studies 2a and 2b, the chocolate bars were initially wrapped in neutral white printing paper to disguise their brand. All chocolate bars were of similar size, weight (85 g – 100 g, averaging at 96 g), and variant (milk or dark chocolate with no additional flavourings or nuts). For each chocolate bar, an equal number of participants were randomly assigned as sellers and as buyers. An approach similar to that of pilot study 2b was used to emphasise ownership for the sellers. In pilot study 4b, the participants received market information from the outset to test for a possible anchoring effect of their uninformed WTA and WTP on their valuation with market information.

## Results

Table 4 presents the results of pilot studies 4a and 4b. For each level of knowledge are presented the mean WTP of the sellers, the mean WTA of the buyers, and the ratio between these two.

Below the subsequent levels of knowledge are four additional measures showing how participants changing their liking of the chocolate bar either positively or negatively changed their WTP (if buyers) and WTA (if sellers). Due to a technical bug in the survey platform, eight possible erroneous answers have been removed from the results of pilot study 4a. The endowment effect is calculated as the ratio between sellers' WTA and buyers' WTP. A ratio above 1 means that sellers value the good higher than buyers. A ratio above 2 is normal and a ratio below 1 is uncommon.

## Discussion

The results of pilot study 4a show the exact development predicted by the UU account. Buyers increasing their liking of the chocolate increase their WTP more than sellers increasing their liking increase their WTA. Sellers decreasing their liking of the chocolate bar decrease their WTA more than buyers decreasing the liking decrease their WTP. This, in turn, results in a decreasing endowment effect with the addition of information. However, this sample is very small.

The results of pilot study 4b directly oppose the development predicted by the UU account: The WTA/WTP-ratio increases with more information. For the knowledge levels they share, the results of pilot study 4b offset the endowment effect found in pilot study 4a resulting in WTA/WTP-ratios just under 0.90.

An interesting observation is the seemingly strange effect of positive and negative information in pilot study 4b. For example, buyers changing their liking of the chocolate bar in an upward direction after having its retail price revealed on average lowered their pricing of it. There might exist a possible confusion between "how do you feel about the chocolate?" and "how do you feel about the chocolate *given the price*". This may explain some of the missing effects of change in liking on valuation. In this case, the participant may price the chocolate bar cheaper and increase her liking, as she just learned that it was cheaper than expected. Both are positive aspects to the buyer but are difficult to account for. A different (monetary)

**Table 4.** Results of pilot studies 4a and 4b testing the increasing information paradigm with ten neutrally wrapped, revealed, and tasted chocolate bars with information about the price range of the chocolate bars and its specific chocolate bar's retail price. Under each knowledge level is presented how participants increased and decreased their liking of the chocolate bar changed their WTP (if buyers) and WTA (if sellers). Amounts in DKK ( $\approx$  €7.45).

	Pilot Study 4a (N = 12)			Pilot Study 4b (N = 20)		
	Mean WTP (N = 6)	Mean WTA (N = 6)	WTA /WTP	Mean WTP (N = 10)	Mean WTA (N = 10)	WTA /WTP
Wrapped Chocolate	8.33	14.67	1.76			
Market Information	10.00	15.17	1.52	18.00	11.50	0.64
Positive (N = 2, 2)	+5.00	+0.50				
Negative (N = 1, 1)	-0.00	-0.00				
Unwrapped Chocolate	13.67	19.67	1.44	22.00	15.30	0.70
Positive (N = 4, 4, 7, 7)	+6.25	+6.00		+4.43	+4.71	
Negative (N = 1, 0, 1, 2)	-0.00	N/A		+4.00	-2.50	
Tasted Chocolate	15.50	16.83	1.09	20.00	15.30	0.77
Positive (N = 4, 1, 2, 5)	+2.75	+0.00		+0.00	+0.00	
Negative (N = 1, 2, 3, 1)	-0.00	-6.50		-6.67	-0.00	
Retail Price Revealed				19.80	17.10	0.86
Positive (N = 3, 1)				-4.33	+0.00	
Negative (N = 1, 1)				-0.00	-0.00	

approach to understanding participants' likings of goods is examined in the general discussion section later in this paper.

## 4.5 Pilot Study 5

The fifth pilot study tests the hypotheses of the UU account implementing the increasing information paradigm with goods previously creating an endowment effect. Based on the limited endowment effect found with chocolate bars in pilot studies 2a, 2b, 4a, and 4b, inspiration was drawn from the results of pilot studies 3a and 3b in which movie tickets appear as a suitable good for testing endowment effect theories. Testing the experimental design of pilot studies 2a, 2b, 4a, and 4b with a new good allows for an investigation of whether the lacking endowment effect is due to the experimental design or the tested good.

### Participants

For pilot study 5, I recruited 24 individual participants ( $M_{\text{age}} = 24.50$ ,  $SD_{\text{age}} = 4.17$ , 70.83% female) at the Humanities Campus of University of Copenhagen on February 28<sup>th</sup>, 2019. All participants signed an informed consent form before participating and received a small piece of wrapped chocolate as a thank you for participating.

### Method

Pilot study 5 implements a quadruple-iteration variation of the increasing information paradigm with the levels of knowledge being 1) limited information (Sunday screening of the feature Roma), 2) market information (price range of tickets to other 2D, feature-length screenings without age discounts: DKK 60-140), 3) brief description about the movie and its nominations, 4) watching a two minute trailer embedded from YouTube, plus 5) knowing the retail price of the ticket (DKK 90). Participants were asked to use their (own) preferred digital device

**Table 5.** Results of pilot study 5 testing the increasing information paradigm with limited information, market information, and extended review information about, a watched trailer, and the retail price of a movie ticket. Under each knowledge level is presented how participants increased and decreased their liking of the movie ticket changed their WTP (if buyers) and WTA (if sellers). Amounts in DKK ( $\approx$  €7.45).

	Pilot Study 5 (N = 24)		
	Mean WTP (N = 9)	Mean WTA (N = 15)	WTA /WTP
Limited information	78.87	129.67	1.48
Market information	96.67	143.33	1.48
Positive (N = 1, 2)	+25.00	+0.00	
Negative (N = 5, 5)	+2.00	+12.00	
Extended information	94.44	139.67	1.48
Positive (N = 4, 8)	+0.00	-1.88	
Negative (N = 1, 2)	-10.00	-20.00	
Watched trailer	92.22	141.33	1.53
Positive (N = 3, 5)	+6.67	+0.00	
Negative (N = 2, 4)	-20.00	+6.25	
Retail price known	88.67	125.33	1.45
Positive (N = 3, 3)	-18.33	-25.00	
Negative (N = 0, 2)	N/A	-17.50	

to access the survey platform. Participants' liking of the movie ticket was indicated on a continuous sliding scale with a sad emoticon face in the one end and a happy emoticon face in the other end. The survey platform covertly quantified the liking on a scale from 0 to 100.

### Results

Table 5 presents the results of pilot study 5. For each level of knowledge about the movie are presented the mean WTP of the sellers, the mean WTA of the buyers, and the ratio between these two. Below the subsequent levels of knowledge are four additional measures showing how participants changing their liking of the ticket either positively or negatively changed their WTP (if buyers) and WTA (if sellers). The endowment effect is calculated as the ratio between sellers' WTA and buyers' WTP. A ratio above 1 means that sellers value the good higher than buyers. A ratio above 2 is normal and a ratio below 1 is uncommon.

### Discussion

The results of pilot study 5 show a small endowment effect. It is substantially bigger than experienced with chocolate bars in pilot studies 2a, 2b, 4a, and 4b (where it was mainly reversed), and even slightly bigger than experienced in pilot studies 3a and 3b. In pilot study 3b, the crossing of participants buying first and selling first show a WTA/WTP-ratio of 1.33. For the results of pilot study 5, the ratio is quite stable at around 1.48. The stable endowment effect directly challenges the UU account as it would expect a diminishing WTA/WTP-ratio with incrementing knowledge. Furthermore, the effect of positive and negative changes in liking of the tickets do not consistently affect buyers' and sellers' prices as the UU account predicts. The results of pilot study 5 also suggest the effect of retail price on the opinion of the good noted in the discussion of pilot study 4b above.

## 4.6 Pilot 6

The sixth pilot study replicates a classic exchange paradigm endowment effect experiment. The study chosen is the original exchange paradigm study presented by Knetsch (1989). Moreover, this pilot study functioned as a test to see if the participants would exhibit the endowment effect under classical conditions as they are also participants of the seventh pilot study which continues the development of my implementation of the increasing information paradigm.

### Participants

I recruited 52 participants ( $M_{\text{age}} = 21.88$ ,  $SD_{\text{age}} = 3.16$ , 38.46% female) from a class that I teach at Copenhagen Business School on March 14<sup>th</sup>, 2019. The class is a first year class on decision-making, risk, and uncertainty of the bachelor's programme on business administration and project management. The experiment was carried out just before the students were introduced to Kahneman (2011) and concepts such as loss aversion and the endowment effect. I orally informed the participants about the experiment about to take place. As the class was non-mandatory, voluntary participation was expected. After the experiment, I debriefed the participants and gave them the preliminary results. All participants received either an apple or a banana as a thank you for participating.



## Method

The participants were parted into two equal-sized groups and one of the groups sent temporarily outside the room. The remaining participants were given a banana and asked to keep it while completing an unrelated survey (pilot study 7 below). As in Knetsch's (1989) original study, the participants were given the fruit individually, without knowing it was random or that there was another fruit to get, and had it placed in front of them on their table. After every participant had completed the unrelated survey, they were asked if they would like to exchange their banana for an apple. I walked around distributing apples to the participants raising their hand. After completing the wished exchanges, the procedure was repeated with the other group receiving an apple to possibly exchange for a banana while the first group was temporarily outside the room.

## Results

Table 6 presents the results of pilot study 6. Of the 24 participants receiving a banana, 3 disregarded my instructions and consumed the banana before they were offered to trade, leaving 21 participants with the ability to keep or trade their banana. Of the 28 participants given an apple, 6 persons ate it, leaving 22 participants with the ability to keep or trade their apple.

## Discussion

The results observed (approximately two-thirds preferring their original endowment) are in accordance with Knetsch (1989) original findings, although not as strong (approximately nine-tenths preferring their original endowment). Of course, these results are subject to the same critique that Plott & Zeiler (2007) pose towards Knetsch's (1989) original experiment. Plott & Zeiler (2007) argue that the procedure of Knetsch's (1989) original experiment causes participants to prefer their original endowment as the procedure and wording might cause participants to think of their endowment as a gift, as the right option, and as easier to keep than to exchange. Plott & Zeiler's (2007) arguments might very well hold true for this pilot study as well. However, it is of less importance as the study mainly serves to see if the participants would show the expected behaviour in a classic experimental design, in case they would show non-expected behaviour in the increasing information paradigm employed in pilot study 7 below.

## 4.7 Pilot Study 7

The seventh pilot study tests the hypotheses of the UU account implementing the increasing information paradigm in a setting in which buyers and sellers are more alike. A general deficit of the earlier pilot studies is the difference between the role as seller and buyer. In this pilot study, the setting and wording

**Table 6.** Results of pilot study 6 replicating an exchange paradigm endowment effect study with bananas and apples.

Original endowment	Pilot Study 6 (N = 43)	
	Chose banana	Chose apple
Banana (N = 21)	14	7
Apple (N = 22)	9	13

are designed to create an exchange situation in which the role of the seller and buyer is more comparable.

## Participants

The same participants, time, and location as pilot study 6.

## Method

Pilot study 7 implements a triple-iteration variation of the increasing information paradigm with the knowledge levels being 1) an unspecified chocolate bar, 2) market information (the price of chocolate bars of similar size and weight in stores around campus: DKK 7.95-31.95), 3) the chocolate bar revealed on-screen (an organic, premium brand dark chocolate bar), plus 4) knowing its retail price (DKK 19.95). Participants' liking of the chocolate bar was indicated on a continuous sliding scale with a sad emoticon face in the one end and a happy emoticon face in the other end. The survey platform covertly quantified the liking on a scale from 0 to 100.

To create a comparable situation for buyers and sellers, sellers were told to imagine that they had created a competitor to the university canteen, selling snacks and coffee from a small wagon to other students. Buyers were told to imagine that a group of students had created a competitor to the university canteen, selling snacks and coffee from a small wagon to other students. Instead of asking what the participant was willing to pay/accept, the question was framed as "what do you think it is fair to pay/charge for the chocolate bar from the kiosk wagon"?

## Results

Table 7 presents the result of pilot study 7. For each level of knowledge are presented the mean WTP of the sellers, the mean WTA of the buyers, and the ratio between these two. Below the subsequent levels of knowledge are four additional measures showing how participants changing their liking of the chocolate bar either positively or negatively changed their WTP (if buyers) and WTA (if sellers). One participant chose

**Table 7.** Results of pilot study 7 testing the increasing information paradigm with limited information, market information, detailed information, and retail price known about a chocolate bar. Under each knowledge level is presented how participants increased and decreased their liking of the chocolate bar changed their WTP (if buyers) and WTA (if sellers). Amounts in DKK (€ ≈ 7.45)

	Pilot Studies 7 (N = 51)		
	Mean WTP (N = 20)	Mean WTA (N = 31)	WTA /WTP
No information	16.50	17.52	1.06
Market information	15.80	17.16	1.09
Positive (N = 9, 4)	-0.22	+2.00	
Negative (N = 2, 6)	-1.00	-1.50	
Details known	18.05	20.61	1.14
Positive (N = 7, 12)	+1.14	+5.25	
Negative (N = 9, 8)	+1.33	+2.50	
Retail price known	17.60	21.00	1.19
Positive (N = 8, 8)	-0.13	-2.13	
Negative (N = 7, 14)	-0.14	-1.07	

not to participate in the survey. The endowment effect is calculated as the ratio between sellers' WTA and buyers' WTP. A ratio above 1 means that sellers value the good higher than buyers. A ratio above 2 is normal and a ratio below 1 is uncommon.

### Discussion

The results of pilot study 7 show an average endowment effect slightly higher than the average endowment effect of pilot studies 4a and 4b combined (1.12 versus 1.01). However, the average endowment effect for chocolate bars found in this pilot study using the increasing information paradigm is smaller than the average endowment effect for movie tickets using the increasing information paradigm in pilot study 5 (1.12 versus 1.48). Furthermore, these results do not concur with the predictions of the UU account. Instead, these results show a tendency for sellers to be more sensitive to new both positive and negative information than buyers.

## 5 The Missing Endowment Effect

The seven pilot studies reported upon above were all carried out in an attempt to test the hypotheses of Gärdenfors' (2018) UU account of the endowment effect. Overall, none of the pilot studies testing the hypotheses of how new positive and negative information affect sellers and buyers succeeded (pilot studies 1a, 1b, 1c, 2a, 2b, 4a, 4b, 5, and 7). The pilot studies attempting to replicate earlier findings succeeded with endowment effect levels both above (pilot study 3a) and below (pilot study 6) the original studies. It should be emphasised that I carried out no studies attempting to disprove the endowment effect. From the outset, I designed the studies with an expectation of the endowment effect naturally appearing. The lack of endowment effect in the studies not following earlier experimental designs warrants a discussion of the results reported within this paper. In the following, I will discuss whether the endowment effect may be mainly subject to experimental methods, another approach to measuring participants' liking of the tested goods, and the importance of the context to participants of endowment effect studies.

### An Experimental Artefact?

Knetsch, Tang, & Thaler (2001) note that the endowment effect is one of the most robust findings in behavioural economy. Pilot studies 1a, 1b, 1c, 2a, 2b, 4a, 4b, 5, and 7 tested the increasing information paradigm with 357 unique participants. They collectively failed at finding a proper endowment effect. As they are only pilot studies with a limited number of participants, they are all too small for impactful conclusions. However, together they tell an interesting story as they are based on a naïve understanding of the endowment effect. Table 8 presents an overview of the initial endowment effects found in these pilot studies. Weighted by the number of participants, the initial endowment effects average at 0.93. Apparently, eliciting a proper endowment effect is more complicated than it tends to appear in most papers on the endowment effect.

With these surprising results, the replication crisis comes easily to mind (see e.g. Pashler & Wagenmakers, 2012). Is the endowment effect yet another un-replicable effect? The short answer is no. Many studies throughout the last three decades have reliably found a notable endowment effect (e.g. Knetsch & Sinden, 1984; List, 2003; Van Dijk & Van Knippenberg, 1998). Two pilot studies reported upon in this paper also do so

(pilot studies 3a and 6). As such, this paper bears no power to discharge earlier endowment effect studies of their results. The long answer is that it depends on what you mean by endowment effect. The results of pilot studies 1a, 1b, 1c, 2a, 2b, 4a, 4b, 5, and 7 showing no endowment effect question the simple introduction to the endowment effect in the opening this paper: "People tend to value goods more if they own them than if they do not". Even after signing the receipt of the chocolate bar (as in pilot studies 2b, 4a, and 4b), the owners do not appear to value the bar higher than buyers. With the successful replication of Thaler's (1980), Adamowicz et al.'s (1993), and Knetsch's (1989) results (pilot studies 3a and 6), it appears that the experimental method might be rather important.

This paper is not the first to question the experimental method used in endowment effect studies. Plott & Zeiler (2007) succeed in removing the endowment effect completely by changing Knetsch's (1989) exchange paradigm slightly. Manson & Levy (2015) find that sellers' WTA depends on the framing of the question. Asking sellers what they will "take" for a pen instead of what they will "sell" it for reduces the endowment effect. Furthermore, the elicitation technique employed in endowment effect studies might be questionable. Lichtenstein & Slovic (1971, 1973) find that when people bet, their preferences depend on whether they are to choose among two bets or to price them. Plott & Zeiler (2005) argue that participants do not comprehend the methods often put in place to ensure truthful answers (see also Cason & Plott, 2014). It might be time to ask if former endowment effect measures are as accurate as they are precise? Are they as true as they are consistent? Are they as externally as they are internally valid (Campbell, 1957)?

This paper does not suggest that the endowment effect does not exist per se, merely that it may be an artefact of methodology rather than human cognition. If it is the experimental procedure causing the endowment effect, it makes only little sense to stick with that procedure, if the goal is to measure something which is thought to exist outside the scope of the procedure. The finding that setting up a simple exchange situation is not enough to elicit the endowment effect (as in pilot studies 1a, 1b, 1c, 2a, 2b, 4a, 4b, 5, and 7) suggests that it may not be the parting with a good that creates the endowment effect. This suggestion is in opposition to the loss aversion and bad deal aversion accounts. The failure of an increased emphasis of ownership to induce an endowment effect (as in pilot studies 2b, 4a, and 4b) opposes the psychological ownership account. However, the general lack of endowment effect

**Table 8.** Average initial WTA/WTP-ratios weighted by numbers of participants of the pilot studies implementing the increasing information paradigm highlighting the lacking endowment effect.

Pilot Study	N	Item	Initial WTA /WTP-ratio
1	179	Mug	0.49
	179	T-shirt	0.62
	179	Falafel	0.66
	179	Art print	1.81
2	20	Expensive chocolate (wrapped)	0.69
	40	Cheap chocolate (wrapped)	1.13
4	32	Unknown chocolate w/ market info	0.90
5	24	Movie ticket	1.48
7	51	Chocolate from kiosk wagon	1.06
<b>Weighted Average WTA/WTP-ratio</b>			<b>0.93</b>

stands in clear contrast to any accounts of it, as they all expect it to naturally appear in great magnitude. Kahneman (2014) suggests that when carrying out replications, one should include the original author(s) as adviser(s) if possible. No authors of original endowment effect studies have advised the methods used in this paper and it is possible that none would approve of the increasing information paradigm. However, as Gigerenzer (1996) notes, theories explaining human behaviour must go beyond meticulous descriptions. To cater to the aim of the cognitive sciences, new experimental procedures are necessary. If the endowment effect is not obtainable in other settings than those of the original experimental procedures, it may be time to question not only these but the generalisability of their results as well.

In an anecdotal note, Ericson & Fuster (2014) use the self-storage industry as evidence for peoples' underestimation of their valuation of goods in their possession. I would argue that the rise of online spaces for re-selling personal items, such as Facebook's Marketplace, tell the opposite story. People meet in the market place and exchange goods with a common understanding of their value. Thus, it is no surprise when it is found that the more a good is like a market good, the lower the endowment effect (Hanemann, 1991; Horowitz & McConnell, 2002; Shogren et al., 1994). As a market is driven by actors willing to buy and sell at an agreed upon price, it is self-explanatory that market goods should show less endowment than rarely traded goods (such as one's health). Borrowing from Gal & Rucker's (2018) terminology; if we are to expect the strong version of endowment effect (that sellers always value goods higher than buyers), we are also to expect that no markets should occur. The advancement of global trade during the last centuries clearly shows that this is not the case. The existence of markets necessitates a limited (or even reversed) endowment effect for the goods traded on these markets.

### *Monetary Measures*

An economist might argue that the best way to measure how people feel towards a given good is by the price they put on it. Following this logic, it should be of no importance how the participants in my pilot studies evaluate the goods or the information about them. One should merely measure the changes in price. Following this logic, the hypotheses deducted from Gärdenfors' (2018) UU account for the endowment effect would be as follows:

**H1:** buyers decreasing their WTP should decrease it more than sellers decreasing their WTA decrease it.

**H2:** sellers increasing their WTA should increase it more than buyers increasing their WTP increase it.

However, this way of measuring peoples' opinions of the goods in question and the added information does not change much. Firstly, analysing the results of the pilot studies with this measurement do not support the UU account. Secondly, this measurement does not change the fact that most of the pilot studies lack endowment effect altogether. Moreover, as noted in the discussion of pilot study 4b, a negative change in price can accompany a positive change in evaluation when the retail price is revealed. This result suggests that peoples' liking of goods is less relevant to their WTP and WTA than the market price, rendering improbable the argument that pricing is the best measure of liking.

The best indication of peoples' liking of one good compared to another, might very well be that of the exchange paradigm. The pilot studies testing the hypotheses of the UU account (pilot studies 1a, 1b, 1c, 2a, 2b, 4a, 4b, 5, and 7) employ the increasing information paradigm, which is based in the valuation paradigm. It might be beneficial to the advocates of the UU account to develop an increasing information paradigm based on the exchange paradigm instead.

### *Understanding the Context*

My participants' feedback and responses suggest that understanding the trade context is of quite some importance. In pilot studies 1a, 1b, and 1c, this became apparent by participants asking for the context of the trade. Were they to think that they were hungry or that maybe their children were? In pilot study 2a, the need for understanding the context is seen in international students' outrageous pricing of a discount chocolate bar. In pilot study 3a, participants explicitly asked if they were to imagine that they would like to watch the movie in question. In pilot study 4b, when revealing the retail price of the chocolate bar, participants increasing their liking of it generally lowered their pricing of it. In pilot study 5, the same happened for the movie ticket. The context of the trade, especially with imaginary goods, appears to be important to participants. This is also seen between pilot studies 3a and 3b in which a change of the context of the trade (the time of the exchange and the origin of the endowed good) changed both buyers' and sellers' prices and lowered the resulting endowment effect.

The contextually dependent responses might not appear surprising, but they are not necessarily explained by existing theories. The loss aversion account for the endowment effect takes only the context of which the good is reference-dependent upon into account. The bad deal aversion account takes the market of the good into account, but not other contextual parameters. The psychological ownership account uses the self as referential context with no additional logic than that of self being good and the non-self not. The attribute sampling bias account limits its context to the role of the buyer and seller and their ownership status. The UU account takes all possible information as its context. Explaining the endowment effect as an experimental artefact reduces the effect to context. While the lacking endowment effect of the pilot studies in this paper inhibits their results to support any of the accounts, the results do suggest that the participants are acting based on available information. The agency stolen from participants in economic theories removes the focus from what is evident from these pilot studies: that people are information seeking and processing entities. This is in accordance with Clark's (2014) account of cognitive humans. Reducing the context to either buying or selling, knowing the market or not, or owning the good or not (as in the loss aversion, bad deal aversion, psychological ownership, and attribute sampling bias account) implies a (potentially too) simple understanding about human decision making. The results of the pilot studies reported herein do not support the UU account. They do, however, point to the need for an account of the endowment effect considering humans as intelligent actors in their context, as Gärdenfors' (2018) UU account does.

This focus on context also takes into consideration an understanding of the roles of the seller and the buyer being fundamentally different. Most people buy goods on a regular basis. Only few people *sell* goods regularly. List (2003) similarly finds that experienced traders showcase less endowment effect. Even in microeconomics, different theories are given for

pricing goods as sellers and buyers. Sellers price goods according to the market price to be able to sell it. Buyers price goods according to their indifference curves to optimise their spending. However, in classic endowment effect studies, only the indifference curves are taken into account. Furthermore, a quite liberal idea of what constitutes the same buying and selling situation is often adopted in endowment effect studies (e.g. for the movie tickets of Adamowicz et al., 1993). Both the frame sampling bias account and UU account take into consideration this disparity between the roles of sellers and buyers and their context. Depending on in which context an actor is located, they act accordingly.

## 6 Concluding Summary

In this paper, seven pilot studies with 422 participants fail to find results in favour of Gärdenfors' (2018) UU account of the endowment effect. More importantly, the pilot studies not employing traditional endowment effect study designs (pilot studies 1a, 1b, 1c, 2a, 2b, 4a, 4b, 5, and 7) fail at eliciting endowment effects at all. While based on responses from only 357 participants, these results question the universality of the endowment effect accepted in much endowment effect literature. Instead, these results favour accounts of the endowment effect based on experimental artefacts (e.g. Plott & Zeiler, 2005, 2007) and misinterpretations of results (e.g. Gal & Rucker, 2018). This challenge of classic (psycho-economic) accounts of the endowment effect (such as loss aversion, bad deal aversion, and psychological ownership accounts) points towards the need for accounts accepting the actor as an information seeking and processing individual (such as the attribute sampling bias and uncertain utilities accounts).

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## 8 Supplementary Material

The supplementary material includes the survey materials for all seven pilot studies, the consent form, and the recruitment speech employed, as well as raw data sets of all results. It is accessible online at: <https://lucs.wrisberg.org/>

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