My precious! Investigating how psychological ownership and the endowment effect are influenced by technology, the individual and item inherent attributes

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General introduction

When I was younger and still living at home, I used to get up every day, make myself something to eat and sit down in my favourite chair to enjoy my breakfast. However, the matter of occupying MY spot sometimes was a somewhat tiring one, because my father also considered the same spot as HIS chair. This developed into a kind of occupation war between the two of us. Things even went so far that I started to adapt my sleeping schedule and get up earlier for a chance to sit in that particular chair. But why did I do that? After all, I am a person that very much appreciates a good night's rest, yet I was still willing to forsake this comfort just for a chance to sit in my chair. The usage of those particular possessive words already gives a clue as to why I was behaving the way I did. I did it because the chair felt like MINE. This particular feeling motivated me to accept the cost of waking up early and pay with a portion of my sleeping time for the reward of sitting in the chair that for some reason just seemed better than the other places our home had to offer.

When it comes to strange behaviour related to objects that people feel ownership over, my case is no single incident. The construct of ownership does take a prominent position in people's lives. It is expressed in mundane things like people fighting over which place to sit, which plate to take, or which equipment to use. One must simply think about the child in kindergarten who gets a temper tantrum after someone took away its toy, or about the almost war-like conflicts that arise when it comes to the topic of who a parking spot belongs to. It's also present in the motivation to create, individualize, and defend the place one calls home. What is mine is for me to hold, use, and control. As history shows, this striving to make sure that one keeps ownership over the things one feels belong to oneself has even driven some people to commit horrible atrocities. And this is not only the case for material ownership. Feeling something belongs to you can very much apply to abstract constructs as well. This is evident in the defensive and sometimes hostile behaviour some people exhibit every time

access to certain groups or rights is granted to formerly excluded people. This can range from smaller offences like blocking some people's membership in certain fandoms to more extreme measures like denying civil rights to social groups such as access to education or the right to marry and adopt. These extreme measures that some people are willing to go to protect what they feel belongs to them can be explained by the close relation between what I own and who I am. This central part of ownership has been the objective of past work ranging from the fields of philosophy, psychology, and more recently consumer research. The current work tries to examine these feelings of ownership over an item and test how it is influenced by external variables presented by the environment as well as internal variables residing in the object itself.

Why do we want to own?

When looking at philosophers from the early twentieth century one can already see that the concept of ownership was suspected to go beyond its legal function. Rather, the possessions of a person could be used to define who that person was. One of the first people to describe this link between ownership and a person's identity was William James (1890) in his work on the principles of psychology. He stated "Tell me-one might say-what you possess by way of lodging, furniture and tools, clothing, provisions and reserves, knowledge and ideas, relationships, links and attachments, etc., and I shall tell you exactly who you are." He also concluded that "If you own nothing of all this you are nothing". This quote reflects that in the past, and sadly sometimes even today, the things a person has ownership over were seen as sufficient to assess a person's worth and place in society. It therefore becomes clear that there are outside factors that play into people's motivation to attain and maintain

ownership over certain items. However, as time passed other factors that also played into the role of ownership gained a place in the spotlight.

Litwinski (1947) for example, promoted the idea that the acquisition and possession of objects is mainly due to the expectations people themselves have for their future use, thereby making ownership less about other people's perception of the individual and more about the internal evaluation of the object by the person. Another interesting point he made was that this was not only true for material objects, but also for non-material possessions like ideas, a notion that has also been present in the work of James (1890). To support this claim, Litwinski (1947) pointed out that people show the same behaviour towards cognitive possessions as they do towards real-world objects. They try to hold on to ideas and beliefs that seem useful to them by keeping them in their memory. However, as soon as those ideas become useless to the individual, he or she tends to get rid of them, similar to a person getting rid of old furniture that has fulfilled its purpose. People treating non-material objects the same way as they would treat material possessions (Abelson, 1986) also paints ownership as more than a means to present one's societal status to the world, since what I hold in my head is not immediately visible to other people. This indicates that there are also factors settled in the individual that influence their perception of ownership.

The two faces of ownership

Scholars have described ownership as being partly defined by society and arising from a collective agreement of what belongs to whom (Etzioni, 1991; Rudmin, 1991). These agreements are reflected in laws and court rulings that define who holds legal ownership over an object (Bala, 1989). But the view of the person her- or himself on this matter does not necessarily follow those guidelines. Even though legal ownership does reinforce a person's

feelings of ownership over the object (Pierce et al., 2003), there are also more subjective components that play into the evolution of those feelings. Factors like the duration a person came into contact with the object (Strahilevitz & Loewenstein, 1998), the effort a person invested into the object (Hook, 1993), and even simple physical closeness to that object (Truong et al., 2016) can all increase a person's feeling of ownership over it. Also, factors that reside within the object, like the amount of control it offers (Prelinger, 1959), its valence (Brenner et al., 2007; Peck & Shu, 2009), and its fit with the self-concept of the person (Pierce et al., 2003) can heighten one's perceived ownership. It is also interesting that the judgement of other people on whether an object belongs to a person or not can be made on more informal terms similar to those factors mentioned above like, who had the most interaction with the object (Scorolli et al., 2018), who put more effort into attaining and maintaining it (Friedman, 2008), or in some cases even simple associations like a person being portrayed next to an object on a photograph (Beggan & Brown, 1994). This shows that even the perception of other people can be influenced by factors other than legal ownership.

Both perspectives, the legal and the emotional one, therefore, tend to include a more objective component of ownership based on rational grounds and a psychological component based on more subjective factors. There were also studies that tried to find out whether individual people put a different emphasis on these two dimensions when it comes to the evaluation of their possessions' importance. The results showed that there were clear differences between members of varying social groups. For example, studies found a gender bias, with men primarily stating functional attributes as being more important, putting a higher focus on an instrumental element of the object, whereas women equally often stated symbolic and emotional reasons as they did functional ones for the perceived importance of their possessions (Dittmar, 1989, 1991). There were also disparities between different age groups (Kamptner, 1991) and even the employment status of a person did influence their perceived importance of certain objects leading currently unemployed people to attribute

more importance to symbolic and emotional objects compared to people that were employed at that time (Dittmar, 1991). These differing perspectives on what makes an object important reinforces the role of internal processes for the concept of ownership.

Ownership and the self

The significance of processes situated within the individual was also highlighted by Litwinski's (1942) placement of the ego as a central part of the genesis of ownership, since a person needs to have an idea of an “I” to define something as “mine”. This idea is mirrored in the role ownership has been given in the definition of the self. Prior work of Cooley (1909) for example defined the self of a person as everything that in common speech is designated as "I", "me", "my", "mine", and "myself". The inclusion of possessive pronounces into his definition of the self accentuates the importance of possessions for a person’s identity. Sartre (1943/1969) wrote in is classic “Being and nothingness” “I am what I have… what is mine is myself”, again drawing attention to the importance of a person’s possessions when it comes to their definition of who they are.

However, there is evidence that possessions are not only used to define the persons we are but can even go a step farther and become a part of our selves. By asking participants to judge whether an item feels like “part of my Self” or “not part of my Self”, Prelinger (1959) found that people can include objects into their “self-region”. What is interesting about this result is that participants did not necessarily legally own all of the objects they had to classify, yet they still sorted some of them as being part of their self. This leads to the question of what probes people to view an object (be it material or non-material) as part of their self.

A feeling of ownership

A reason for the inclusion of an item into the self of a person can be found in the emotional bond he or she has with the possession. This relationship is apparent in the feelings experienced by people after the loss of their belongings. Victims of burglaries and people who lost their possessions due to natural disasters often report strong feelings of personal violation (Bogaard, & Wiegman, 1991; Korosec-Serfaty, 1985; Maguire, 1980), sometimes even going as far as resembling a grieving process similar to losing a loved one (McLeod, 1984). This illustrates that additional to their financial damage, those who suffered losses of ownership also suffered an emotional injury.

Seeing this sometimes almost companion-like role of a possession in a person's life makes it interesting to observe how this relation between object ownership and a person's self changes over time. In early adolescence people often use physical possessions (e.g. clothes) as a means of expressing their individuality to others, whereas in later adolescence possessions are more often used to communicate the person's skills to the outside world. In the middle of their life people use possession for both purposes – those directed into their future, but also their past (Belk, 1988). And finally, for elderly people the purpose of possessions is often directed towards the past as a means to store memories and experiences in (Cram & Paton, 1993). This ongoing emotional connection does speak to a constant importance of ownership for a person's identity, elevating an object from a possession to a part of its owner's self (Kleine, et al., 1995; Mehta & Belk, 1991; Wilpert, 1991). Being aware of this connection, the question arises of whether possession can cloud our judgement of the object in question.

Imagine the following scenario:

On your fifteenth birthday your mother gifts you a coffee mug of your favourite television show at that time. From that day onward you use that mug every morning to drink your tea, cocoa and later coffee. Flash forward 12 years and you are still using that same mug even though you have not watched the TV-show in years. One morning while you are preparing breakfast you accidently drop the mug on the floor and it is shattered to pieces, too many to be glued back together. How would you feel? You are not a particular fan of the TV-show anymore and have enough other mugs to replace the broken one. Also, the mug was a gift, so there is no financial loss involved. Yet, there is still a pretty high chance that you would be hurt over losing the mug. Continuing the scenario, next time you see your mother you tell her what happened, and she sees that you are upset about the lost mug. So, she goes out to get you a new mug, one that is an exact replica of the one that was destroyed and gives it to you as a surprise.

How would you feel towards the new mug? It is an exact replica of the one you lost, and it was given to you by the same person. However, despite all this it is very likely that the new mug would still seem inferior to its predecessor. But why? Because, even though the mug looks exactly the same it does not feel the same. You had formed a bond with the previous mug over a prolonged time. It was a connection to your past self, because it was gifted to you back than and accompanied you all this time. This new mug, however, lacks this exact connection. And even though, you were a fan of the show back than it is not relevant to your current self anymore.

The example illustrates that even though an object might have the same or even a lower monetary value compared to an identical other piece, one’s ownership over it and the

shared experiences one had with it can make it seem more valuable to us (Belk, 1991a). This biased perception is encompassed by the concept of psychological ownership. As stated previously, Prelinger (1959) found that people can include certain objects into their "self-region". This idea was later picked up by Belk (1988) who argued that people include objects they feel ownership over into their extended self. Being part of the self means the object will be evaluated similarly as one would evaluate oneself. Consequently, as human nature is fallible, especially when it comes to our self-evaluations, the same is true for the evaluations we make of the things we include into our extended self (Beggan, 1992; Belk, 1988, 1991a,b). Studies show that people generally tend to evaluate themselves in a more favourable way compared to others (Liebrand, et al., 1986; Mezulis et al., 2004). Which in turn means that the evaluation of a person's possessions should also be tilted in a more positive direction. This is reflected in the example above in which the old mug seemed superior to the new one even though they objectively shared the same value. The simple notion that we do have favourite things, like our favourite mug, leather jacket or teddy bear demonstrates that humans have a tendency to evaluate certain things more positively on a basis that is not necessarily grounded in logic (Schultz et al., 1989). Our favourite mug might not be the prettiest one, the leather jacket might have some holes in it, and the teddy might miss an eye, yet we still prefer those things over new and objectively better alternatives because they are OURS.

The pain and joy of ownership

This biased perception towards certain objects has also attracted the attention of researchers in the economic field. Especially in the context of financial interactions people's reactions to giving up ownership over an item and their motivation to attain ownership over new ones was of prime interest. It was already demonstrated above that the loss of one's

belongings can go along with strong negative emotions (McLeod, 1984). However, all examples mentioned so far described situations in which people unwillingly lost the objects in question. But what happens if a person decides to willingly part with an object? Kahneman (1979) proposed that even people who are willingly giving up ownership over an object still feel pain over the loss. He stated that in trading situations the loss of ownership over the initial item always looms larger than the joy the acquisition of the new object brings to the person. He stated that due to this emotional imbalance people exhibit a natural aversion towards losing ownership over an item regardless of the possibility for a compensation in the process. To help cope with the pain caused by the departure of the object the owner (seller) tends to attribute a higher price to it compared to someone who does not yet hold ownership over the object in question (buyer). This price discrepancy was labelled as the endowment effect (Thaler, 1980) and was according to Kahneman et al. (1990, 1991) a direct consequence of people's aversive behaviour towards losses. This perspective, however, is debatable considering that it only looks at the endowment effect from a perspective of losing an object but neglects the effect of ownership itself (Morewedge & Giblin, 2015).

This critique was also raised by Morewedge et al. (2009) who stated that rather than the negative emotional consequence of losing the object, it is much more the positive experience of having ownership over the item that leads to the higher value attributed to it. They showed that if people who are supposed to set a price for buying a mug and who already owned an identical one (buyer/owner) tended to set prices similar to participants who were asked to set prices for selling the mug (regular owner). Their results line up with the previously discussed concept of psychological ownership. Holding ownership over an item should encourage the person to perceive a link between the object and his or her self. This association should bias their valuation of the object into a more positive direction which could incidentally also lead to a more positive evaluation of objects that are similar to it. Later studies focused even more explicitly on the role psychological ownership plays in the endowment effect. Shu and Peck

(2011) carried out a series of replication studies in which they repeated 9 classical loss aversion experiments. They showed that the endowment effect found in those studies was due to an interplay between the amount of psychological ownership a person felt over the object as well as a person's emotional response to it. Therefore, a person's feelings of ownership can have a strong impact on their judgements of an object's worth.

To hold and to have – Touch and ownership

Seeing that feeling ownership over an item seems to increase the value a person attributes to it, the concept of psychological ownership has not gone unnoticed by researchers within the marketing field. Here the focus, however, was less on how actual ownership influences a person's perception of their possessions, but rather on whether there are ways to generate feelings of ownership within the person before he or she attained legal ownership over it. A variable that has gained a lot of attention in this regard is the haptic interaction a person has with the item. The motives behind a person's wish to touch an item can vary. One could be the attempt to gain information about the quality of the object in question serving a more instrumental purpose, another the simple enjoyment provided by touching the object following a more emotional impulse (Peck & Childers, 2003). So, as for ownership the need for touch can be separated into a cognitive and an emotional component.

Research has shown that touching an object can affect a person's perception and evaluation of it (Peck & Wiggins, 2006; Peck & Shu, 2009; Shu & Peck, 2011; Streicher & Estes, 2015). Reb and Connolly (2007) for example showed that having physical possession over an object did increase participants' feelings of ownership over the item before they had legal ownership over it and subsequently led them to be willing to pay higher prices for the object. Similar results were found by a study of Wolf et al. (2008) in which they showed that

a prolonged physical interaction with an object heightened its perceived value. A later study by Peck and Shu (2009) in which they explicitly measured psychological ownership by means of a questionnaire showed that touching an object increased a person's perceived amount of psychological ownership over it regardless of whether they had legally owned the item or not. They also found that this was especially true for people whose need for touch was highly motivated by emotional reasoning which again fits the emotional nature of psychological ownership.

The effect of touch was even found in situations in which the spending of money did not provide a person with explicit ownership over an item. A study by Peck and Wiggins (2006) showed that including a positive haptic element into an information pamphlet increased a person's willingness to donate money for the advocated cause. Another point that highlights the importance of touch in a consumer setting becomes apparent when people's wish for haptic interaction is denied, leading them to feel less confident about their evaluation of the object as well as reducing their enjoyment of the shopping experience (Peck & Shu, 2009).

Touch in a virtual environment

Seeing as nowadays people's shopping behaviour is more and more shifting from a real-world to an online setting the role of touch for this new environment has to be re-evaluated. Since the virtual world does not provide actual haptic interaction with an object the question arises whether there can be a substitute for it. A possibility could be to motivate people to imagine a haptic interaction with the object in question. Peck and Shu (2009) found that if participants envisioned themselves touching the object the consequences of the missing haptic interaction were partly compensated. But how might one lead a person to do that without explicitly instructing them to do so?

One circumstance which is helpful in this situation is that the age of the Internet did not only usher in new platforms for people's desire to purchase items from the comfort of their own home - it also brought along the development of new devices to do so, namely the introduction and steady improvement of touch interfaces. Being able to tap on, zoom in, and drag along items on the screen with one's own hand could help create an illusion of haptic interaction. To test whether there are actual benefits in the usage of touch interfaces researchers utilized the fact that people often use different devices for their navigation online. For example, Brasel and Gips (2015) showed that participants who used a touchscreen to carry out a shopping task tended to look at more alternatives and focused more attention on tangible aspects of an item compared to participants who were using a mouse. Additionally, the usage of a touch device increased participants reliance on internal evaluation, e.g. their "gut feeling", when it came to their decision of whether or not to buy the item. This fits prior findings from real-world interaction which showed that touch also heightens the likelihood of impulse purchases (Peck & Childers, 2003).

Further evidence that the usage of touch devices can mirror the effects of real world interaction is provided by a study from Shen et al. (2016) who found that participants who used a touchscreen in a food ordering task were more likely to decide for hedonic items, like a cheesecake or ice cream, compared to their cognitively superior alternatives, like a fruit salad or a USB stick, compared to participants who were using a mouse, again showing that the usage of touch devices seems to increase the role of emotions in the evaluation of an item. A study by Brasel and Gips (2014) also explicitly measured the amount of psychological ownership participants perceived during a shopping task and found that those who used a touchscreen perceived significantly higher levels of psychological ownership over the items compared to those who used a mouse. By doing so they were able to replicate the results found by Peck and Shu (2009) for real-world touch in a virtual setting. Taken together, these

results suggest that the effect of mere touch found in the physical world can also be triggered by touch interfaces in a virtual setting.

Target attributes

The previous sections showed that things like real-world touch or the interface a person uses can affect their perceived ownership over and evaluation of an item, but these circumstances all focus on variables in relation to the target item itself. However, there are also attributes residing within the item that can affect a person's feelings of ownership over it. Possible candidates for such attributes present themselves in the different motivations people have for developing psychological ownership over an item. Pierce et al. (2003) defined three major motives in this regard, being the desire for efficacy and effectance, defining one's identity, and having a home.

Considering the desire for efficacy and effectance, the variable of control plays an essential part in the emergence of psychological ownership, since one is only able to effectively use an item if one has control over it. Prelinger (1959) for example, found that objects which provided higher levels of control over them were more likely to be included into a person's self-region. Also, the effect of touch on psychological ownership (Peck & Shu, 2009; Shu & Peck, 2011) relates to a sense of control since haptic interaction provides a person with a certain degree of physical control over the object. Therefore, attributes that make it easier for a person to exercise control over an object, e.g. size of an object, could increase the amount of psychological ownership a person perceives over it.

The role of ownership for a person's identity was also already made clear by the usage of possessive pronouns in the various definitions of the self (Cooley, 1909; James, 1890; Sartre, 1943/1969) as well as the idea that a possession can literally become a part of a

person's extended self (Beggan, 1992; Belk, 1988). Keeping in mind this link between possessions and a person's self, one could argue that when it comes to an individual's identity a person would strive to feel ownership over items that reflect more positive qualities and distance him- or herself from objects that display negative ones (Cialdini & Richardson, 1980; Cialdini & De Nicholas, 1989). Therefore, the valence of an item should also considerably influence a person's perceived ownership over it. An example for this was provided by Brenner et al. (2007) who showed that people who possessed ownership over a negative item were more likely to trade that item against another negative one compared to a person that could freely choose between the two alternatives. However, regarding positive items owners tended to stick with their initial positive possession when they were given the opportunity to switch it against an equally positive alternative. Brenner and colleagues concluded that when it comes to negative items people are more willing to accept the loss of their item and receive another negative one in the exchange because the loss of the negative item provided them with greater joy than the discomfort felt over receiving a new negative one. This simultaneously challenges both the explanations for the endowment effect by Kahneman et al. (1990, 1991) and Morewedge et al. (2009) because it would mean that not every possession loss is more painful than the gain of a new item and on the other hand having ownership over an item does not always provide a positive experience.

Peck and Shu (2009) also offered support for this idea. They found that the endowment effect (sellers setting higher prices for the item than buyers) was only present if the haptic sensation provided by the object was pleasant or neutral. If the interaction was negative (coarse surface of an object) owners tended to demand prices akin to those set by non-owners. Similar to Brenner et al. (2007) they explained the absence of the effect with a more negative affective reaction of owners towards their possessions motivating them to get rid of the item. They later replicated their findings showing again that the affective reaction towards the object caused the endowment effect to disappear (Shu & Peck, 2011).

What is interesting about these results is that even though owners showed a more negative reaction towards the object, leading them to attribute a lower value to it, they still felt more psychological ownership over the item compared to non-owners. This is remarkable, considering that under the motive of self-definition one might expect that owners would show similar levels of psychological ownership to non-owners when it comes to negative items as a means to protect their positive self-view. However, the results also showed a significant effect of touch on psychological ownership with participants who touched the object perceiving more psychological ownership over the item regardless of its valence (Peck & Shu, 2009). This could give a clue as to why owners still felt more psychological ownership over negative items compared to non-owners. It is possible that the physical control a person was granted through the haptic interaction reinforced the importance of the control motive associated with psychological ownership and in turn counteracted possible effects of the object valence on psychological ownership in regard to the motive of self-definition.

But what happens in situations in which the motive of control is less apparent, like when the object in question is not physically present? It has already been established that psychological ownership can be perceived over items that are not tangible, seeing that it can also be felt over things like ideas (Baer & Brown, 2012), arguments (De Dreu & van Knippenberg, 2005) or even things like nursery rhymes (Isaacs, 1933). So, there are situations in which physical control is taken out of the equation. In a replication of one of Brenner et al.'s (2007) studies Shu and Peck (2011) compared participants' willingness to stick with one of two penalty options, a 100 $ fine or three four-hour sessions in traffic school, and assessed how much psychological ownership participants perceived over the options. Both items could not be physically interacted with but possessed a strong negative valence. This time the results showed that psychological ownership lost its significance for predicting participants' behaviour. Therefore, attributes that trigger a strong affective reaction seem to be able to

impact psychological ownership as long as the motive of self-identity is not overshadowed by other factors like physical control.

Dissertation overview

The introduction made it clear that there are different variables that can have an impact on how much psychological ownership a person perceives over an item and how this impacts their subsequent behaviour towards it. To gain a deeper understanding of the concept the present dissertation focused on different variables ranging from the technical device a person uses, whether a he or she has legal ownership over an object and different item inherent attributes. To test the effect of virtual touch, different devices were used that provided participants with a varying degree of direct touch. Because the present work tried to distance the construct of psychological ownership from its often-used consumer framework, these studies only focused on the effect of direct touch on participants' perceived psychological ownership and their basic evaluation of the presented items, thereby excluding any financial aspect from the experimental design. To test the effect of legal ownership a number of the presented studies in this dissertation also gave participants prior ownership over some of the items. However, in contrast to previous research mainly focusing on the effect of legal ownership over positive items, the studies also varied the valence of the items used as material again diverging from the often consumption focused setting of prior research. Concerning item inherent attributes a series of studies tested the effect of the previously mentioned object valence on psychological ownership and participants' behaviour towards the object, additionally, the object size of certain items was taken into consideration.

The following three chapters describe five empirical studies focusing on the effect of touch devices on psychological ownership, how different attributes of an item influence a

person's perceived psychological ownership over them, and whether these effects are also depicted in the behaviour participants exhibit. The chapters were written as three separate manuscripts that are currently in preparation for submission. However, parts of these manuscripts (e.g., numbering of studies, introductory parts, references) were edited to create a coherent narrative.

Chapter 1 predominantly focuses on the role that the devices we use have on our perception of the content we interact with. The experiments were inspired by prior research showing that within online shopping tasks touchscreen usage led to higher degrees of psychological ownership over the products participants interacted with (Brasel & Gips, 2014). However, the two experiments presented in Chapter 1 changed the shopping task to a more basic evaluation task, excluding any financial aspect from the situation - thus focusing exclusively on the basic effect of mere touch on psychological ownership in a virtual setting. Additionally, the material used in the two experiments varied in its degree of abstraction, from relatively abstract stimuli (adjectives) in Study 1 to more concrete ones (pictures of objects) in Study 2.

In Study 1 half of the participants carried out the task using a touchscreen, the other half using a mouse. Depending on the respective device, they either had to press down with their finger or the mouse cursor on the presented items. The material consisted of 90 adjectives that were classified as negative, neutral, or positive. It was expected that participants who carried out the task with a touchscreen would perceive higher levels of psychological ownership compared to participants who used a mouse. Furthermore, it was hypothesized that participants who use a touchscreen would evaluate positive and neutral adjectives more positively than participants who use a mouse, but that the two groups would not significantly differ in their evaluation of negative adjectives. This was based on the results of Peck and Shu (2009) who showed that the endowment effect was only present for objects

that provided a positive or neutral haptic interaction but was absent for those who provided a negative one.

Study 2 used the same experimental task, however, instead of using words the material was switched to a more concrete level using pictures of real-world objects. The depicted objects were classified as either small or large, depending on whether a person could easily pick up the object and handle it with their own hands. The object size was varied to test the idea of highlighting object attributes that communicate an easier physical control mentioned earlier in the introduction. Additionally, a keyboard condition was included in the design to further vary the degree to which participants perceived direct touch. The results were expected to show a main effect of the device participants used on the amount of psychological ownership they perceived over the depicted objects. Participants within the touchscreen condition were thought to show the highest amount of psychological ownership compared to the other two conditions. Also, participants within the touchscreen condition were supposed to evaluate the depicted objects more positively compared to the other conditions.

The results of both studies demonstrated that the usage of touch interfaces did neither significantly increase perceived psychological ownership over the presented items nor did it lead to a more positive evaluation of them. Both studies, however, did show that attributes of the items themselves, namely the valence as well as the size of the object, significantly affected the amount of psychological ownership participants perceived over them. Picking up on the importance of stimulus inherent attributes Chapter 2 includes two experiments dealing with the effect of the stimulus valence on perceived psychological ownership as well as participants' subsequent behaviour (apparent by the endowment effect). The studies used pictures taken out of the IAPS (Lang et al., 1997) and presented them to participants as postcards with extraordinary motives. Participants were then either told that the postcard belonged to them and they should now indicate a price for selling the card, or that it did not yet belong to them and they should indicate a price they would be willing to pay for

attaining ownership over it. Additionally, participants had to state their perceived psychological ownership over the postcards. The postcards were either classified as negative, neutral, or positive depending on their emotionality score within the IAPS norms. Study 3 simply saw participants carry out the described task. It was expected that participants would feel more psychological ownership over positive and neutral items compared to negative ones. This hypothesis was based on results from Study 1 in the previous chapter which showed that the valence of the adjective had a significant effect on the amount of psychological ownership participants perceived over it. Additionally, it was predicted that sellers would set higher prices for the postcards than buyers.

Study 4 saw participants carrying out the same task, however, this time they had to either re-call a past success or failure experience before starting the task. This was done to test whether people would use psychological ownership as a coping strategy to deal with the self-threat induced by the negative memory. Studies showed that participants can use their object ownership as a means to cope with situations in which their positive self-view is threatened (Beggan, 1991; Sivanathan, & Pettit, 2010). Also, research has shown that people do have an innate drive to associate themselves with positive objects or people and distance themselves from negative ones (Cialdini & Richardson, 1980; Cialdini & De Nicholas, 1989), making it seem logical that this strive would be exacerbated if they feel their positive self-view threatened. Keeping in mind the results from prior research it was expected that legal ownership over an item would also heighten participants' psychological ownership over it (Peck & Shu, 2009; Shu & Peck, 2011). It was further hypothesized that these two processes would interact with each other leading to sellers generally experiencing more psychological ownership than buyers, but that this difference would be bigger concerning positive and neutral items, if the participants had to recall a past failure. Considering the prices participants set for the items the classical endowment effect with sellers setting higher prices than buyers was expected. The results of Study 3 and 4 showed that while legal ownership consistently

influenced the prices participants set, with sellers always setting higher prices than buyers, the pattern for psychological ownership was less clear, due to it only appearing in Study 4 after participants recalled a past experience.

Chapter 3 investigates the effect of the stimulus valence on people's behaviour in situations that do not involve a financial component. Therefore, Study 5 used a non-monetary measure for the endowment effect. As stimuli again pictures from the IAPS were used, however, this time participants were either given ownership over a sample of postcards and then had the chance to switch their postcards against an equally positive, or negative alternative or participants had to pick freely between the two alternatives without having been given ownership over one of them beforehand. Keeping in mind the results found by Brenner et al. (2007) it was expected that participants who were given ownership over negative postcards would be more likely to switch those postcards against an equally negative alternative that they however, would be more likely to stick with their positive postcards than switching them against an equally positive alternative. To make sure that the effect was not due to any unwanted prior differences in the material used, it was also expected that participants who could freely choose between the same two postcards would show no such bias in their choices. In addition to the switching behaviour of the participants, also their perceived psychological ownership over the postcards was measured. The results showed that there was indeed an effect of the stimulus valence on the switching behaviour of participants with people being more likely to switch negative items against their alternative, but to stick to their positive possessions. However, participants who could freely choose between the same two items also showed the same bias in their choices as participants who were given prior ownership. This indicates a possible bias within the used material which makes it hard to judge whether the expected effect was present in the data or not.

Concerning participants' perceived psychological ownership over the postcards, the question of whether a postcard initially belong to the participant did have a significant impact.

Participants who possessed legal ownership over a postcard reported significantly more psychological ownership over them than participants who did not. This suggests that feelings of ownership are not necessarily reflected in the behaviour participants exhibit towards an item.

In the General Discussion the outcome of all five studies will be discussed in more detail and put into relation with one another. The main goal will be to provide an overarching picture of the insights provided by the results of the studies as well as a discussion of strengths and limitations of the presented research.

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DECLARATION ACCORDING TO § 5 ABS. 2 NO. 8 OF THE PHD REGULATIONS OF THE FACULTY OF SCIENCE

- SHARE IN COLLABORATIVE PUBLICATIONS/MANUSCRIPTS-

The subsequent chapter (Chapter 1) consists of a manuscript currently under review in *Computers in Human Behaviour*. Dr. Jürgen Buder is co-author of this manuscript. The proportional contributions to the manuscript are presented in the following table.

Author	**Author position**	**Scientific ideas**	**Data generation**	**Analysis & Interpretation**	**Paper writing done**
Lisa Rabl	First author	80 %	100 %	90 %	60 %
Jürgen Buder	Second author	20 %	0 %	10 %	40 %

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Chapter 1: Mere touch is not enough - Researching the effects of touch interfaces on psychological ownership and stimulus evaluation

Introduction

Due to advances in display technologies the usage of touch interfaces for accessing information on the Internet has become the norm. Every day we use touch-based devices like smartphones or tablets to look at pictures, read texts or watch videos. While we are often using these devices, we rarely ask ourselves how this new technology might influence our perception of the content we consume. Is there a difference between using a mouse compared to using a touch device while reading a text? Does being able to virtually touch an object on a touch interface alter our perception of it?

Research suggests that – in comparison to indirect touch via mouse or keyboard - directly interacting with objects on a touch display may be more similar to touching real objects (Brasel & Gips, 2014, 2015), and this may have implications on subsequent cognitive processing. Related research was inspired by studies showing that touching and interacting with real products positively influenced consumers' perception of them and heightened consumers' confidence into their own evaluations (Peck & Childers, 2003). Research also showed that touching real products resulted in higher prices being attributed towards the object in question (Grohmann et al., 2007; Krishna & Morrin, 2007; Peck & Childers, 2003; Peck & Shu, 2009; Shu & Peck, 2011).

One may argue that there is a huge difference between interacting with real objects versus interacting with virtual depictions of real objects on a touch display. However, there is evidence that interaction with real objects is not necessary to impact user evaluations. For instance, Peck and Shu (2009) showed that imagined touch was able to compensate to some degree for actual haptic interaction with a product. People who were asked to imagine that

they are touching the product tended to attribute higher prices to it compared to participants who were not specifically asked to imagine the haptic interaction. Touch devices offer an even closer experience to real world touch. They allow people to virtually "touch" depicted products. This would have implications for consumer psychology, as shopping behaviour is gradually shifting towards online settings. Direct evidence that touch interaction on touch displays impacts product evaluation comes from a study by Brasel and Gips (2014) who could show that the usage of touch interfaces led participants to charge higher prices for a presented object compared to participants who were using a conventional computer mouse. Similarly, Brasel and Gips (2015) found that the usage of touch interfaces directed participants' attention towards haptic attributes of the presented product, therefore indicating that the usage of touch interfaces not only influences the evaluation of the presented object, but also the attributes of a stimulus participants focus on. In sum, both the touch interaction with real and with virtual objects appears to have an impact on subsequent cognitive processing.

Psychological ownership

The influence of touch on subsequent positive evaluation has been linked to the concept of psychological ownership (Beggan, 1992; Morewedge et al., 2009; Pierce et al., 2003), according to which owned objects are psychologically associated to their owner, thus becoming an extended part of the self. This association can bias a person's perception of the objects in question. More specifically, we tend to apply the same self-serving biases on the evaluation of things we feel ownership over as we do on the evaluation of our self. This leads us to evaluating things more positively if we feel psychological ownership over them. Nesselroade et al. (1999), for example showed that participants tended to rate objects they owned more positively compared to objects they did not own. Evidence for an association between (psychological) ownership and evaluation can even be found on a biological level.

Krigolson et al. (2013) found that the medial-frontal system was sensitive to the role of ownership in a gambling paradigm. EEG measurements showed that participants did differ between gains and losses if they had to gamble with money that belonged to them but showed no indication of a differentiation if the money belonged to another person or no one at all. Based on this literature, it was proposed that touch interaction with real or virtual objects may create psychological ownership, thus explaining better evaluation of touched objects. Indeed, research on touch interaction has found that the different prices set by owners and non-owners were partly due to higher levels of perceived psychological ownership over the presented objects (Peck & Shu, 2009; Shu & Peck, 2011). In sum, research in consumer psychology has provided evidence that touching virtual depictions of objects on a touch display bears similarities to touching real objects, and that the ability to touch leads to higher psychological ownership and better product evaluation.

To date, most effects linking touch and psychological ownership were found under similar, and quite specific circumstances. First, in many of these studies psychological ownership and legal ownership were confounded, and therefore it is difficult to assess the unique influence of psychological ownership which typically is proposed to be independent from legal ownership (Beggan, 1992). Second, the confounding of legal and psychological ownership and the focus on marketing contexts led to an emphasis on monetary issues. For instance, a common measure in studies on the evaluation of products is the gap between prices that owners and non-owners assign to an object (Horowitz & McConnell, 2002; Kahneman et al., 1990; Novemsky & Kahneman, 2005). However, evaluation of products could also be measured in non-monetary terms such as rating the valence of products. Third, prior studies also did not control the specific interaction participants had with the presented stimulus. Participants were free to touch and interact with the stimulus at will (Brasel & Gips, 2014, 2015; Grohmann et al., 2007; Shen et al., 2016). Even though this approach comes closer to a real online shopping experience, there is research that indicates that the kind of

interaction a person has with an item on a touchscreen can influence the person's evaluation of the presented content. Studies for example showed that the direction a stimulus is dragged over a touchscreen can influence how positive or negative it is evaluated (Cervera-Torres et al., 2018). This lack of control over the exact interaction participants had with a stimulus makes it hard to pinpoint which specific interaction evokes the effect of the device on psychological ownership. Is it the fact that touchscreens provide the illusion of direct touch? Is it the hand movements and subsequent control over the objects? Or might the time and position a person keeps their finger on the screen make a difference? Fourth, prior studies focused on highly specific stimuli, typically pictures of real products. This, however, begs the question of what would happen if more abstract stimuli would be used. The literature suggests that psychological ownership can be felt over a wide variety of things, including abstract concepts like arguments (De Dreu & van Knippenberg, 2005), or ideas (Baer & Brown, 2012), or even the letters in one's name (Nuttin, 1987). Fifth, because many prior studies were set in a marketing context the research question often focused on making the presented objects more appealing, thus using stimuli with a positive valence. This raises the question whether people also exhibit psychological ownership over negatively valenced objects and possessions. Golubickis and colleagues (2019) for example found that participants were quicker to attribute positive possession towards themselves compared to attributing them to others. When it came to negative possessions, however, they were quicker to attribute them to others compared to themselves. Brenner et al. (2007) found in their study that participants were more concerned with getting rid of a negative object in their possession than they were worried about receiving a different negative object in return. This shows that the valence of an object does have an effect on the attribution of ownership.

In sum, most studies investigating the interplay of touch, psychological ownership, and evaluation had confounds between legal ownership and psychological ownership, focused on monetary evaluation (willingness to pay vs. willingness to accept payment), confounded

mere touch with touch interaction, and analysed the evaluation of real objects with a positive valence. This raises the question whether the same effects could also be obtained under conditions that differ from these specific circumstances.

Present studies

In this paper we tried to take all these points into consideration. In two studies, we focused on the effect touch-based interfaces have on the general evaluation (valence ratings) of a stimulus as well as the perceived psychological ownership over it, taking out any monetary aspects present in former studies and using a scenario that was devoid of legal ownership. In both studies reported here, we also focused on mere touch, thus limiting the interaction with the depicted stimulus in the touchscreen condition to only directly touching the stimulus without any hand movement. The aim was to see whether the simple act of laying one's finger on a depicted stimulus is enough to evoke psychological ownership and subsequently influence the evaluation of it. In the present studies, we also addressed the evaluation of abstract stimuli (Study 1) by looking at psychological ownership felt over adjectives which varied in valence (positive, neutral, negative).

Three types of devices were used over the course of two studies. Study 1 either used a touchscreen or a conventional computer mouse. Study 2 also featured an additional keyboard condition. These different devices were chosen because they provided participants with varying degrees of direct touch.

Analysis strategy

In this paper we decided to utilize linear mixed models to analyse our data opposed to more conventional approaches like ANOVAs. We did this because linear mixed models allow for a better representation of dependencies within a data set when it comes to repeated

measure designs. They also are capable of handling data sets containing missing values which is not the case for repeated measure ANOVAs. The linear mixed model approach was pre-registered for both studies, pre-registrations can be found at https://osf.io/ve9jm/?view_only=e3c2380e90f24ddf837c78f49381fcae. For every analysis the predictors were added stepwise into the model and the model fits were tested against each other using a Chi^2-Test. As a starting point we always tested a model only containing the fixed intercept against a model containing the random effects. All analyses were carried out using the statistical software R (the data and R-scripts can be found at https://osf.io/ve9jm/?view_only=e3c2380e90f24ddf837c78f49381fcae). To estimate the random and fixed coefficients, the lmer function within the lme4 package Version 1.1-21 (Bates, 2010) was used.

Study 1

Prior studies did lead us to suspect that touch interfaces will induce higher levels of psychological ownership. Study 1 tested this proposed relation for abstract material (adjectives). Under this assumption we also expected a more positive evaluation when touch interfaces were used. However, the inherit valence of the adjectives was expected to moderate this effect, meaning a more positive evaluation should only appear for neutral and positive adjectives, but not for negative ones.

Therefore, for Study 1 our hypotheses were:

- Participants within the touchscreen condition will report higher levels of perceived psychological ownership over the adjectives than participants within the mouse condition.

- Participants within the touchscreen condition will rate the positive and neutral adjectives more positively than participants in the mouse condition; however, there will be no difference for negative adjectives.

Method

Design

The focus of the study was to test the effect of the device used on perceived psychological ownership and the general evaluation of the presented adjectives. Participants either used a mouse, or a touchscreen to carry out the experimental task. The adjectives were grouped into three conditions, “Positive”, “Neutral”, and “Negative”. Therefore, the study had a 2 x 3 design with the device as a between-subjects and the valence group as a within-subjects variable.

Sample

Prior to data collection, a power analysis was carried out. A sample size of 60 participants was deemed to be sufficient to find the expected effect, because every participant would provide 90 measurements (for the R-Script of the Power-Analysis https://osf.io/ve9jm/?view_only=e3c2380e90f24ddf837c78f49381fcae). Participants were recruited via an online platform provided by [institute name]. After data collection our sample consisted of 70 participants. As pre-registered participants were excluded if they had a standard deviation of 0 for the perceived psychological ownership or the valence ratings. This was done to ensure that participants actually paid attention to the task instead of rushing through it by always checking the same values. The final sample consisted of 69 participants of whom 54 were women and 15 were men. Due to the within design every participant

provided 90 measure points leaving a total sample of *N* = 6210. The average age within the sample was 26.51 (*SD* = 9.36) with a range of 19 to 68. After completion, participants received 8 € as payment for their participation.

Measures and material

The perceived psychological ownership was rated via three items (Pierce et al., 2003) "I personally would use the object", "I feel a strong connection to the object", and "The object belongs to me" on a scale from 1 =" Disagree" to 9 =" Agree". The valence of the adjectives was rated by one item "How do you perceive this word?" on a scale from 1 = "Negative" to 9 = "Positive". To assess participants' affinity towards touching objects the Need for Touch Scale was used. Since the study was conducted in Germany the German translation of the scale was used (Nuszbaum et al., 2010). The questionnaire can be found at https://osf.io/ve9jm/?view_only=e3c2380e90f24ddf837c78f49381fcae. All words were taken out of the BAWL-R, a list of all words can also be found at https://osf.io/ve9jm/?view_only=e3c2380e90f24ddf837c78f49381fcae.

Procedure

After entering the laboratory, participants were greeted and handed out an information sheet concerning the purpose of the experiment and signed an informed consent statement. Participants then were seated in front of a table on which a screen was placed flat on the tabletop. After starting the experiment, participants first read a short summary of the purpose of the study and were then asked to state their sex, age, and area of study or profession. Before starting the actual task, participants had to carry out four practice trials. The task always had participants answering 3 questions concerning their perceived psychological

ownership over a depicted adjective as well as one question concerning their perception of the adjective's valence.

Participants in total had to rate 90 adjectives that were either classified as "Negative", "Neutral", or "Positive" with 30 adjectives per valence group. In the task the adjectives were always presented in a grey rectangle in the middle of the screen. The adjectives were presented on an M3 touch desktop (model M2767PW) with a resolution of 1920x1080 pixels. At the bottom of every rectangle a circle was presented (see https://osf.io/ve9jm/?view_only=e3c2380e90f24ddf837c78f49381fcae for screenshots of the task). Participants had to either press their finger down on that circle (for 3 seconds) or use the mouse to press down on the circle (for 3 seconds) to make the first rating scale appear. After participants rated all 90 adjectives, they were asked to answer the Need for Touch Scale to assess their affinity towards touching objects. After participants finished the experiment, they were paid for their participation and dismissed.

Results

Material check

To check whether the assignment of the adjectives was correct an ANOVA with the valence group the adjectives were assigned to as the independent variable and the valence rating of the adjectives as dependent variable was carried out. The analysis showed that there was a significant effect of the valence group on the valence rating. Negative objects (M = 2.68, SD = 1.48) were rated significantly more negative than neutral and positive ones and positive adjectives (M = 7.72, SD = 1.36) were rated significantly more positive than negative or neutral ones (M = 5.07, SD = 1.98), $F(2, 6207) = 4961$, $p < .001$.

Table 1.1. *Summary of group sizes, means and standard deviations of psychological ownership and valence ratings*

	Psychological ownership			**Valence**	
	N	Mean	SD	Mean	SD
Mouse	3150	4.96	1.71	5.14	2.59
Touch	3060	5.14	1.75	5.18	2.65
Positive	2070	5.72	1.69	7.72	1.36
Neutral	2070	4.83	1.68	5.07	1.98
Negative	2070	4.60	1.61	2.68	1.48

Perceived psychological ownership

For a summary of all group means standard deviations and group sizes see Table 1.1. As pre-registered we used a series of linear mixed models to test the effect of the device on perceived psychological ownership. We hypothesized that touching words on a touchscreen would lead to a higher amount of perceived psychological ownership over them compared to using a mouse. The random effects we included into the model were a random intercept for every participant as well as a random intercept for every adjective used. Within the analysis the mouse condition was used as a reference category. For a summary of the results see Table 1.2. The predictors were included stepwise into the model.

As a starting point we compared a model only containing the fixed intercept against models also containing random effects. Our analysis showed that the amount of perceived psychological ownership did show a significant variance in intercepts across participants, $SD = 0.94$, 95% CI [0.79, 1.11], χ^2 (1, $N = 6210$) = 1860.4, $p < .001$, as well as across different adjectives, $SD = 0.80$, 95% CI [0.69, 0.94], χ^2 (1, $N = 6210$) = 1896.8, $p < .001$.

After that we added the device with which participants carried out the task to the model as a fixed effect using the mouse condition as the reference point. The analysis showed that the device the participants used did not have a significant effect on the amount of perceived psychological ownership over the adjectives. Participants within the touchscreen condition (M = 5.14, SD = 1.75) did not perceive significantly more psychological ownership over the adjectives than participant within the mouse condition (M = 4.96, SD = 1.71), b = 0.18, $t(67) = 0.769$, p = .442. A Chi²-test was used to compare the fit of the two models. The analysis showed that including the device as a predictor into the model did not improve the model fit in a significant way (Model1), χ^2 (1, N = 6210) = 0. 60, p = .437. Therefore, the addition of the Device used to carry out the task did not add a significant amount of explained variance to the model.

Table 1.2. *Summary of linear mixed model showing the effect of the device on perceived psychological ownership*

	Model 1			**Model 2**		
Predictors	Estimates	95% CI	p	Estimates	95% CI	p
(Intercept)	5.05	[4.77, 5.33]	**<.001**	4.96	[4.61, 5.32]	**<.001**
Touch				0.18	[-0.27, 0.63]	.442
Random Effects						
σ^2	1.49			1.49		
τ_{00}	0.64 $_{word}$			0.64 $_{word}$		
	0.88 $_{id}$			0.89 $_{id}$		
ICC	0.51			0.51		
N	69 $_{id}$			69 $_{id}$		
	90 $_{word}$			90 $_{word}$		
Observations	6210			6210		
Marginal R^2 / Conditional R^2	.000 / .506			.003 / .508		

Because we also included the Need for Touch Scale in our study, participants' scores on both dimensions of the scale (autotelic touch and instrumental touch) were controlled for in additional models. However, neither the inclusion of autotelic need for touch, χ^2 (1, N = 6210) = 0.19, p = .662, nor the inclusion of instrumental need for touch, χ^2 (1, N = 6210) = 1.31, p = .252, added a significant amount of explained variance to the model. For a detailed summary see Table 1.8 and 1.9 in the Appendix.

Adjective valence rating

Participants also had to evaluate the valence of the presented adjectives. It was expected that participants who carried out the task with a touchscreen would evaluate neutral and positive adjectives more positively compared to participants who carried out the task with a mouse. To test this hypothesis a MANOVA with the device as an independent variable was carried out. As dependent variables the mean valence ratings of the three valence groups were used. The analysis showed that there was no significant difference between the two devices in any of the three valence groups $F(3, 65) = 0.46$, $p = .709$.

Exploratory analyses

In an exploratory analysis, the role of the valence group on psychological ownership was investigated more thoroughly. Again, a series of linear mixed models used with an intercept for the participants and an intercept for the adjectives, see Table 1.3. For the valence group variable, the negative adjective group was used as a reference category. The results show that the addition of the valence group into the model did add a statistically significant amount of explained variance, χ^2 (2, N = 6210) = 39.44, $p < .001$. Participants perceived significantly more psychological ownership over adjectives from the positive valence group (M = 5.72, SD = 1.69) compared to adjectives from the negative adjectives group (M = 4.60, SD = 1.61), $t(87) = 6.57$, $p < .001$. There was no significant difference in perceived

psychological ownership between the negative adjectives group (M = 4.60, SD = 1.61) and the neutral adjectives group (M = 4.83, SD = 1.68), $t(87) = 1.31$, $p = .190$.

Table 1.3. *Summary of linear mixed model showing the effect of valence group on psychological ownership*

	Model 1			**Model 2**		
Predictors	Estimates	CI	p	Estimates	CI	p
(Intercept)	5.05	[4.77, 5.33]	**<.001**	4.60	[4.28, 4.93]	**<.001**
Neutral				0.22	[-0.11, 0.56]	.190
Positive				1.12	[0.79, 1.45]	**<.001**
Random Effects						
σ^2	1.49			1.49		
τ_{00}	0.64 $_{word}$			0.42 $_{word}$		
	0.88 $_{id}$			0.88 $_{id}$		
ICC	0.51			0.47		
N	69 $_{id}$			69 $_{id}$		
	90 $_{word}$			90 $_{word}$		
Observations	6210			6210		
Marginal R^2 / Conditional R^2	.000 / .506			.078 / .507		

Another exploratory analysis looked at the effect of the valence group on the relationship between psychological ownership and the valence ratings of the adjectives. Beggan (1992) proposed that higher perceived psychological ownership would lead to a more positive evaluation of the object.

In a similar approach to the analyses above we again used a linear mixed model with the two intercepts for the participants and the adjectives. The predictors were added stepwise into the model. As dependent variable the valence ratings of the adjectives were used. First, only the random intercepts were added into the model, then in a next step the perceived

psychological ownership was added, after that the valence group of the adjective was added and finally the interaction between psychological ownership and the valence group was included into the model. In every step the inclusion of the new predictor added a significant amount of explained variance to the model, for a summary of the results see Table 1.4.

Table 1.4. *Summary of the linear mixed models showing the effect of the interaction between psychological ownership and valence group on valence rating.*

	Model 1			**Model 2**			**Model 3**			**Model 4**		
Predictors	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p
(Intercept)	5.16	[4.69, 5.63]	**<.001**	3.38	[2.93, 3.84]	**<.001**	1.07	[0.74, 1.40]	**<.001**	1.69	[1.34, 2.04]	**<.001**
PO				0.35	[0.33, 0.38]	**<.001**	0.35	[0.33, 0.38]	**<.001**	0.22	[0.18, 0.26]	**<.001**
Neutral							2.31	[1.89, 2.73]	**<.001**	1.18	[0.71, 1.66]	**<.001**
Positive							4.64	[4.22, 5.07]	**<.001**	3.88	[3.38, 4.37]	**<.001**
PO*Neutral										0.24	[0.19, 0.29]	**<.001**
PO*Positive										0.16	[0.11, 0.21]	**<.001**
Random Effects												
σ^2	1.80			1.60			1.60			1.57		
τ_{00}	5.08 $_{word}$			4.29 $_{word}$			0.67 $_{word}$			0.65 $_{word}$		
	0.06 $_{id}$			0.12 $_{id}$			0.12 $_{id}$			0.11 $_{id}$		
ICC	0.74			0.73			0.33			0.33		
N	69 $_{id}$			69 $_{id}$			69 $_{id}$			69 $_{id}$		
	90 $_{word}$			90 $_{word}$			90 $_{word}$			90 $_{word}$		
Observations	6210			6210			6210			6210		
Marginal R^2 / Conditional R^2	.000 / .741			.058 / .750			.657 / .771			.663 / .773		

Most interesting was the significant interaction between the valence group of the adjective and the perceived psychological ownership over it on the mean valence rating. The positive relationship between psychological ownership and the valence rating of the adjective was significantly less pronounced for adjectives within the negative valence group compared to adjectives within the neutral, $b = 0.24$, 95% CI [0.19, 0.29], $t(6132) = 9.27$, $p < .001$, and positive valence group, $b = 0.15$, 95% CI [0.11, 0.21], $t(6165) = 6.20$, $p < .001$, see Figure 1.1. Therefore, the evaluation was clearly influenced by the inherent valence of the adjectives.

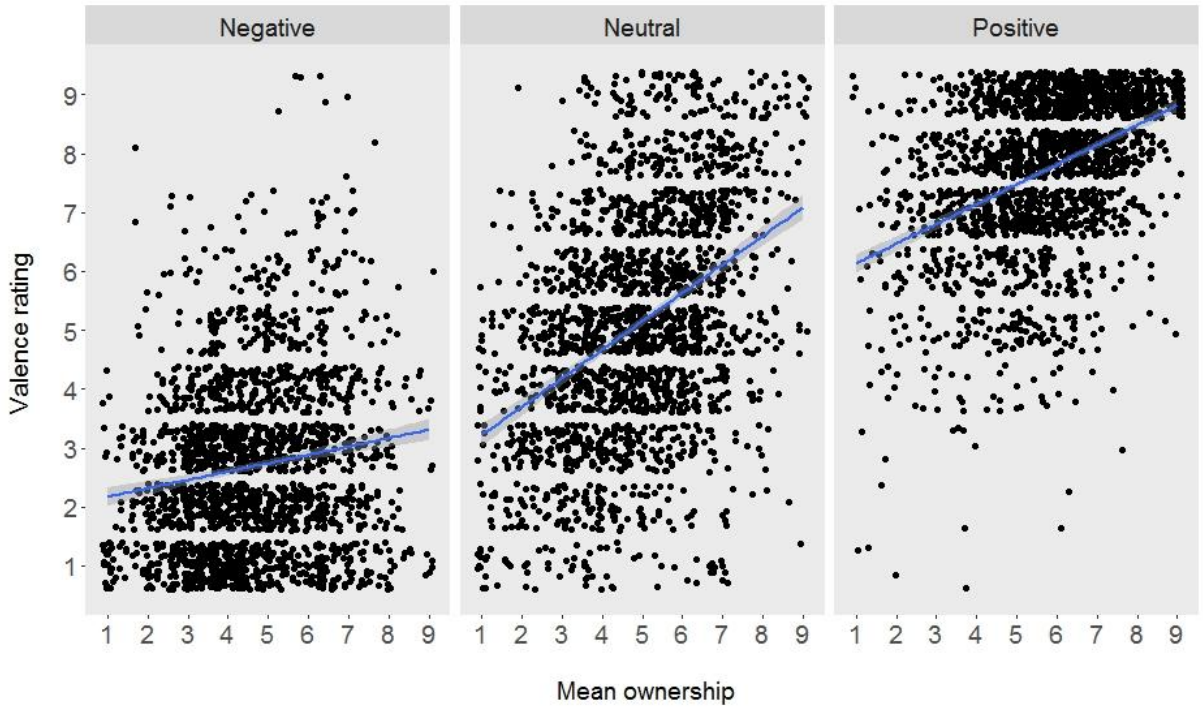

Figure 1.1. Effect of valence group on the relation between valence rating and psychological ownership.

Discussion

In our Study 1 we tried to explore the idea that touch interfaces could have an effect on how people evaluate written material. Due to the popularity of touch devices a possible effect of this technology on perception could have huge implications, especially considering

the fact that nowadays a lot of information is consumed online. Our results, however, did not show a significant effect of the device on perceived psychological ownership or the general evaluation of written material. This indicates that the effect found in prior studies might not apply to abstract textual material like adjectives.

Since most of the prior research regarding the effect of touch interfaces on psychological ownership was set in a marketing context most studies used pictures depicting products which potentially could be owned. Brasel and Gips (2014) found that participants who used a touchscreen to carry out an online shopping task reported higher levels of psychological ownership over a depicted sweatshirt or tent compared to participants that used a mouse. It is possible that for an effect of touch interfaces to occur material is needed that provides more information about haptic attributes of an object. Therefore, in Study 2 we decided to use pictures depicting real-world objects that could potentially be touched and bought by participants. The pictures were taken out of the Bank of Standardized Stimuli (BOSS) Version 2014 (Brodeur et al., 2014).

As with the inherent valence provided by adjectives, we also wanted to take attributes of the stimuli themselves into consideration. Brasel and Gips (2015) found that people focused more on the tangible attributes of products when they were using touch-based interfaces. This suggests that the usage of a touchscreen does influence the attention given to touch-related attributes of an object. The importance of haptic attributes has also been reported by Peck and Shu (2009) who found that the quality of touch influenced the prices participants assigned to a product. It therefore makes sense to assume that objects with attributes that convey more haptic input should amplify the effect of touch devices on psychological ownership and stimulus evaluation. One such attribute is the size of the depicted object. Smaller objects can be picked up and handled at will, facilitating haptic input, whereas larger objects are not that easily manipulated. Hence, one would expect that the evaluation of smaller objects is stronger impacted by the device through which they are

presented than larger objects. In Study 2 we therefore classified the depicted objects either as small or large depending on whether they could be easily picked up by hand.

Study 2

In this study we tried to investigate the effect of touch interfaces on perceived psychological ownership as well as the subsequent evaluation of objects depicted on the screen. The stimulus material therefore had greater similarity to the material that was used in consumer studies which found relationships between touch, psychological ownership, and object evaluation. However, the task in Study 2 was still different from those earlier studies as we focused on psychological ownership in the absence of legal ownership, measured non-monetary evaluation (valence rating), and investigated mere touch rather than full touch interaction. To also account for potential similarities between using a touchscreen vs. a mouse, three devices were used to carry out the task, a touchscreen, a computer mouse and a keyboard. Prior research suggest that the usage of touch devices should induce higher levels of psychological ownership which in turn should lead to a more positive evaluation of the depicted objects. Therefore, our hypotheses were:

1. Touching pictures of objects on a touchscreen will lead to higher levels of perceived psychological ownership over the depicted objects than clicking on them with a mouse or holding down a keyboard key.

2. Touching pictures of objects on a touchscreen will lead to a more positive evaluation of the depicted objects than clicking on them with a mouse or holding down a keyboard key.

Method

Design

Participants either used a keyboard, a mouse, or a touchscreen to carry out the experimental task. Additionally, the size of the objects depicted on the screen was manipulated. The objects were either classified as large or small, depending on whether the object could be easily picked up by hand. Therefore, the study had a 3 x 2 design with the device (Keyboard vs. Mouse vs. Touchscreen) as a between-subjects variable and the object size (Large vs. Small) as a within-subjects variable.

Sample

Prior to data collection, a power analysis was carried out. A sample size of 90 participants was deemed to be sufficient to find the effect, with participants again providing 90 measurements per person (for the R-Script of the Power-Analysis see https://osf.io/ve9jm/?view_only=e3c2380e90f24ddf837c78f49381fcae). Participants were recruited via an online platform provided by [institute name]. After data collection the sample consisted of 105 participants. As pre-registered participants again were excluded if they had a standard deviation of 0 for the perceived psychological ownership or the valence ratings. The final sample consisted of 100 participants of whom 79 were women and 21 were men. Due to the within design every participant provided 90 measure points leaving a total sample of N = 9000. The average age within the sample was 25.68 (SD = 8.38) with a range of 18 to 72. After completion, participants received 8 € as payment for their participation.

Measures and material

To measure the perceived psychological ownership over the depicted objects we again used the three items “I personally would use the object”, “I feel a strong connection to the

object", and "The object belongs to me" on a scale from 1 ="Disagree" to 9 ="Agree" provided by Pierce et al. (2003). The valence of the objects was rated by one item "How do you perceive this object?" on a scale from 1 = "Negative" to 9 = "Positive". To assess participants' affinity towards touching objects again the Need for Touch Scale was used. Since this study was also conducted in Germany the German translation of the scale was used (Nuszbaum et al., 2010). The questionnaire can be found at https://osf.io/ve9jm/?view_only=e3c2380e90f24ddf837c78f49381fcae. The pictures used in the study were taken out of the Bank of Standardized Stimuli (BOSS) Version 2014 (Brodeur et al., 2014), for an example see Figure 1.2. All pictures either depicted small or large objects that could potentially be bought and owned in real life, the whole sample of pictures can be found at https://osf.io/ve9jm/?view_only=e3c2380e90f24ddf837c78f49381fcae.

Figure 1.2. Example for large and small object stimuli

Procedure

Study 2 followed the same procedure as Study 1 with two exceptions. First, the material displayed on the screen consisted of pictures depicting objects which could

potentially be touched and owned in the real world. Second, some of the participants had to carry out the task using a keyboard. They were instructed to press down the space key for 3 second for the first rating scale to appear.

After entering the laboratory, participants were greeted and handed out an information sheet concerning the purpose of the experiment and signed an informed consent statement. Participants then were seated in front of a table on which a screen was placed flat on the tabletop. After starting the experiment, participants first read a short summary of the purpose of the study and were then asked to state their sex, age, and area of study or profession. Before starting the actual task, participants had to carry out four practice trials. The task always had participants answering 3 questions concerning their perceived psychological ownership over a depicted object as well as one question concerning their overall perception of the valence of the depicted object.

Participants in total had to rate 90 pictures depicting different kinds of objects. In the task the pictures were always presented in the middle of the screen. The pictures were presented on an M3 touch desktop (model M2767PW) with a resolution of 1920x1080 pixels. All pictures had a size of 600x600 pixels. At the bottom of every picture a circle was presented (see https://osf.io/ve9jm/?view_only=e3c2380e90f24ddf837c78f49381fcae for screenshots of the task). Participants had to either press their finger down on that circle (for 3 seconds), use the mouse to press down on the circle (for 3 seconds), or press down the space key on a keyboard (for 3 seconds) to make the first rating scale appear. After participants rated all 90 objects, they were asked to answer the Need for Touch Scale to assess their affinity towards touching objects. After participants finished the experiment, they were paid 8 € for their participation and dismissed.

Results

Perceived psychological ownership

As pre-registered we used a series of linear mixed models to test our hypotheses. A summary of all means, standard deviations and group sizes can be found in Table 1.5. We predicted that touching pictures of objects on a touchscreen would lead to a higher perceived psychological ownership over the depicted object compared to the usage of a mouse or a keyboard. Additionally, we also controlled for the size of the depicted object. To test the effect of the device on perceived psychological ownership (PO) a linear mixed model including the device as predictor and the size of the object as a control variable was used.

Table 1.5. *Summary of group sizes, means and standard deviations of psychological ownership and valence ratings*

	Psychological ownership			**Valence**	
	N	Mean	SD	Mean	SD
Key	3060	3.04	2.43	6.22	1.98
Mouse	2790	3.25	2.30	6.00	1.87
Touch	3150	2.56	2.06	6.04	1.96
Small	4500	3.19	2.42	5.88	1.93
Large	4500	2.68	2.10	6.29	1.94

Similar to Study 1 a random intercept for every participant as well as a random intercept for every picture that was shown were included into the model. Within the analysis

the keyboard condition was used as a reference category. For a summary of the results see Table 1.6. We included the predictors stepwise into the model.

As a first step a model only containing the fixed intercept was compared against models also containing the random effects. Our analysis showed that the amount of perceived psychological ownership did show a significant variance in intercepts across participants, *SD* = 1.16, 95% CI [1.01, 1.35], χ^2 (1, *N* = 9000) = 2336.6, *p* < .001, as well as across different pictures, *SD* = 0.91, 95% CI [0.79, 1.06], χ^2 (1, *N* = 9000) = 1842.20, *p* < .001.

Next, the device with which participants carried out the task to the model was added as a fixed effect using the keyboard condition as a reference point. The analysis showed that there was a marginally significant effect of the device on psychological ownership. Participants within the touchscreen condition (*M* = 2.56, *SD* = 2.06) perceived less psychological ownership compared to participants within the keyboard condition (*M* = 3.04, *SD* = 2.43), *b* = -0.48, *t*(99.83) = -1.72, *p* =. 088. A Chi²-test was used to compare the fit of the two models. The analysis showed that including the device as a predictor into the model (Model1) did improve the fit of the model in a statistically significant way (Model1), χ^2 (2, *N* = 9000) = 6.14, *p* = .047. Therefore, the addition of the Device used to carry out the task did add a significant amount of explained variance to the model.

Finally, the size of the depicted object was also included in the model (Model 3). Here large objects were used as the reference category. There was a statistically significant difference in perceived psychological ownership between Large (*M* = 2.68, *SD* = 2.10) and Small objects (*M* = 3.19, *SD* = 2.42), *b* = 0.51, *t*(89.65) = 2.74, *p* = .007. The new model (Model3) again showed a statistically significantly better fit than the old one (Model2), χ^2 (1, *N* = 9000) = 7.22, *p* = .007).

Similar to Study 1 we also assessed participants need for touch. To control for possible effects of this trait we included the value of both scales (autotelic and instrumental touch) in additional models. A summary of the results can be found in the Appendix in Table 1.10 and

1.11. Neither the inclusion of autotelic need for touch, χ^2 (1, N = 9000) = 0. 02, p = .899, nor the inclusion of instrumental need for touch, χ^2 (1, N = 9000) = 0.11, p = .744, added a significant amount of explained variance to the model.

Table 1.6. *Summary of the linear mixed models showing the effect of the device and the object size on perceived psychological ownership.*

	Model 1			**Model 2**			**Model 3**		
Predictors	Estimates	95% CI	p	Estimates	95% CI	p	Estimates	95% CI	p
(Intercept)	2.94	[2.64, 3.23]	**<.001**	3.04	[2.61, 3.46]	**<.001**	2.78	[2.32, 3.24]	**<.001**
Mouse				0.21	[-0.34, 0.77]	.454	0.21	[-0.34, 0.77]	.454
Touch				-0.47	[-1.02, 0.07]	.085	-0.47	[-1.02, 0.07]	.085
Small							0.51	[0.15, 0.88]	**.006**
Random Effects									
σ^2	3.04			3.04			3.04		
τ_{00}	1.36 $_{id}$			1.28 $_{id}$			1.28 $_{id}$		
	0.82 $_{pic\_num}$			0.82 $_{pic\_num}$			0.76 $_{pic\_num}$		
ICC	0.42			0.41			0.40		
N	100 $_{id}$			100 $_{id}$			100 $_{id}$		
	90 $_{pic\_num}$			90 $_{pic\_num}$			90 $_{pic\_num}$		
Observations	9000			9000			9000		
Marginal R^2 / Conditional R^2	.000 / .418			.016 / .418			.028 / .418		

Object valence rating

Participants also had to evaluate the valence of the depicted objects. It was expected that participants who carried out the task with a touchscreen would evaluate the depicted objects more positively than participants that used a mouse or a keyboard. Again, a linear mixed model including the device as predictor and the size of the object as a covariate was used to test the hypothesis. The model also included a random intercept for every participant and a random intercept for every picture. A detailed summary of the results is depicted in Table 1.7. The predictors were included stepwise into the model as it was done within prior analyses. At first a model only containing the fixed intercept was tested against models also containing the random effects. The results showed that the valence ratings of the objects did show a significant variance in intercepts across participants, $SD = 0.62$, 95% CI [0.53, 0.72], χ^2 (1, $N = 9000$) = 715.52, $p < .001$, as well as across different pictures, $SD = 0.77$, 95% CI [0.66, 0.90], χ^2 (1, $N = 9000$) = 1441.8, $p < .001$.

In the next model the device participants used to carry out the task was added to the model as a fixed effect using the keyboard condition as a reference point. The analysis showed that there was no significant effect of the device on valence ratings of participants. Participants within the keyboard condition ($M = 6.22$, $SD = 1.98$) neither significantly differed from participants within the mouse condition ($M = 6.00$, $SD = 1.87$), $b = -0.22$, $t(99.62) = -1.35$, $p = .182$, nor the touchscreen condition ($M = 6.04$, $SD = 1.96$), $b = -0.18$, $t(99.62) = 1.13$, $p = .260$. A Chi²-test was used to compare the fit of the two models. The analysis showed that including the device as a predictor into the model (Model1) did not improve the model fit in a statistically significant way (Model1), χ^2 (2, $N = 9000$) = 2.08, $p = .354$. Therefore, the addition of the Device used to carry out the task did not add a significant amount of explained variance to the model.

In a last step, the size of the depicted object was also included in the model (Model 3). There was a statistically significant effect of the object size on the valence rating of the

depicted objects, $t(89.86) = -2.55$, $p = .013$. Large objects were rated more positively ($M = 6.29$, $SD = 1.94$) than small objects ($M = 5.88$, $SD = 1.93$), see Figure 1.3.

The fit of the two models were tested against each other and the inclusion of the object size as a control variable (Model3) significantly improved the model fit, $\chi^2 (1) = 6.27$, $p = .012$.

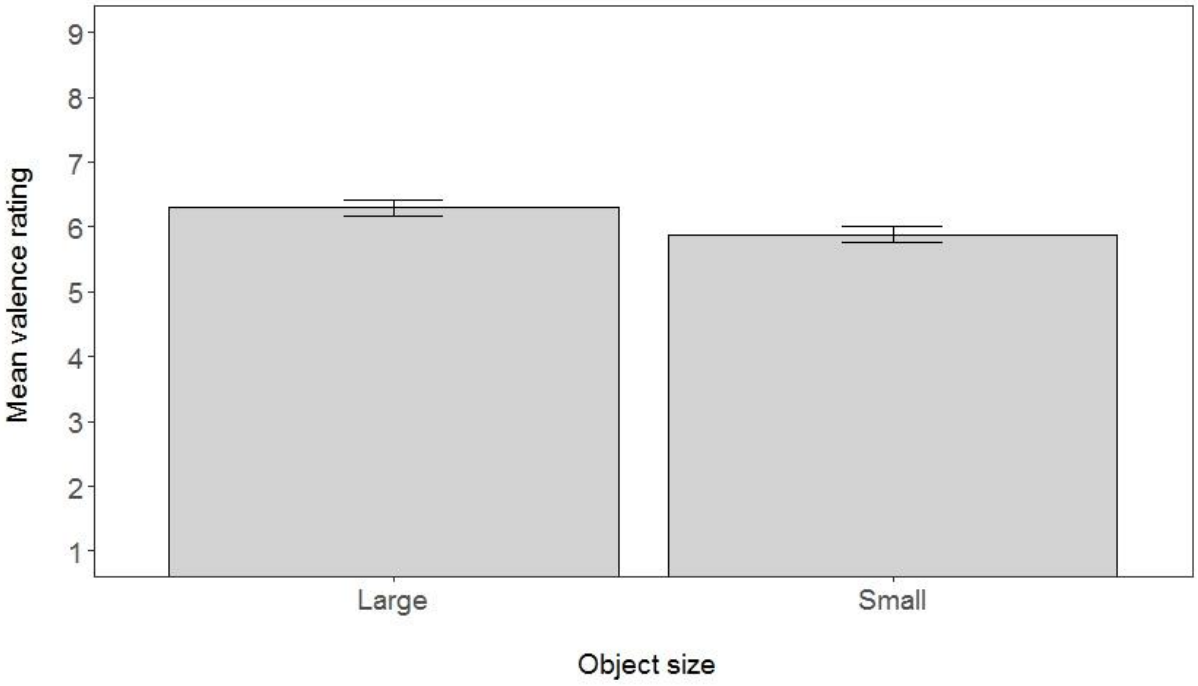

Figure 1.3. Main effect of object size on the valence rating of the objects with error bars depicting the standard errors.

Table 1.7. *Statistical summary of the linear mixed models depicting the effect of the device and the object size on valence ratings.*

	Model 1			**Model 2**			**Model 3**		
Predictors	Estimates	95% CI	p	Estimates	95% CI	p	Estimates	95% CI	p
(Intercept)	6.09	[5.89, 6.29]	**<.001**	6.22	[5.95, 6.49]	**<.001**	6.42	[6.11, 6.73]	**<.001**
Mouse				-0.21	[-0.53, 0.10]	.179	-0.21	[-0.53, 0.10]	.179
Touch				-0.18	[-0.48, 0.13]	.258	-0.18	[-0.48, 0.13]	.257
Small							-0.41	[-0.72, -0.09]	**.011**
Random Effects									
σ^2	2.80			2.80			2.80		
τ_{00}	0.39 $_{id}$			0.38 $_{id}$			0.38 $_{id}$		
	0.59 $_{pic\_num}$			0.59 $_{pic\_num}$			0.55 $_{pic\_num}$		
ICC	0.26			0.26			0.25		
N	100 $_{id}$			100 $_{id}$			100 $_{id}$		
	90 $_{pic\_num}$			90 $_{pic\_num}$			90 $_{pic\_num}$		
Observations	9000			9000			9000		
Marginal R^2 / Conditional R^2	.000 / .260			.002 / .260			.013 / .260		

Since we again included the Need for Touch Scale in our study, participants' scores on both dimensions of the scale (autotelic touch and instrumental touch) were controlled for in additional models. However, also this time neither the addition of the autotelic need for touch (χ^2 (1, N = 9000) = 0.23, p = .632) nor the addition of the instrumental need for touch (χ^2 (1, N = 9000) = 0.62, p = .432) score added a significant amount of explained variance to the model, for a summary see Table 1.12 and 1.13 in the Appendix.

Material check

To get a deeper understanding of the effect of object size on perceived psychological ownership we looked more closely at the values provided by the BOSS (2014) data base from which the pictures were taken. The data base includes values describing the familiarity and manipulability of the depicted object. We carried out two independent t-tests to test whether the two object types differ on these two dimensions. Here we found that "Large" objects (M = 4.44, SD = 0.31) possessed a higher familiarity than "Small" objects (M = 4.28, SD = 0.40), t(8205) = 19.50, p < .001. However, "Small" objects (M =3.24, SD = 0.61) yielded a higher manipulability value than "Large" objects (M = 2.94, SD = 0.67), t(8616) = -21.13, p < .001.

Discussion

In Study 2 we set out to test whether the absence of the effect of touch devices on perceived psychological ownership and subsequent stimulus evaluation in Study 1 might have been due to the type of material that was used. Participants had to carry out the same task as in Study 1, but this time the stimuli consisted of pictures depicting real-world objects that could potentially be touched and owned. We did this to come closer to predecessor studies which were mostly focusing on the effects of touch interfaces regarding online shopping

behaviour (Brasel & Gips, 2014, 2015). To also control for possible effects of participants perceiving the computer mouse as an extension of their self we also included a condition in which participants had to carry out the task with a keyboard. Our analysis indicate again that the usage of a touchscreen does not have an effect on the perception of a stimulus. As with the adjectives in Study 1 there was no difference in valence ratings between the three devices. Surprisingly, the amount of perceived psychological ownership was lowest within the touchscreen condition which was the opposite of what we expected. A possible explanation for the result might be the ergonomic properties of the task. Participants might have felt uncomfortable in the position they had to adapt to carry out the task using a touchscreen compared to participants who used a keyboard.

As in Study 1 we also wanted to consider stimulus-inherent attributes. This time we controlled for the size of the objects and subsequent manipulability. Our analysis showed that the size of the depicted objects did have an influence on both the amount of perceived psychological ownership as well as the general evaluation of the object. Smaller objects evoked higher levels of perceived psychological ownership whereas larger objects were generally evaluated more positively. To further explore possible sources of the effect of the object size, we took a closer look at the manipulability and familiarity values provided by the BOSS (2014) data bank. The analysis showed that overall objects that were classified as small are generally perceived to be easier to manipulate than objects classified as large. On the other hand, objects classified as large had an overall higher familiarity score compared to objects that were classified as small. These insights fit with the effect of object size on perceived psychological ownership and general stimulus evaluation. A sense of control over an object is an important variable for the occurrence of psychological ownership (Beggan, 1991; Pierce et al., 2003). Being able to picture oneself handling an object should induce a higher sense of control leading to a higher level of perceived psychological ownership over it. On the other hand, being more familiar with an object could facilitate a more positive perception of it, as

suggest by mere exposure literature (Zajonc, 1968). However, since both analyses were conducted post-hoc, they have to be interpreted with care.

General discussion

No matter if it's our smartphone, tablet or e-reader, touchscreens have increasingly become a part of our lives. In this paper, we focused on the question whether the simple usage of a touch device is enough to alter our perception of ownership over the content we consume as well as our evaluation of it. In a course of two studies we tested the effect of different types of devices on perceived psychological ownership and general stimulus evaluation. Our findings do not provide evidence for this notion, suggesting that the device we use to interact with content does not affect how we perceive the things we consume.

Looking back at prior studies researching the effect of touch interfaces on psychological ownership and stimulus evaluation a key difference to our studies is that participants were not free to interact with the stimulus at will. All participants within the touchscreen condition were instructed to put their finger on a pre-defined position on the screen and perform the same interaction, namely press down on the stimulus. Other studies offered their participants more freedom when it came to the length of time and type of interaction they had with the stimulus (Brasel & Gips, 2014, 2015; Cano et al., 2017; Shen et al., 2016). This made sense since those studies were mostly focusing on the effect in relation to online shopping behaviour. Hence, the task was designed to mimic a more realistic online shopping experience. However, a higher interactivity of the task makes it harder to pinpoint which aspect offered by touch interfaces led to the increase of perceived psychological ownership. There is a huge variety of possible interactions (tipping, dragging, zooming in or out) a person can have with a stimulus on a touchscreen. Additionally, the position a person

places their finger on might also have an impact. Thus, in this study we decided to only focus on the effect specifically due to mere touch.

For future studies it would be interesting to compare different levels of interactivity with an object on a touchscreen. For example, comparing only touching an object without moving it, to dragging it into a certain direction. This could give room to the exploration of the role of control in the relation between touch interfaces and psychological ownership as well as subsequent stimulus evaluation. Indication for a relation between the perception of control, touch and psychological ownership has been found in studies before. Scorolli et al. (2018) for example showed that cues of control influenced the attribution of object ownership. One such cue was whether a person touched the object or not. Participants were more likely to attribute ownership over an object towards a person who touched it compared to a person who did not.

The effect of object size on perceived psychological ownership also points into this direction. Participants perceived a higher amount of psychological ownership over small objects compared to large objects. Considering that smaller objects are easier to physically manipulate, they could have conveyed a higher sense of control over them. This notion was supported by an analysis of the manipulability score of the pictures provided by the BOSS (2014) data base. Objects classified as small had an overall higher manipulability score than objects classified as large. Since manipulability is defined as the ease with which participants can imagine handling the depicted object this also supports an influence of physical control on perceived psychological ownership. This in turn could be important for the role of interactivity concerning the usage of touch interfaces. If participants have a feeling of control over a depicted stimulus because it is reacting to their hand movements this could lead to higher amounts of perceived psychological ownership.

Another insight given by our studies is that psychological ownership and stimulus evaluation seem to be influenced by attributes inherent to a stimulus, including physical as well as abstract aspects. For example, Study 1 found a main effect of the adjective valence on perceived psychological ownership. Participants did perceive significantly more psychological ownership over adjectives in the positive valence group compared to adjectives within the negative valence group. Furthermore, the valence group of an adjective had an effect on the relation between perceived psychological ownership and the valence ratings of the adjectives. Beggan (1992) defined the endowment effect as the relationship between perceived psychological ownership and a more positive evaluation of an object. This positive relationship was significantly less prominent for negative adjectives compared to neutral and positive ones, suggesting that the inherent valence of an object can have an influence on the amount of psychological ownership perceived over it as well as the endowment effect as proposed by Beggan (1992). However, this effect does not seem to be affected by the device that is used to carry out the task. Since these analyses were only exploratory the results need to be interpreted with caution, though. Future studies could focus more on the effect of stimulus valence on perceived psychological ownership as well as its relation to the endowment effect.

Overall, our data suggest that rather than the device influencing the perceived psychological ownership over a stimulus or the general evaluation of it, the attributes rooted within the stimulus itself need to be taken into consideration. However, because of the exploratory nature of some of our analyses this notion must be interpreted with caution. At this point it seems justified to say that for an effect of touch devices on perceived psychological ownership and the evaluation of the stimulus to occur simply laying one's finger on the screen is not sufficient enough to have an impact. More research on the interplay between the interfaces we use, the interaction we have and the attributes of the content we

consume is needed to fully understand the implications that this new technology has for our perception as well as our behaviour.

- SHARE IN COLLABORATIVE PUBLICATIONS/MANUSCRIPTS-

The subsequent chapter (Chapter 2) consists of a manuscript in preparation for submission. Dr. Jürgen Buder is co-author of this manuscript. The proportional contributions to the manuscript are presented in the following table.

Author	**Author position**	**Scientific ideas**	**Data generation**	**Analysis & Interpretation**	**Paper writing done**
Lisa Rabl	First author	90 %	100 %	90 %	65 %
Jürgen Buder	Second author	10 %	0 %	10 %	35 %

Title of paper: If it is mine, then it is good. If it is not good, then it isn't mine! The effect of stimulus valence on psychological ownership and price setting

Status in publication process: In preparation for submission

Chapter 2: If it is mine, then it is good. If it is not good, then it isn't mine! The effect of stimulus valence on psychological ownership and price setting

Introduction

From our childhood onward we tend to prefer our own belongings over the possessions of other people. Regardless of whether it's one's home, one's idea, or simply one's office chair, somehow the things we feel are ours always seem to be a touch better than those of others. While some of our possessive behaviours may be explained rather easily (e.g. making sure to secure one's own resources), studies have also reported feelings of ownership over rather abstract things (Abelson, 1986; Baer & Brown, 2012), like randomly assigned arguments (De Dreu & van Knippenberg, 2005) or letters that are present within one's own name (Nuttin, 1987). This hints at a deeper meaning of ownership beyond that of the mere protection of resources. So, where does this feeling come from? Why do we feel that "mine" is better than "yours"?

The present paper set out to take a closer look at this phenomenon and test the boundaries that apply to it. Most work in this area is taking place in the field of behavioural economics and investigates the so-called endowment effect (Thaler, 1980) – the relationship between legal ownership (whether a person is in possession of an object or not) and the subsequent behaviour towards that object (typically, the price a person sets for the object). The present paper extends this classic relationship between legal ownership and behaviour in two ways. First, we did not only investigate behaviour towards an object (price setting), but also feelings towards an object, drawing on the concept of psychological ownership (Beggan, 1992). Second, and most crucially, we investigated the role of object valence. Most work in this area is situated in commercial and consumer contexts, thus focusing on objects and possessions with a positive valence. But how would people deal with objects that have a negative valence? Will feelings towards negatively valenced objects (psychological

ownership) and behaviour towards negatively valenced objects (endowment effect) differ from feelings and behaviour towards positive objects?

Endowment Effect and Psychological Ownership

The relationship towards one's possessions often shows itself in situations in which a person is about to lose legal ownership over an item. Based on his seminal work on prospect theory, Kahneman (1979) has suggested that losses loom larger than comparable gains. Applying this notion to losses of ownership, standard experiments in this area are asking participants to set a price for which they would be willing to sell an object that they had recently acquired ownership over (Kahneman et al., 1990, 1991). Typically, these experiments report a so-called endowment effect (Thaler, 1980), indicating that people who had to set a price for selling an object in their legal possession (sellers) tend to demand higher prices for letting go of it than people who were asked to set a price they would be willing to pay for gaining legal ownership over that object (buyers) (Horowitz et al., 1999; Knetsch & Sinden, 1984; Knetsch, 1989).

But the idea that the endowment effect is caused by people's natural aversion towards losses has also been called into question by some scholars (Morewedge & Giblin, 2015). Morewedge et al. (2009) for example criticized that in classical loss aversion studies ownership over an item and loss aversion are often confounded. They showed in their study that rather than the negative and aversive pain caused by the loss of an object it is much more the positive feeling of ownership itself over an object that leads people to demand higher prices. To test this prediction, they asked participants who already owned a coffee mug to set a price for a second, identical mug. Though these so-called owner-buyers had no experience of loss, they were willing to set a price for the second mug that was similar to the (increased)

price that regular sellers had charged. It seems therefore that irrespective of losses, ownership increases the perceived value of an object. But why?

One reason for this could be that ownership over an object goes beyond the simple fact of legal ownership. Prior research already suggested that people tend to form emotional bonds with their possessions (Csikszentmihalyi & Halton, 1981; Dittmar, 1991). One concept that describes this relationship is psychological ownership which is defined as the emotional connection between a person and the objects they feel ownership over (Dittmar, 1991; Wilpert, 1991). This connection is supposed to be due to an inclusion of those objects into our sense of self (Beggan, 1992; Belk, 1988; Mehta & Belk, 1991; Pierce et al., 2003; Prelinger, 1959). Because people have a tendency to evaluate themselves in a positive light (Liebrand et al., 1986; Mezulis et al., 2004; Ross, & Fletcher, 1985; Sedikides, & Strube, 1997), it stands to reason that this would also apply to the things they associate with themselves, resulting in a positivity bias towards one's possessions (Beggan, 1992; Gawronski et al., 2007; Hoorens et al., 1990; Irwin & Gebhard, 1946; Nesselroade et al., 1999).

There are different ways and motives for the development of psychological ownership. It is known to increase with prolonged time of possession (Shu & Peck, 2011, Study 2; Strahilevitz & Loewenstein, 1998), and it apparently can be evoked by acts as simple as touching an object (Peck & Shu, 2009; Shu & Peck, 2011). Psychological ownership can also arise from a need to define oneself to the outside world (Abelson, 1986), to get to know oneself better (McCracken, 1986), or to maintain a continuity in one's life by using possessions as tokens to store memories in (Cram & Paton, 1993). All of these examples show that psychological ownership goes further than simply legally owning an object. But still, is psychological ownership the root of participants' behaviour when it comes to possession loss?

Shu and Peck (2011) tried to answer this question by testing the role psychological ownership plays in the endowment effect. They carried out a number of replication studies of classical loss aversion experiments, but also measured psychological ownership (and affect) via questionnaire items. Their results showed that the endowment effect was mediated by the interplay between psychological ownership and affect, providing further evidence for Morewedge et al.'s (2009) claim that the value sellers and buyers attribute to an object is induced by the ownership over the object itself rather than the experience of loss.

Object valence

By measuring not only psychological ownership, but also the affect of participants the studies conducted by Shu and Peck (2011) also point to a potential factor that was often disregarded in classical endowment studies: the valence of the object in question. Because a lot of studies researching the endowment effect as well as psychological ownership were set in a marketing context the used items were mostly designed to be attractive for participants and therefore often only exhibited a positive valence. This leaves open the question of whether participants would show the same behaviour if they were about to lose ownership over an item that lacks positive traits or even exhibits negative ones.

Only very few studies have investigated how people deal with possession of a negative valence. The classical buyer-seller paradigm was investigated in two studies by Shu and Peck (2011). In study 1, participants who owned a pen (moderately positive valence) showed a classical endowment effect by setting higher prices than buyers. Importantly, the endowment effect went along with increased psychological ownership. In their study 8, they repeated this experiment, this time with a pen that was unpleasant to touch (moderately negative valence). In this case, the endowment effect between sellers and buyers was eliminated. Interestingly,

however, sellers still felt more ownership over the negatively valenced item (but also more negative affect).

Other studies on the role of objects with different valence relied on a non-monetary paradigm where it was measured whether participants are inclined to switch an item of positive or negative valence for another item of similar positive or negative valence. Brenner et al. (2007, Study 1) found that people are more likely to stick with a positive item rather than to switch it for another positive one. In contrast, people are more likely to switch a negative item for another negative item. Shu and Peck (2011, Study 7) managed to replicate these findings and showed that the endowment effect for positive items went along with psychological ownership (and positive affect), whereas the reversed endowment effect was not associated with ownership (but only with negative affect).

The present studies now try to take a closer look at how the behavioural and emotional consequences of object ownership come to be. To do this we first carried out a study using the classic loss aversion paradigm (Study 3) in which participants had to set prices for selling or buying an object, in this case postcards that either possessed a positive, neutral or negative valence. Contrary to the studies of Shu and Peck (2011) we included all three valence groups into one study design to better be able to judge the effect of object valence on psychological ownership and the endowment effect. The following study (Study 4) dealt with the idea that the behavioural and emotional effects of ownership are rooted in a integration of the possession of a person into the person's self (Beggan, 1992) and set it in relation to the object valence. To do this we manipulated the positive self-view of our participants by asking them to either recall a success or failure experience form their past. After that they carried out the same task used in Study 3.

Both studies not only measured psychological ownership and behaviour with regard to a single item, but for a set of 15 different items, thus giving better insights into the

mechanisms. In both studies we asked participants to imagine that they were collectors of postcards with unusual designs. The postcards which participants could either buy or sell were represented by pictures taken out of the International Affective Picture System (IAPS) that could be classified as either positive, neutral or negative (Lang et al., 1997).

Shu and Peck (2011) manipulated the valence of their stimuli via pleasantness of touch whereas Brenner et al. (2007) used descriptions of different job offers that provided either certain advantages or disadvantages. While being effective both manipulations are limited. They either require a real-world interaction with the stimulus, or conscious processing of the job offers. In contrast, our studies with their focus on visually valenced items were not dependent on real-world interaction with objects and also did not require a deeper level of processing. Hence, we got the opportunity to test the impact of the item valence on psychological ownership and the endowment effect on a more basic level, which offers application to a wider range of contexts.

In both studies we measured psychological ownership over postcards (with three items taken from Pierce et al., 2003) as well as participants' behaviour with regard to the postcards (prices set for the postcards).

Study 3 sought to identify how the role (buyer/seller) and the valence of the postcards (positive/neutral/negative) affected psychological ownership and pricing. Study 4 additionally investigated a potential moderator of these relations: self-threat. Built on the assumption that psychological ownership associates objects to the self, it was tested whether participants whose sense of self is threatened exhibit a stronger inclination to feel psychological ownership over positive (compared to negative) items than participants whose sense of self is affirmed.

Analysis strategy

In this paper we decided to utilize linear mixed models to analyse our data opposed to more conventional approaches like ANOVAs. We did this because linear mixed models allow for a better representation of dependencies within a data set when it comes to repeated-measures designs. They also are capable of handling data sets containing missing values which is not the case for repeated-measures ANOVAs (Brauer & Curtin, 2018). The linear mixed model approach was pre-registered for all both studies; pre-registrations can be found at https://osf.io/9bv8a/?view_only=3c6e1ca864f04d25938eb307b6dbad6c. For every analysis the predictors were added stepwise into the model and the model fits were tested against each other using a Chi^2-Test. As a starting point, we always tested a model only containing the fixed intercept against a model containing the random effects. All analyses were carried out using the statistical software R (the data and R-scripts can be found at https://osf.io/9bv8a/?view_only=3c6e1ca864f04d25938eb307b6dbad6c). To estimate the random and fixed coefficients, the lmer function within the lme4 package Version 1.1-21 (Bates, 2010) was used.

Study 3

In Study 3, we wanted to test the general effect of item valence on the amount of psychological ownership a person perceives over it as well as on the endowment effect. Participants were requested to either set prices for selling affectively positive, neutral, or negative postcards to which they were endowed, or to set prices for buying corresponding postcards. Additionally, they also rated their perceived psychological ownership over all postcards.

As pre-registered and based on the notion that ownership is linked to a (positive) sense of self (Beggan, 1992; Beggan & Brown, 1994) we expected participants to show significantly more psychological ownership over positive compared to negative postcards. We did not pre-register hypotheses with regard to legal ownership or an interaction between legal ownership and valence. However, following up on Shu and Peck's (2011, study 8) results one might expect that sellers will report higher levels of psychological ownership than buyers and that this difference would not be modified by the valence of the object.

For the behavioural measures (pricing) we pre-registered the classical endowment effect, predicting that sellers demand higher prices than buyers. Other hypotheses were not pre-registered, though Shu and Peck's (2011) results would indicate an interaction between legal ownership and valence, with sellers charging similar prices to buyers for negative postcards (Shu & Peck, 2011, Study 8).

Method

Sample

We carried out a Power analysis to determine the sample size needed to find the expected effect (the R-Script can be found at https://osf.io/9bv8a/?view_only=3c6e1ca864f04d25938eb307b6dbad6c). The analysis indicated that a sample of 150 participants should be sufficient to find the effect. After data collection our initial sample consisted of 164 participants. As stated in the pre-registration participants were excluded from data analysis if they showed a standard deviation of zero on their perceived psychological ownership, the valence ratings of the postcards, or the prices they set for them. This was done to make sure participants did not simply rush through the experiment by only ticking the same box for every question. Additionally, participants also

had the opportunity to indicate that they did not want their data to be included in the data analysis. After data exclusion, 135 participants remained (providing a total N = 2070 of measurements) of whom 105 were women, 29 were men, and one person neither identified as female or male. The final sample had a mean age of 25.5 (*SD* = 7.39) and a range from 18 to 67.

Materials and measures

The study used a sample of 15 pictures taken out of the IAPS ranging in their emotionality ratings between 2-7 as postcards. The pictures were categorized into positive, neutral and negative pictures (the used pictures can be found at https://osf.io/9bv8a/?view_only=3c6e1ca864f04d25938eb307b6dbad6c). The perceived psychological ownership over the postcards was rated via three items (Pierce et al., 2003) “I feel I own the postcard”, “I feel a high amount of personal ownership over the postcard”, and “The postcard belongs to me” on a scale from 1 = ”Disagree” to 7 = ”Agree”. The perceived valence of the postcard was rated by one item “How do you perceive this postcard?” on a scale from 1 = “Negative” to 7 = “Positive”. Participants had to set prices to either sell or buy the postcards. They were asked to set a price between the range of 0 to 6 €. To indicate the price, they had to use a slider which could be moved by intervals of 10 Cents.

Procedure

The study took place online. At first participants saw a form containing information about the study and were asked to give their consent for participation. After that they had to state their age and gender. In the beginning of the study participants read a text which assigned them the role of a postcard collector. Half of the participants (Buyers) were told that

they would be presented with a sample of postcards that they could acquire for their selection and should now indicate the prices they would be willing to pay for them. The other half (Sellers) were told that they would see a sample of postcards from their collection for which they should indicate prices for which they would be willing to sell them. After they read the instruction, participants were presented with a sample of 15 postcards. For each postcard participants had to rate their perceived valence as well as perceived psychological ownership over it. Additionally, they also had to set a price for either buying or selling the postcard. The order of measurements for ownership and pricing was balanced. After they finished the task, participants were de-briefed about the specific goal of the study. Participants then had the possibility to take part in a lottery in which 10 vouchers á 15 € of an online shopping platform were given away.

Results

Material check

To see whether the classification of the pictures into positive, neutral and negative pictures was correct a one-way ANOVA was carried out using the valence group of the pictures as an independent variable and the valence ratings as a dependent variable. The analysis showed a significant effect of the valence group, $F(2, 2022) = 947.7$, $p < .001$. Negative postcards ($M = 2.23$, $SD = 1.43$), were rated significantly more negatively than neutral (M = 3.61, SD = 1.23) and positive ($M = 5.38$, $SD = 1.33$) ones and positive postcards were rated significantly more positively than neutral postcards, indicating that our valence manipulation was successful.

Psychological ownership

As pre-registered, we used a series of linear mixed models to test the effect of stimulus valence and the role participants were assigned to on the amount of perceived psychological ownership. The model contained random intercepts for every participant and every postcard, as well as random slopes for the valence groups. The first step in our analysis was to test the models containing the random effects against a model only containing the fixed intercept. Our analysis showed that the amount of perceived psychological ownership did show a significant variance in intercepts across participants, SD = 0.98, 95% CI [0.85, 1.12], χ^2 (1, N = 2025) = 527.84, p < .001, as well as across different postcards, SD = 0.74, 95% CI [0.52, 1.09], χ^2 (1, N = 2025) = 586.8, p < .001. Additionally, the slopes significantly varied across the positive, SD = 0.98, 95% CI [0.84, 1.16], χ^2 (1, N = 2025) = 175.25, p < .001, and neutral valence group, SD = 0.48, 95% CI [0.32, 0.64], χ^2 (1, N = 2025) = 15.90, p < .001. Here the negative valence group was used as a reference point.

Table 2.1. *Summary of the means and standard deviations for psychological ownership and set prices.*

	Psychological Ownership (1-7)			Prices (0-6 €)		
	N	Mean	SD		Mean	SD
Positive	675	3.49	1.86	Positive	1.87	1.55
Neutral	675	*2*.30	1.37	Neutral	0.86	0.96
Negative	675	1.93	1.36	Negative	0.97	1.19
Seller	1065	2.72	1.81	Seller	1.50	1.47
Buyer	1005	2.43	1.55	Buyer	0.98	1.14

After testing the random effects the fixed effects were added step-wise into the model, first adding the valence group of the postcard (Model 1), followed by the role of the

participant (Model 2), and lastly the interaction between valence and role (Model 3); for a summary of all means and standard deviations see Table 2.1. Our analysis showed that only the addition of the valence group of the postcard (Model 1) added a significant amount of explained variance to the model, χ^2 (2, N = 2025) = 27.72, p < .001, for a detailed summary of the model see Table 2.2. As pre-registered, participants reported significantly more psychological ownership over positive (M = 3.49, SD = 1.86) compared to negative postcards (M = 1.93, SD = 1.36), see Figure 2.1. However, neither the addition of the role of the participants (Model 2), χ^2 (1, N = 2025) = 1.49, p = .222, nor addition of the interaction between the two predictors (Model 3), χ^2 (2, N = 2025) = 3.80, p = .150, did significantly improve the model fit.

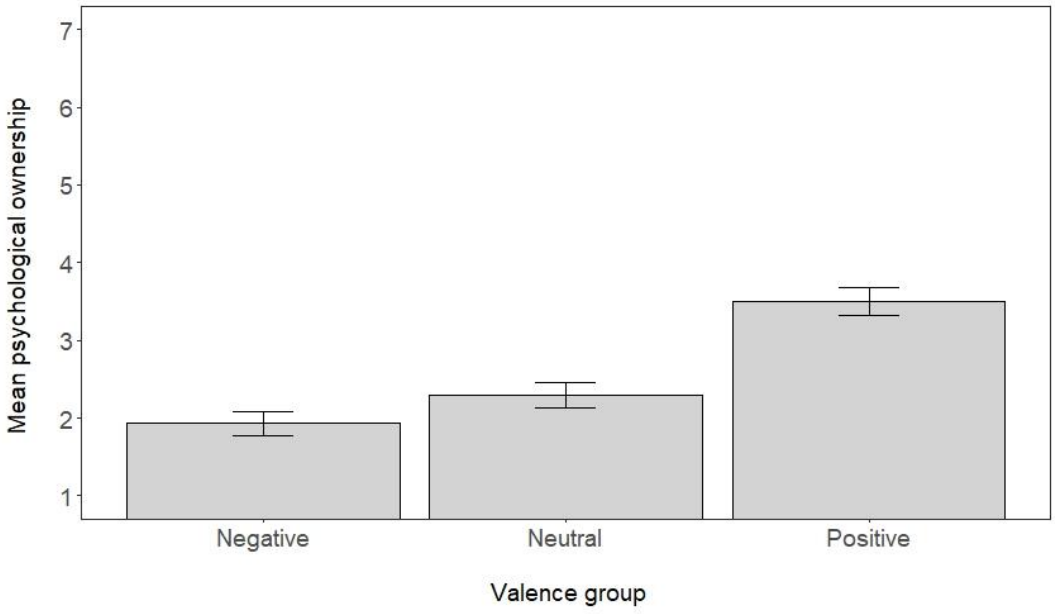

Figure 2.1. Main effect of valence group on psychological ownership; Errorbars depict the standard error.

Postcard pricing

We used the same approach for the analysis of the endowment effect (postcard pricing) as we did for the analysis of the perceived amount of psychological ownership. The

same random effects and reference groups were used as before. To start with we again tested the model only containing the fixed intercept against the models containing the random effects. Our analysis showed that the prices that participants attributed to the postcards did show a significant variance in intercepts across participants, SD = 0.85, 95% CI [0.74, 0.97], χ^2 (1, N = 2025) = 711.30, p < .001, as well as across different postcards, SD = 0.52, 95% CI [0.37, 0.78], χ^2 (1, N = 2025) = 496.05, p < .001. Also, the slopes significantly varied across the positive, SD = 0.76, 95% CI [0.65, 0.90], χ^2 (1, N = 2025) = 177.85, p < .001, and neutral valence group, SD = 0.46, 95% CI [0.35, 0.58], χ^2 (1, N = 2025) = 32.17, p < .001. The negative valence group was again used as a reference point.

After that the fixed effects were included stepwise into the model, first adding the valence group (Model 1), then the role of participants (Model 2) and lastly the interaction between the two (Model 3); for a summary of all means and standard deviations see Table 2.1. Our results showed that the inclusion of the valence group (Model 1), χ^2 (2, N = 2025) = 21.87, p < .001, as well as the inclusion of the role the participants were assigned to (Model 2), χ^2 (1, N = 2025) = 10.11, p = .002, added a significant amount of explained variance to the model (for a detailed summary of the model see Table 2.2).

Participants set significantly higher prices for positive (M = 1.87, SD = 1.55) compared to negative postcards (M = 0.97, SD = 1.19). Also, Sellers (M = 1.50, SD = 1.47) demanded higher prices for giving up their ownership over the postcards than Buyers (M = 0.98, SD = 1.14) for attaining ownership over them, see Figure 2.2. The inclusion of the interaction between the predictors (Model 3) again did not significantly improve the model fit, χ^2 (2, N = 2025) = 4.17, p = .124, for a detailed summary of the models see Table 2.2.

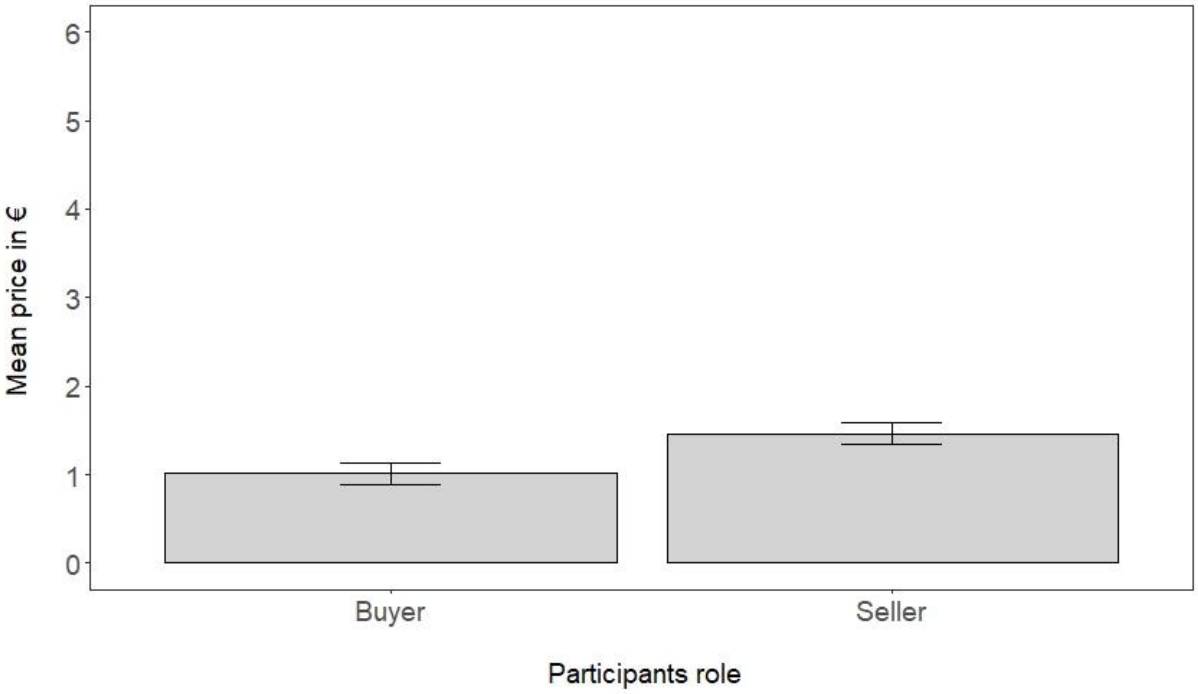

Figure 2.2. Main effect of the role participants were assigned to on the prices they attributed to the postcards. Error bars depict the standard error.

Table 2.2. *Summary of the effects of the item valence and role on perceived psychological ownership and pricing (only best fitting models are shown)*

	Psychological ownership			**Price setting**		
Predictors	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*
(Intercept)	1.93	[1.62, 2.23]	**<.001**	0.75	[0.46, 1.04]	**<.001**
Neutral	0.37	[-0.02, 0.75]	.061	-0.11	[-0.44, 0.22]	.505
Positive	1.57	[1.15, 1.98]	**<.001**	0.90	[0.55, 1.24]	**<.001**
Seller				0.45	[0.18, 0.72]	**.001**
Random effects						
σ^2	1.08			0.62		
τ_{00}	0.74 $_{id}$			0.58 $_{id}$		
	1.11 $_{id.1}$			0.63 $_{id.1}$		
	0.23 $_{id.2}$			0.21 $_{id.2}$		
	0.08 $_{pic}$			0.06 $_{pic}$		
ICC	0.43			0.51		
N	135 $_{id}$			135 $_{id}$		

	15_{pic}	15_{pic}
Observations	2025	2025
Marginal R^2 / Conditional R^2	.193 / .541	.173 / .594

Discussion

In Study 3 we investigated how the valence of an item as well as legal ownership (buyer or seller) influences perceived psychological ownership and price setting for the item. As predicted participants reported higher levels of psychological ownership over positive items compared to negative ones. This is in line with the idea of psychological ownership being the association between a person's self and the object he or she feels ownership over. If participants do include their possessions into their extended self (Belk, 1988; Kim & Johnson, 2014) it seems reasonable that they would be sensitive to the valence of the items to protect their positive self-image (Golubickis et al., 2019; Mezulis et al., 2004; Sedikides & Strube, 1997).

Interestingly, legal ownership did not influence the perceived amount of psychological ownership over the item in a significant way. Prior research though, would suggest that the legal possession of an item alone should already be enough to evoke psychological ownership over it (Pierce et al., 2001, 2003; Shu & Peck, 2011).

There is the possibility that the lack of an effect of legal on psychological ownership was due to the fact that our study did not involve tangible objects which might bestow larger feelings of psychological ownership considering that they also provide a higher level of control over them (Furby, 1978a, 1978b; Pierce et al., 2003). Thus, our findings indicate that legal ownership on its own might not necessarily be enough to induce psychological ownership. There are, however, also other variables that were revealed to have an effect on psychological ownership. For example, the duration of possession (Shu & Peck, 2011, Study 2; Strahilevitz & Loewenstein, 1998) or intimate knowledge of an item (Pierce et al., 2003)

have proven to be sufficient to build a connection between the person and the object in question. Our results suggest that the valence of an item could also be included into this category possibly outshining the question of whether something objectively belongs to a person or not.

With regard to pricing the valence of a postcard also was a strong predictor, with negative postcards consistently being rated as less valuable than positive postcards. Considering that the appeal of an object is vital for its monetary value this result is not surprising. What was interesting is the fact that even though the role (buyer/seller) did not have a significant effect on psychological ownership, it did however very much influence the prices participants set for the postcards. Consistent with prior studies, we found the classical endowment effect according to which sellers set higher prices than buyers. However, this endowment effect was not moderated by the valence of the objects, thus contradicting results from Shu and Peck (2011, studies 1 and 8). One has to keep in mind though that those earlier studies used the haptic feel of an object as their valence manipulation. The haptic experience with an item is often brought into relation with the quality of the object, therefore the coarse surface of the pen might have had a deeper impact on participants' evaluation of the items objective worth.

In any case, similar to Shu and Peck (2011) Study 3 provided evidence that it is useful to not only measure pricing of objects, but also psychological ownership over those objects.

Study 4

Study 4 built up on the findings of Study 3, and it was motivated by a deeper understanding of the concept of psychological ownership. As already mentioned, Beggan (1992) defined psychological ownership as an association between the things one feels

ownership over and one's self. He also proposed that people are able to use this association to cope with situations that provide them with threats towards their positive self-view (Beggan, 1991, 1992). Study 4 tested these proposed relations by investigating whether people will cling to their (positive) possessions even more after their sense of self is threatened. Moreover, mimicking Study 3 we also investigated how a threat to the self may moderate the influence of legal ownership (buyer vs. seller) and valence (positive, neutral, negative) on psychological ownership and pricing. Threat to the self was manipulated by requesting participants to recall a past failure or success experience.

It is reasonable to assume that an association between a positive object and the self of a person can boost their positive self-image and therefore offer a certain amount of protection towards self-esteem threats. Following this train of thought the opposite should be true for negative items, with people being even more motivated to diminish their association with a negative object if their positive self-view is under threat to protect their self-esteem from further being diminished. Little attempts have been made so far to actually confirm this idea experimentally.

Concerning participants' perceived psychological ownership over the postcards we expected to find a significant three-way interaction between the valence group of the postcard (positive/neutral/negative), the threat condition a participants was in (threat/no threat) and the participants' role (buyer/seller) on the amount of psychological ownership they perceived over the postcards. We predicted that sellers whose self-esteem was threatened would perceive significantly more psychological ownership over positive and neutral postcards compared to buyers, but that there would be no significant difference between the two for negative postcards. Sellers whose self-esteem is not threatened were expected to generally perceive more psychological ownership over the postcards compared to buyers. This hypothesis can also be found in the pre-registration.

With regard to pricing, we expected to find the classical endowment effect that was also present in Study 3 with sellers consistently setting higher prices for their postcards than Buyers. Consequently, we pre-registered to find a significant main effect of the role participants were assigned. However, based on the results from Study 3 we did not expect the valence of the postcards to influence this price gap.

Method

Sample

As in our prior study we carried out a Power-analysis to determine the sample size necessary to find the expected effect. Our analysis showed that a sample size of 240 participants would be sufficient. After data collection our initial sample consisted of 240 participants. We applied the same exclusion criteria as in Study 3. Additionally, participants whose recall protocols of past failures or successes contained nonsense words were also excluded. After data exclusion, 203 participants remained of whom 142 were women, 57 were men and 4 did not identify as female or male (providing a total number of N = 3045 measurements). The final sample had a mean age of 23.0 (*SD* = 4.00) and a range of 18 to 50 years.

Materials and measures

Study 4 used the same 15 IAPS pictures that were used in Study 3 (see https://osf.io/9bv8a/?view_only=3c6e1ca864f04d25938eb307b6dbad6c). Also, the same measures for perceived psychological ownership, valence of the postcards and the prices participants set were used. To test whether the manipulation of the positive view of their self

was successful the German version of the State Self-esteem scale (Rudolph et al., 2020) was used.

Procedure

The set-up of Study 4 was almost identical to Study 3. Participants again imagined to be collectors of postcards of different valence, and – depending on the condition – either were shown 15 postcards that they might acquire (Buyers) or 15 postcards of their legal possession that they might part with (Sellers). Again, participants were indicating their amount of psychological ownership and their prices (counter-balanced across the condition). The only difference to Study 3 was the manipulation of self-threat. Participants either had to recall a past success (No threat) or failure (Threat) experience. They had to write down keywords describing the event but were specifically asked not to use any places or names that could make any person involved identifiable. After they recalled a past success or failure experience, they had to fill out the State Self-esteem scale.

Results

Material check

Threatened sense of self

To test whether the manipulation of threat worked participants were asked to fill out the State Self-esteem scale after the task (Rudolph et al., 2020). We compared the mean state self-esteem between the two threat conditions using an independent t-test. The result showed that there was no significant difference between participants who recalled a past failure experience (M = 3.16, SD = 0.61) and those who recalled a past success (M = 3.24, SD =

0.65), $t(199.1) = 0.75$, $p = .347$. This unfortunately indicates that the manipulation did not yield the expected effects.

Valence group

To also see whether the classification of the pictures into positive, neutral and negative pictures was correct a one-way ANOVA was carried out using the valence group of the pictures as an independent variable and the valence ratings of the postcards as a dependent variable. The analysis showed a significant effect of the valence group, $F(2, 3042) = 1090$, $p < .001$. Negative postcards ($M = 2.34$, $SD = 1.53$) were rated significantly more negatively than neutral ($M = 3.64$, $SD = 1.34$) and positive ($M = 5.30$, $SD = 1.43$) ones and positive postcards were rated significantly more positively than neutral postcards, indicating that our valence manipulation worked.

Psychological ownership

As stated in the pre-registration we used a linear mixed model to test the effect of stimulus valence, the role participants were assigned to, and self-threat on the amount of perceived psychological ownership; for a summary of all group means see Table 2.3. As with Study 3 the random effects within the models concerned the random intercepts of the participants as well as the different postcards and the random slopes for the valence groups.

We first tested the models containing the random effects against a model only containing the fixed intercept. Our analysis showed that the amount of perceived psychological ownership did show a significant variance in intercepts across participants, $SD = 0.96$, 95% CI [0.86, 1.08], χ^2 (1, $N = 3045$) = 872.73, $p < .001$, as well as across different postcards, $SD = 0.61$, 95% CI [0.44, 0.92], χ^2 (1, $N = 3045$) = 614.85, $p < .001$. Additionally, the slopes significantly varied across the positive, $SD = 1.01$, 95% CI [0.88, 1.15], χ^2 (1, $N =$

3045) = 251.75, $p < .001$, and neutral valence group, $SD = 0.56$, 95% CI [0.43, 0.69], χ^2 (1, N = 3045) = 36.02, $p < .001$. Here the negative valence group was used as a reference point.

For the analysis of the fixed effects Negative postcards, participants in the Buyer condition, and the No Threat condition were used as reference groups.

Table 2.3. *Summary of the means and standard deviations of psychological ownership and set prices*

	Psychological ownership (1-7)				Prices (0-6 €)	
	N	Mean	SD		Mean	SD
Positive	1015	3.42	1.78	Positive	2.02	1.54
Neutral	1015	2.45	1.49	Neutral	1.03	1.14
Negative	1015	2.06	1.43	Negative	1.09	1.27
Seller	1530	2.82	1.70	Seller	1.61	1.46
Buyer	1515	2.48	1.62	Buyer	1.14	1.30
Threat	1545	2.64	1.69	Threat	1.36	1.44
No threat	1500	2.65	1.66	No threat	1.40	1.36

As in Study 3 the predictors were added in a stepwise order, first adding the valence group of the postcards (Model 1), followed by the role of the participants (Model 2), the self-esteem threat (Model 3) and finally the interactions between the three predictors (Model 4). Our results showed that the inclusion of the valence group of the postcard (Model 1), χ^2 (2, N = 3045) = 28.90, $p < .001$, as well as the inclusion of the role of participants were assigned to (Model 2), χ^2 (1, N = 3045) = 5.13, $p = .024$, added a significant amount of explained variance to the model; for a detailed summary of the model see Table 2.4.

Again, participants perceived significantly more psychological ownership over positive (M = 3.42, SD = 1.78) compared to negative postcards (M = 2.06, SD = 1.43). However, this time they also perceived significantly more psychological ownership over neutral (M = 2.45, SD = 1.49) compared to negative postcards, see Figure 2.3. Concerning the role, Sellers (M = 2.82, SD =1.70) reported higher levels of psychological ownership than Buyers (M = 2.48, SD = 1.62).

The inclusion of the self-esteem threat (Model 3), χ^2 (1, N = 3045) = 0, p = 1.000, and the inclusion of the interaction between the three predictors (Model 4), χ^2 (7, N = 3045) = 3.99, p = .781, did not significantly improve the model fit. Given the failed manipulation, this lack of effects is not surprising.

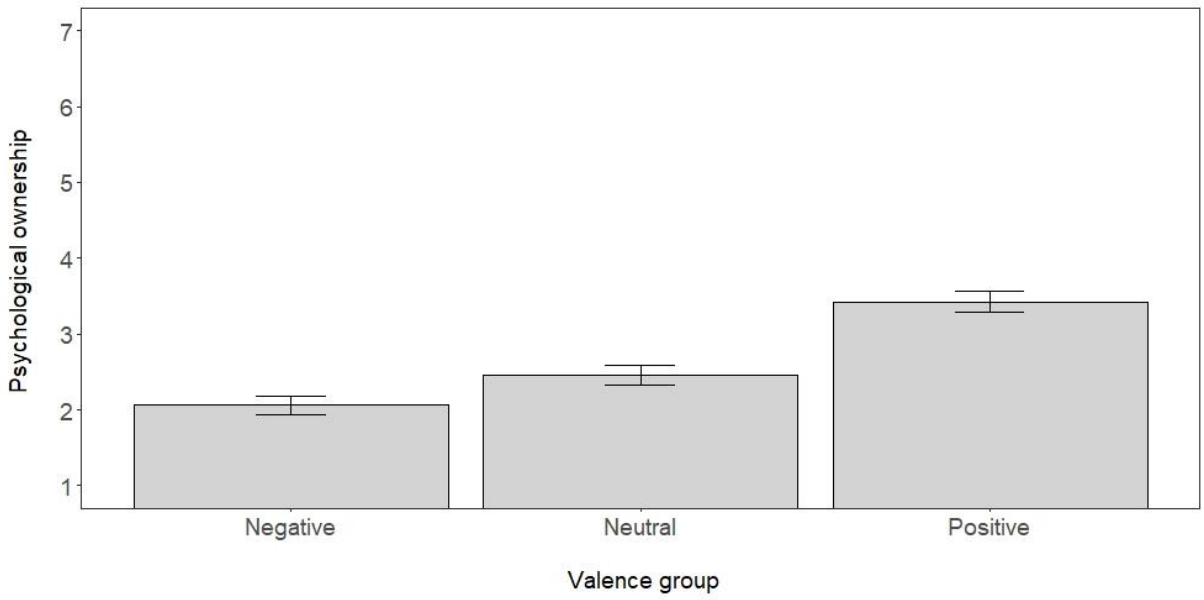

Figure 2.3. Main effect of the valence group of a postcard on the perceived amount of psychological ownership over it

Postcard pricing

To analyse the prices participants set for the postcards, we utilized the same approach as we did for psychological ownership. The same random effects and slopes were used in the model as before. Our analysis showed that the prices that participants attributed to the

postcards did show a significant variance in intercepts across participants, *SD* = 0.83, 95% CI [0.74, 0.93], χ^2 (1, *N* = 3045) = 856.81, *p* < .001, as well as across different postcards, *SD* = 0.51, 95% CI [0.37, 0.77], χ^2 (1, *N* = 3045) = 621.53, *p* < .001. Also, the slopes significantly varied across the positive, *SD* = 0.84, 95% CI [0.74, 0.96], χ^2 (1, *N* = 3045) = 260.6, *p* < .001, and neutral valence group, *SD* = 0.45, 95% CI [0.34, 0.56], χ^2 (1, *N* = 3045) = 31.48, *p* < .001. The negative valence group was again used as a reference point.

We then added the fixed effects in the same order to the model as we did for psychological ownership, for a summary of all group means and standard deviations see Table 2.3.

. Our results showed that similar to psychological ownership the inclusion of the valence group of the postcards (Model 1), χ^2 (2, *N* = 3045) = 22.22, *p* < .001, as well as the role of the participants (Model 2), χ^2 (1, *N* = 3045) = 15.87, *p* < .001, did add a significant amount of explained variance to the model. Participants attributed significantly higher prices to positive postcards (*M* = 2.02, *SD* = 1.54) compared to negative ones (*M* = 1.09, *SD* = 1.27). Also, similar to Study 3 Sellers (*M* = 1.61, *SD* = 1.46) demanded higher prices than Buyers (*M* = 1.14, *SD* = 1.30) for their postcards. The addition of the self-threat (Model 3), χ^2 (1, *N* = 3045) = 0.40, *p* = .526, and the interaction between the three predictors (Model 4), χ^2 (7, *N* = 3090) = 6.36, *p* = .499, however, again did not significantly improve the model fit. For a detailed summary of the models see Table 2.4.

Table 2.4. *Summary of the final models regarding the effects of postcard valence and participants role on psychological ownership and price setting*

	Psychological ownership			**Price setting**		
Predictors	*Estimates*	*95% CI*	*p*	*Estimates*	*95% CI*	*p*
(Intercept)	1.91	[1.64, 2.18]	**<.001**	0.85	[0.59, 1.10]	**<.001**
Neutral	0.39	[0.10, 0.68]	**.009**	-0.06	[-0.36, 0.24]	.691

Positive	1.36	[1.04, 1.68]	**<.001**	0.93	[0.61, 1.25]	**<.001**
Seller	0.31	[0.04, 0.58]	**.023**	0.48	[0.25, 0.70]	**<.001**
Random effects						
σ^2	1.17			0.79		
τ_{00}	0.80 $_{id}$			0.60 $_{id}$		
	1.14 $_{id.1}$			0.80 $_{id.1}$		
	0.31 $_{id.2}$			0.20 $_{id.2}$		
	0.05 $_{pic}$			0.05 $_{pic}$		
ICC	0.42			0.45		
N	203 $_{id}$			203 $_{id}$		
	15 $_{pic}$			15 $_{pic}$		
Observations	3045			3045		
Marginal R^2/ Conditional R^2		.148 / .507			.154 / .535	

Exploratory analysis

While our manipulation of threat was not successful, one benefit of the study design was that the measurement of state self-esteem still allowed us to explore whether natural variations in state self-esteem between participants as well as the interaction of self-esteem and valence affected psychological ownership and pricing.

State self-esteem and psychological ownership

First, we decided to take a closer look at the general relation between psychological ownership and the state self-esteem of a person in connection to the valence of an item. We carried out a series of linear mixed models using the state self-esteem rating of the participants, the valence group of the postcards and the interaction between the two as predictors and the perceived amount of psychological ownership as a dependent variable, for a detailed summary of the model see Table 2.5 in the appendix.

In our prior analyses we found a significant main effect of the valence group on the perceived psychological ownership. We now added the state self-esteem of the participant and

the interaction between the two to the models. While the inclusion of the state self-esteem alone did not significantly improve the model fit, χ^2 (1, N = 3045) = 0.00, p = .987, the addition of the interaction between the valence group and the state self-esteem did, χ^2 (1, N = 3090) = 6.12, p =.047. People perceived more psychological ownership over positive and neutral postcards if they showed a higher state self-esteem, but the opposite was true for negative postcards. Here, a higher state self-esteem led to lower levels of perceived psychological ownership over the postcards, see Figure 2.4.

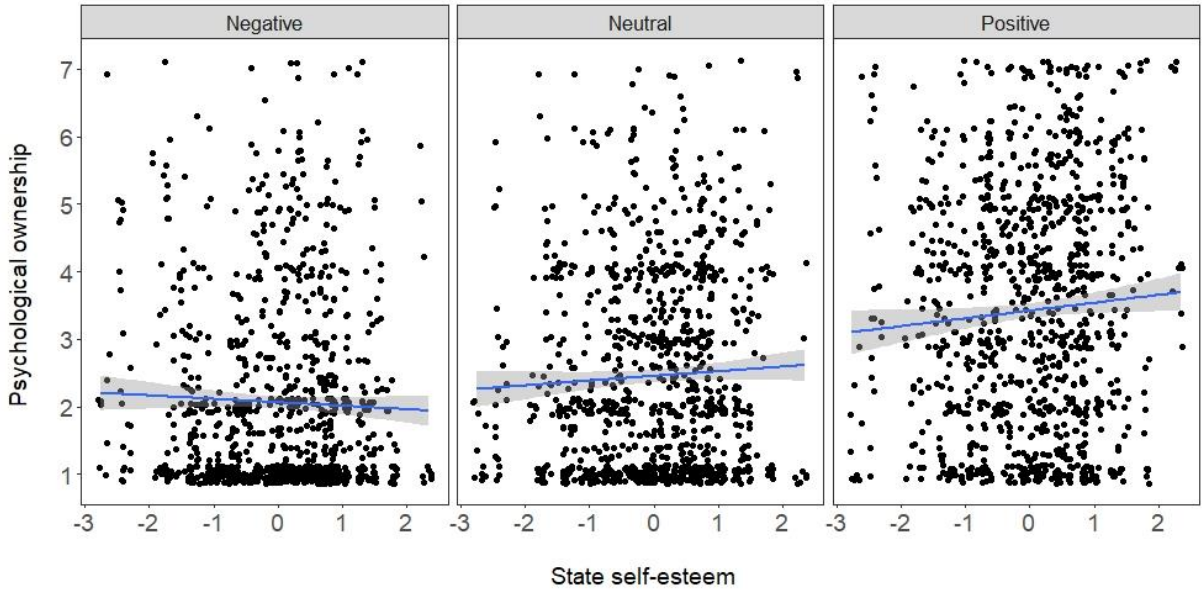

Figure 2.4. Interaction between state self-esteem and valence on psychological ownership

State self-esteem and pricing

To further investigate the difference between objective and emotional aspect of ownership we also tested the relation between state self-esteem and valence on the monetary value participants attributed to the postcard.

We used the same analysis strategy as we did for psychological ownership, for a detailed summary of the model see Table 2.6 in the appendix. We started out with the model only containing the effect of the valence group (Model 1) on the monetary value attributed towards the postcards and then added the state self-esteem and the interaction between the two variables as predictors. However, neither the addition of the state self-esteem (Model 2), χ^2 (1, N = 3045) = 0.07, p = .797, nor the addition of the interaction (Model 3), χ^2 (2, N = 3045) = 0.46, p =. 796, significantly improved the model fit. This suggests that the self-esteem of a person did affect participants' feelings of ownership over a postcard but not their pricing of it.

Discussion

Study 4 sought out to build on the findings from Study 3 by again investigating the impact of legal ownership (role of buyer and seller) and item valence on psychological ownership and pricing. In addition, Study 4 extended Study 3 by examining a potentially moderating role of self-threat. We expected that when the sense of self is threatened via recalling a past failure, participants – notably in the seller condition – will even more strongly differentiate between positively and negatively valenced items.

Consistent with Study 3 we again found a significant main effect of the postcard valence on the perceived amount of psychological ownership with participants perceiving significantly more psychological ownership over positive postcards compared to negative ones. What was different this time, however, was a significant main effect of legal ownership (role as buyer or seller). In contrast to Study 3, sellers perceived significantly higher levels of psychological ownership over the postcards than buyers. Considering that the only difference in the design between the two studies was that participants had to recall a past experience before they carried out the task this indicates a possible role of self-awareness. Recalling a

past experience could have made participants more focused on their own person compared to participants in Study 3 which might have led them to not only consider attributes of the item (like the valence of the postcard) but also attributes of themselves, like the role they were assigned to. This could have resulted in the increased importance of the actual ownership over an item for a person's perceived amount of psychological ownership. Additionally, this result also shows that the object a person has ownership over does not necessarily have to be tangible for psychological ownership to occur.

In addition, Study 4 sought to examine the assumption that psychological ownership (more than legal ownership) becomes manifest through an association between one's (positive) sense of self and an item (Beggan, 1992). We tried to examine this relation by putting participants' self-esteem under threat, expecting them to use the association with certain items in their possession as a possible way of coping with the threat. Unfortunately, our manipulation of threat to the self (via recall of past failures vs. successes) did not systematically affect state self-esteem, thus making it impossible to directly test the proposed relations. However, based on the available data it was possible to indirectly examine the proposed relations by analysing how normal variations of state self-esteem in our sample interacted with item valence on psychological ownership.

This exploratory analysis revealed that higher self-esteem was related to higher psychological ownership for positive and neutral postcards. When it came to negative postcards however, participants showed the opposite pattern and perceived less psychological ownership if their state self-esteem was higher. On first sight, this effect seems to contradict our hypothesized relations as we originally expected that a diminished self-esteem will lead to a stronger dissociation between positive possessions and negative items than a non-diminished self-esteem. However, it is conceivable that both relations can co-exist – people with higher self-esteem will make a larger difference between positive and negative items (as

shown in our exploratory analysis) than people with lower self-esteem, but when this sense of self is severely threatened (which we could not successfully manipulate) participants will still use psychological ownership as a means to bolster and re-affirm their diminished sense of self.

If one looks at it from this angle the result does make sense. Studies already showed that participants with higher levels of self-esteem are better at using strategies to keep their positive self-image (Beauregard & Dunning, 2001; Blaine & Crocker, 1993; Jones & Buckingham, 2005). Similarly, Beggan (1991) found that participants' ability to protect themselves against self-threats was influenced by their locus of control. Participants with a higher internal locus of control were better at using their possessions as a strategy to counteract negative feelings than participants with a higher external locus of control.

Interestingly, the relation between state self-esteem and valence on psychological ownership did not carry over to pricing – neither state self-esteem nor the interaction between self-esteem and valence showed a significant effect. Consistent with the construct of psychological ownership, this difference hints at a greater role of the self for the emotional side of ownership compared to the monetary one.

With regard to pricing we also found the classical endowment that we pre-registered, with sellers always attributing higher prices towards their postcards than buyers. Participants were also sensitive towards the valence of the postcards with regard to the prices they set for them by setting significantly higher prices for positive compared to negative postcards. However, the valence of the postcards did not significantly affect the price difference between sellers and buyers. Consequently, both Study 3 and 4 showed that the difference between the prices sellers and buyers set for their postcards was not influenced by the valence of the postcards even though participants were aware of the value-decreasing effect of negative valence. A reason for that could lie in the nature of the monetary measure for the endowment

effect which might be more resistant to context variables. A monetary value is a more constant attribute of an item compared to for example someone's feelings towards it. Therefore, it might also be more resilient against external influences.

General Discussion

Lots of work on behavioural economics and consumer psychology has dealt with the endowment effect – investigating how legal ownership (buyer/seller) affects behavioural components like pricing. The present paper adds to a literature that tries to extend the boundaries of the endowment effect. First, we build on one strand of literature which has shown that possessions should not only be defined as something that people are aversive to lose – possessions also can create a positive psychological connection with those who possess them. We incorporated this line of research by measuring those connections (psychological ownership). Second, we followed a more basic psychological approach by not only looking at the applied question of how people feel about and deal with the (positively valenced) products they own, but also ask ourselves how people's behaviour would change when objects with a negative emotional valence are involved. In two studies we investigated how legal ownership and valence of an object impact both psychological components (feelings of ownership) and behavioural components (pricing behaviour).

One of the key findings from our studies is that it appears to be useful to investigate psychological and behavioural components separately – in other words, to also measure the feelings of psychological ownership. Feelings of ownership and actual behaviour may not always align with one another. Our studies have shown that there are variables for which they correspond (valence of an object), but that there are also some variables for which they don't (role or legal ownership). Identifying variables where the measures correspond or dissociate can help to further understanding of how people relate to their possessions.

One variable for which we found strong correspondence between psychological and behavioural facets of ownership is object valence. Both studies consistently found that objects with a negative valence elicited lower psychological ownership and also increased the likelihood to behaviourally part with the object (by setting lower prices for the object). This shows that object valence has a huge impact on both feelings and behaviour – a fact that can easily be overlooked by endowment researchers who only investigate consumer items with a positive valence.

While the effects of object valence on psychological ownership and on behaviour were corresponding, comparable patterns for legal ownership were more complex, suggesting that it is important to distinguish between legal ownership and psychological ownership. For the context that we have chosen (endowment of intangible postcards), Study 3 showed that it is not sufficient to tell participants that they own an object to create a bond between the self of the person and the object in question. This is especially interesting considering the stimuli we used – intangible postcards – since nowadays the possession of non-tangible object is nothing unusual anymore, with people for example buying movies or games digitally. Keeping the results of Study 3 in mind, simply having legal ownership over such items should lead people to attribute higher values to the object (showing the classical endowment effect), but not necessarily lead to higher perceived ownership over them. However, our results of Study 4 can be interpreted in a way to suggest that even for non-tangible objects a psychological bond between owner and object can be created when their focus is drawn away from monetary aspects and towards their self (recall of past experiences). Once a sense of self is evoked, psychological ownership is built up, supporting the notion of Beggan (1992) that possessions can be seen as extensions of the self.

Interestingly, the studies did not find much evidence for interaction effects among the investigated variables. Studies 3 and 4 both did not find an interaction between valence and

legal ownership, suggesting that the impact of these two factors on psychological ownership and behaviour is independent. This is in contrast to earlier findings (Shu & Peck, 2011; studies 1 and 8). We can think of two reasons for this discrepancy. First, the lack of an interaction between legal ownership and valence might have occurred in our studies because legal ownership for non-tangible objects is less salient. Second, the presence of an interaction might depend on specifics of the objects in question. Shu and Peck (2011) – like most studies in an endowment context – only investigated isolated objects (a normal pen, or a pen that is unpleasant to the touch). In contrast, our context involved 15 objects with positive, neutral, or negative valence (postcards), and for this larger range of objects we did not find providing evidence that actual ownership and valence interact in systematic ways.

With regard to interaction effects, our Study 4 also did not find that the relationship among the variables under scrutiny was affected by threat. However, an exploratory analysis provided some evidence that state self-esteem moderates the influence of valence on psychological ownership. Compared to participants with low self-esteem, participants with high self-esteem felt a stronger ownership over positive items, and a reduced ownership over negative ones, indirectly suggesting that psychological ownership reflects some association with a person's self. While the unsuccessful manipulation of threat in that study did not permit us to see whether psychological ownership is used to *bolster* self-esteem, the exploratory analysis pointed at the possibility that psychological ownership could be a means to *express* self-esteem.

Taken together, legal ownership over an object holds significance for the monetary value people attribute to it but does not necessarily impact their feelings of ownership over those objects. But regardless of whether money is involved or not, positive items always tend to evoke more psychological ownership than negative ones. In a nutshell, it appears as if

people feel and act by the following principle: if it is good, then it is mine. If it is bad, then I still want my money.

DECLARATION ACCORDING TO § 5 ABS. 2 NO. 8 OF THE PHD REGULATIONS OF THE FACULTY OF SCIENCE

- SHARE IN COLLABORATIVE PUBLICATIONS/MANUSCRIPTS-

The subsequent chapter (Chapter 3) consists of a manuscript in preparation for submission. Dr. Jürgen Buder is co-author of this manuscript. The proportional contributions to the manuscript are presented in the following table.

Author	**Author position**	**Scientific ideas**	**Data generation**	**Analysis & Interpretation**	**Paper writing done**
Lisa Rabl	First author	90 %	100 %	90 %	70 %
Jürgen Buder	Second author	10 %	0 %	10 %	30 %

Title of paper: Mine is always better! Or is it? How stimulus valence influences people's willingness to part with an item

Status in publication process: In preparation for submission

Chapter 3: Mine is always better! Or is it? How stimulus valence influences people's willingness to part with an item

Introduction

Starting from an early age, humans tend to show a rather protective behaviour towards their own possessions. This is evident in the negative reaction of children when their toys are taken away from them, adults fighting over who gets which parking spot or elderly people being unwilling to part with old possessions even though they long surpassed their usefulness. All of these behaviours point to a special connection between a person and the things he or she feels ownership over (Dittmar, 1989, 1991; Wilpert, 1991). This connection has been the subject of numerous studies especially within an economic framework. These studies often put participants in a situation where they were supposed to set a price for which they would be willing to forsake their ownership over an item, thus mainly focusing on the effect ownership has on a person's perception of an item, especially concerning the monetary value attributed to it.

The present study, however, tries to take a different route by not just focusing on how legal ownership over an item influences a person's perception of the item, but also how the item itself influences a person's perception of their ownership over it. To do this we investigated both participants behaviour towards an object (willingness to part with it), as well as their feelings towards the object, drawing on the concept of psychological ownership (Beggan, 1992) and additionally put the two in relation to the valence of the item. Because most of the prior work done in this area was set in a marketing context, the material used was mostly designed to be attractive to participants. This raises the question of how people would react to possessions with negative traits. Will their feelings of ownership and their behaviour towards the item be different from the behaviour exhibited towards objects with more positive traits?

Legal ownership and the endowment effect

It has already been mentioned that most prior research concerning the effects of ownership on people's behaviour took place in situations in which participants were about to give up ownership over an item (setting prices for selling them). Kahneman (1979) suggested that people are more sensitive towards situations in which they are about to lose ownership over an item, because the experienced loss is more painful to them than the joy provided by the acquisition of ownership over a new item. This sensitivity is thought to make people more aversive towards losses which results in the so-called endowment effect (Thaler, 1980). The effect is most often conceptualized by asking owners to set a price for which they would be willing to forsake ownership over an item (as stated above) and compare it to the prices non-owners would be willing to pay for them (Kahneman et al., 1990, 1991). Typically, results show that participants who have to indicate a price for selling one of their possessions (sellers) demand a higher price than participants who have to indicate a price they would be willing to pay for obtaining the item (buyers) (Horowitz et al., 1999; Knetsch & Sinden, 1984). Kahneman (1979) attributed this price gap to participants trying to compensate themselves for the pain of losing ownership over the item. This idea can be questioned though, considering that studies found that sellers seemed genuinely convinced that the prices they set for the item also matched prices other people attributed to them (Van Boven et al., 2000), pointing at a general biasing effect of ownership itself rather than a compensation on the sellers' side.

This critique has also been raised by Morewedge et al. (2009) who found that rather than the painful experience of parting with an item, it is much more the positive feelings evoked by ownership itself that leads to the higher valuation of the object. They asked participants who already were in possession of one coffee mug to set a price for a second identical one. Despite these so-called owner-buyers not experiencing a loss of ownership, they

tended to set a price for the second mug that was similar to the price that regular sellers demanded. This suggests that regardless of a loss experience, ownership over an item increases the perceived value of that object. But why is that?

A possible explanation can be found in research dealing with the emotional connection people form with their possessions, which goes beyond the mere legal ownership over an item (Csikszentmihalyi & Halton, 1981; Dittmar, 1991). This connection is represented in the concept of psychological ownership, which is defined as the inclusion of a person's possessions into their self (Beggan, 1992; Belk, 1988, 1991a, b; Pierce et al., 2003; Prelinger, 1959). This association between an object and the self of a person, can potentially lead the person to apply the same biases on the evaluation of the object as they would on the evaluation of themselves. Evidence for this can be found in the results of Nesselroade et al. (1999) who found that participants showed the same behaviour in situations where they compared their possessions with someone else's possessions, as they would if they compared themselves to that person. Because people exhibit a general tendency to evaluate themselves more positively than others (Liebrand et al., 1986; Mezulis et al., 2004; Ross, & Fletcher, 1985; Sedikides, & Strube, 1997), it stands to reason that this would also apply to the things they associate with themselves, which should result in a positivity bias towards their possessions (Beggan, 1992; Gawronski et al., 2007; Hoorens et al., 1990; Irwin & Gebhard, 1946; Nesselroade et al., 1999).

This more favourable evaluation of one's possessions due to psychological ownership has been linked to the endowment effect. Shu and Peck (2011) for example carried out a series of replication studies of classical loss aversion experiments and could show that the behaviour used to measure the endowment effect was due to higher levels of psychological ownership and a more positive affective reaction within owners. By also considering the affective reaction towards the owned object into the emergence of the endowment effect Shu

and Peck (2011) pointed towards an often-disregarded variable in the research of ownership, the valence of the object. Because a huge part of prior research was set in a marketing context the used material mostly exhibited positive traits. But what happens if an object evokes a negative emotional reaction within a person? Would owners still feel more pain over the loss of the item, or would they even see it as a relief?

Object valence

One study that focused on this question was carried out by Brenner et al. (2007, study 1) in which they gave participants ownership over positive and negative items and gave them the opportunity to switch those items against alternatives with the same valence. They found that participants were more likely to switch their negative possessions against a negative alternative, however tended to stick with their initial positive possessions. Brenner et al. (2007, study 2) also found in another study that owning a negative item increased the probability of participants deciding for the alternative negative item compared to people who could freely choose between the two without having prior ownership over one of them. This could indicate that the ownership over a negative item decreases the person's evaluation of the object motivating him or her to get rid of it. The focus on switching behaviour of participants also holds the advantage that it more closely captures participants' actual willingness to part with the item. While setting prices for selling or buying an item generally indicates a transaction situation, switching one item against another object breaks ownership down to the more basic question of do I want to keep my item or not, rather than what price would I be willing to accept for it.

While Brenner et al. (2007) included the valence of an item into the equation they did not explicitly measure the person's emotional connection with the object. However, Shu and Peck (2011) managed to replicate their findings and show that the unwillingness to part with a

positive possession was due to higher levels of psychological ownership and a more positive affective reaction towards it. Concerning the negative possession, however, psychological ownership lost its significance which could indicate that if an object evokes a negative reaction in a person, they would disregard their emotional bond with it. This would also go along with the definition of psychological ownership being an association between a possession and the self of a person. Self-affirmation literature does suggest that participants are inclined to associate themselves with positive and disassociate themselves from negative people and objects (Beggan, 1991; Cialdini & Richardson, 1980; Cialdini & De Nicholas, 1989). While including the valence of an object into the picture does open up a new interesting path, there are also a number of problems concerning the experimental design of prior studies.

For example, Brenner et al. (2007) did not measure psychological ownership in their studies and while they did include a free choice condition in one study, they only compared it to negative items, but did not include positive ones. Shu and Peck (2011) on the other hand did measure psychological ownership, however they did not include a free choice condition to control for effects that might be due to a varying degree of attractiveness in the material itself. In the current study we try to address these problems by including all variables of interest in one design: objects with positive and negative valence, measurement of psychological ownership, and an inclusion of both an owner condition and a chooser condition.

We gave half of our participants initial ownership over a number of pre-defined postcards (owners) before giving them the opportunity to switch each postcard against another one of similar valence; and we let the other half freely choose between the cards (choosers) to access a baseline attractiveness of the items. Additionally, we included a negative as well as a positive valence group. We focused on two dependent variables: the amount of psychological

ownership participants perceived over the object, and the behaviour they exhibited towards them (choice among two postcards of equal valence.)

With regard to psychological ownership, we expected participants to perceive more psychological ownership over positive compared to negative postcards, building up on the idea that participants would try to distance themselves from negative objects to protect their positive self-image (Cialdini & Richardson, 1980; Cialdini & De Nicholas, 1989). Support for this idea was also provided by the findings of Golubickis et al. (2019) who showed that people were quicker at attributing positive object towards themselves, however, when it came to negative objects, they were quicker to attribute those to other people. Additionally, we expected switchers to perceive more psychological ownership over their postcards compared to choosers in line with prior research of the connection between legal and psychological ownership (Pierce et al., 2001, 2003; Shu & Peck, 2011).

With regard to participants' behaviour, we modelled our hypotheses on the findings of the previous studies from Brenner et al. (2007) and Shu and Peck (2011). If an effect of the valence on the endowment effect is present in the data, one would expect that owners of a positive postcard (target) are more likely to keep their postcard rather than switching it for another positive postcard (alternative). The opposite pattern would be expected for negative items, with owners being more likely to switch their negative postcard (target) against another negative one (alternative). Participants in the chooser condition were exposed to the same pairs of postcards (the "target" and the "alternative") and could freely choose among the two options. We used the relative frequency with which the participants in both conditions chose the "target" postcard as our dependent variable.

We expected to find a significant two-way interaction between the role participants were assigned to (owner or chooser) and the valence of the object (negative or positive) on

participants' relative frequency of choosing the "target" item. This hypothesis can also be found in the pre-registration.

Analysis strategy

In this paper we decided to utilize linear mixed models to analyse our data opposed to more conventional approaches like ANOVAs. We did this because linear mixed models allow for a better representation of dependencies within a data set when it comes to repeated-measures designs. They also are capable of handling data sets containing missing values which is not the case for repeated-measures ANOVAs (Brauer & Curtin, 2018). The linear mixed model approach was pre-registered for all three studies; pre-registrations can be found at https://osf.io/9bv8a/?view_only=3c6e1ca864f04d25938eb307b6dbad6c. For every analysis the predictors were added stepwise into the model and the model fits were tested against each other using a Chi^2-Test. As a starting point, we always tested a model only containing the fixed intercept against a model containing the random effects. All analyses were carried out using the statistical software R (the data and R-scripts can be foundat https://osf.io/9bv8a/?view_only=3c6e1ca864f04d25938eb307b6dbad6c). To estimate the random and fixed coefficients, the lmer function within the lme4 package Version 1.1-21 (Bates, 2010) was used.

Study 5

Method

Sample

Before conducting the study, a Power analysis was carried out and showed that for finding the expected effect a sample size of 240 participants would be sufficient. After data collection the sample consisted of 257 participants. Participants were excluded from data

analysis if they showed a standard deviation of zero on their perceived psychological ownership over the postcards, to make sure participants did actually focus on the task and not sped through it by repeatedly clicking on the same option or they wanted their data to be excluded form data analysis.

Additionally, participants within the Owner condition who never exchanged a postcard were also excluded from the sample. After data exclusion our final sample consisted of 184 participants of whom 101 were women, 80 were men and 3 neither identified as male or female (providing a total of N = 1840 measurements). The final sample had a mean age of 29.63 (*SD* = 10.05) and a range of 18 to 70.

Materials and measures

Study 5 used 20 pictures taken out of the IAPS which were either classified as positive or negative. 10 pictures of those pictures were defined as the "target" items in the study. The other 10 pictures were matched in their emotionality ratings to the "target" postcards. The postcard pairs always depicted similar motives. The pictures were categorized into positive and negative pictures (the used pictures can be found at https://osf.io/9bv8a/?view_only=3c6e1ca864f04d25938eb307b6dbad6c). The perceived psychological ownership over the postcards was rated via three items (Pierce et al., 2003) "I feel I own the postcard", "I feel a high amount of personal ownership over the postcard", and "The postcard belongs to me" on a scale from 1 = "Disagree" to 7 = "Agree". The perceived valence of the postcard was rated by one item "How do you perceive this postcard?" on a scale from 1 = "Negative" to 7 = "Positive".

Procedure

Participants were asked to imagine that they were postcard collectors. They were told that they would be gifted 10 postcards for their collection. Participants in the Owner condition were told that they would be randomly assigned 10 postcards out of a sample of 20 and that they would get the opportunity to exchange their postcards with other postcards from the sample if they wished to do so. They would be presented with pairs of two postcards, one of which would already belong to them, and the other one being an alternative against which they could switch their endowed postcard.

In contrast, participants in the Chooser condition, were told that they would get the opportunity to select between pairs of two postcards taken out of the sample. The postcard pairs where kept constant in both conditions and were matched in their valence. After participants read the task description, they had to rate their perceived psychological ownership over all 20 postcards. After evaluating the postcards participants made their choices between target and alternative on the 10 pairs.

Results

Material check

To see whether the classification of the stimuli into positive and negative pictures was correct we carried out an independent t-test using the valence group of the pictures as an independent variable and the valence ratings of the postcards as a dependent variable. The analysis showed a significant difference between the valence groups, $t(2439) = -72.36$, $p < .001$. Negative postcards ($M = 2.17$, $SD = 1.36$) were rated significantly more negatively than positive ones ($M = 5.04$, $SD = 1.39$), indicating that our valence manipulation worked.

Psychological ownership

For a summary of all means and standard deviations of the conditions see Table 3.1. For our analysis concerning psychological ownership we only looked at the 10 postcards which were assigned to participants in the owner condition and compared them to the same 10 postcards within the chooser condition. As described in the introduction we used a series of linear mixed models to test the effect of actual ownership over an item and its valence on the perceived amount of psychological ownership. We included a random intercept for participants and a random slope for the valence group of a postcard. Our analysis showed that the amount of perceived psychological ownership did show a significant variance in intercepts across participants, $SD = 1.51$, 95% CI [0.82, 1.06], χ^2 (1, $N = 1840$) = 301.95, $p < .001$. Additionally, the slopes significantly varied across the positive compared to negative postcards, $SD = 1.12$, 95% CI [1.69, 2.13], χ^2 (1, $N = 1840$) = 606.7, $p < .001$.

Table 3.1. *Summary of the means and standard deviation of all groups concerning psychological ownership and relative frequency for choosing the target item*

	Psychological ownership (1-7)				Relative frequency of choosing the target		
	N	*Mean*	*SD*		*N*	*Mean*	*SD*
Owner	970	3.01	1.81	Owner	194	0.51	0.26
Non-Owner	870	2.60	1.72	Chooser	174	0.47	0.25
Positive	920	3.64	1.73	Positive	184	0.62	0.22
Negative	920	1.99	1.40	Negative	184	0.36	0.22

Next, we included the fixed effect to the model in a stepwise fashion. First adding the valence group (Model 1), then the role of the participant (Model 2) and finally the interaction between valence and role (Model 3). Our results showed that adding the valence group

(Model 1), χ^2 (1, N = 1840) = 200.62, p < .001, and the role of the participant (Model 2), χ^2 (1, N = 1840) = 10.24, p = .001, did add a significant amount of explained variance to the model, respectively, for a detailed summary of the models see Table 3.2. Therefore, the data showed both predicted main effects of valence and ownership on participants' perceived amount of psychological ownership.

Choice

In the same fashion as for psychological ownership we also used a series of linear mixed models to test the effect of the role (Owner vs. Chooser) a participant was assigned to and the valence group (Positive vs. Negative) of a postcard on their likelihood to choose a postcard, for a summary of the group means and standard deviations see Table 3.1.

We again included a random intercept for participants and a random slope for the valence group of a postcard. However, our analysis showed that the likelihood with which participants tended to choose a postcard did not show a significant variance in intercepts across participants, SD = 0.00, 95% CI [0.00, 0.05], χ^2 (1, N = 368) = 0.00, p = 1, nor did the slopes significantly vary across the positive valence group, SD = 0.00, 95% CI [0.36, 0.76], χ^2 (1, N = 368) = 0.00, p = 1. We decided to keep the random effects in our model regardless of the non-significance of the effects since there is still an underlying dependency in the data because the valence group of the postcard is grouped within the participants.

We added the fixed effects in a stepwise fashion, first including the valence group (Model 1), then the role of the participant (Model 2) and as a last step the interaction between the two variables (Model 3). This time we found that only the addition of the valence group (Model 1) did add a significant amount of explained variance to the model, χ^2 (1, N = 368) = 104.24, p < .001. The inclusion of the role of the participants (Model 2), χ^2 (1, N = 368) =

3.10, $p = .078$, and the inclusion of the interaction between the predictors (Model 3), χ^2 (1, $N = 368$) = 0.10, $p = .753$, did not significantly improve the model fit. For a detailed summary of the models see Table 3.2. Therefore, the data did not support the predicted two-way interaction between the object valence and role of the participant on their choosing behaviour.

Table 3.2. *Summary of the effect of item valence and role on perceived psychological ownership and choice*

	Psychological ownership			**Choice**		
Predictors	*Estimates*	*95% CI*	*p*	*Estimates*	*95% CI*	*p*
(Intercept)	1.74	[1.52, 1.95]	**<.001**	0.34	[0.30, 0.38]	**<.001**
Positive	1.65	[1.48, 1.83]	**<.001**	0.25	[0.21, 0.30]	**<.001**
Owner	0.48	[0.19, 0.77]	**.001**	0.04	[-0.00, 0.09]	.079
Random effects						
σ^2	1.25			1.25		
τ_{00}	0.81 $_{id}$			0.81 $_{id}$		
	0.94 $_{id.1}$			0.93 $_{id.1}$		
ICC	0.39			0.39		
N	184 $_{id}$			184 $_{id}$		
Observations	1840			1840		
Marginal R^2 / Conditional R^2	.264 / .554			.260 / .552		

Discussion

How a person's relationship with his or her possessions influences their evaluation of them has been object of countless studies, especially in regard to the endowment effect. The current study tried to focus at the issue from a different angle, not only considering how ownership impacts the evaluation of an object, but also how certain qualities residing in the object itself influence one's perceived ownership over it. As a stimulus inherent attribute, we used the valence of the object, building up on former studies trying to investigate the

underlying processes behind the development of psychological ownership (Brenner et al., 2007; Shu & Peck, 2011).

Our results showed that the valence of an item does indeed influence participants' feelings of ownership over it, with positive items leading to higher levels of psychological ownership compared to negative ones, confirming our first hypothesis concerning psychological ownership. This result is in line with predictions rooted in self-affirmation literature (Mezulis et al., 2004; Sedikides, & Strube, 1997) suggesting that participants are sensitive to the valence of the object that they are associating with themselves. This sensitivity has often been found in studies focusing on public image management (Cialdini & Richardson, 1980; Cialdini & De Nicholas, 1989). However, our results suggest that sensitivity not only applies to the picture participants want to convey to other people, but also the perception participants have of themselves (Finch & Cialdini, 1989), which does support the notion that psychological ownership results from the inclusion of the object into one's extended self (Beggan, 1992; Belk, 1988).

Psychological ownership was also increased by object ownership, with participants who were given prior ownership over a subsample of the postcards (switcher) displaying higher levels of psychological ownership over them compared to those who were not (chooser). This does align with prior research dealing with the effects of legal on psychological ownership (Peck & Shu, 2009; Pierce et al., 2003; Shu & Peck, 2011). A reason for the effect of legal on psychological ownership is often attributed to the amount of control it offers over an item (Furby, 1978a; Prelinger, 1959). This variable of control might have been facilitated by our use of a non-monetary measure for the endowment effect. By giving participants the opportunity to switch or keep the postcard the aspect of control over the item might have been highlighted and thus increased peoples felt ownership over an object even if it was only randomly assigned to them.

With regard to participants' behaviour towards an item (choice), we expected that owners would be more motivated to keep the positive postcards in their possession rather than switching them against other postcards with the same valence, whereas the opposite would be true for negative postcards. On first sight, this pattern was present in our data. However, in order to control that the choices of participants were not due to prior difference in the attractiveness of the items, we also included a condition in which participants could freely choose between the postcards. Here, we expected participants to freely choose the "target" items in about 50 percent of the time in both valence groups. If that had been the case, the hypothesized interaction between valence and role would have materialized. However, our analysis showed that participants who could freely choose between the postcards showed about the same likelihood of choosing the "target" items as participants who were assigned prior ownership over them. This does indicate a bias in the baseline attractiveness of our stimuli which makes it hard to judge whether the expected effect was actually present or not. It is possible that our "target" items might have been more prototypical for positive and negative stimuli than the alternative postcards which we used to match the targets, thereby triggering similar behaviour in choosers.

Even though unfortunate, this circumstance provided two valuable lessons. First, an experimental design that uses all variables of interest (owners and switchers, positive items and negative items, as well as psychological ownership and choice) might yield widely different results than the partial designs used by the previous studies in the literature. If we hadn't included a chooser condition, we would have shown that owners tend to keep positive but are motivated to switch negative items against other negative alternatives, in line with the extant literature (Brenner et al., 2007; Shu & Peck, 2011). However, due to our inclusion of the chooser condition we were able to see that the same pattern also appeared when participants did not possess legal ownership over the items. Second, the fact that participants in the owner as well as chooser condition showed the same behaviour towards the target

postcards, indicates that feelings and behaviours towards objects might be susceptible to very subtle cues like prototypicality of items.

The study showed that participants quickly form feelings of ownership over an object, even if it is randomly assigned to them. It also showed that participants are sensitive towards the valence of an item, when it comes to their feelings of ownership over it. The randomly assigned ownership, however, was not enough to influence their behaviour towards their respective possessions. Therefore, even though legal ownership influences one's subjective perception of an item, it does not necessarily affect one's objective behaviour towards it.

Main discussion

The feeling that certain objects belong to us, be it real objects like mugs or clothes or metaphorical ones like ideas and beliefs, is a universal human experience. The motives behind it are manifold and encompass the attempt to achieve a certain feeling of effectance, defining one's self-identity and communicating it to the world, or simply building a place one can call home to provide a sense of shelter and safety (Pierce et al., 2003). These different motives make it quite clear that "ownership" as such is more than the societal decision of whether something belongs to a person or not. A construct that encapsulates this is psychological ownership which is the inclusion of someone's possessions into that person's extended self (Beggan, 1992). Nowadays this emotional connection between the self and one's possessions is quite often researched within a consumer framework, thus focusing more on questions concerning the financial aspect of ownership. The present work though, turned that focus away from the monetary perspective and looked at the concept from a more basic view. Thus, the work tested three possible aspects playing into the emergence of psychological ownership, the interfaces one uses, whether one has legal ownership over the item, and item-inherent attributes, e.g. stimulus valence and object size.

Studies 1 and 2 tested the effect that devices providing different levels of direct touch have on the amount of perceived psychological ownership and the general evaluation of items. Studies 3, 4, and 5 took a step closer to prior research by testing the effect of legal ownership on psychological ownership as well as including more classical measures for the endowment effect like price setting and participants' willingness to part with an item. However, the design also included items normally not used in commercially oriented studies, by also utilizing material that exhibits a negative valence. Study 4 also tested the impact a threat to a person's positive self-view has on psychological ownership and the endowment effect. Looking at variables residing within an object Study 1 and 2 both additionally included

item-specific attributes in their experimental design, with Study 1 varying the valence of the presented items (adjectives) and Study 2 using pictures of object varying in their real-world size. Studies 3, 4, and 5 on the other hand explicitly focused on the effect of the object valence on psychological ownership and the endowment effect.

Environmental variables: The effect of touch interfaces

The emergence of new technologies has influenced our everyday life in a variety of ways from the answer to most of our questions being only one Google request away, our clothes and other goodies being easily purchased with one click online, or specific moments quickly captured with one tap on our smartphones. Technology accompanies us through our daily struggle. One technology that has established itself quite impressively are touch interfaces. Regardless of whether we play games on our smartphone, draw pictures with a graphical touchpad or navigate through virtual books or newspapers, touchscreens are everywhere.

Starting in the 1960s as a means to simplify airplane communications (Johnson, 1967) touchscreens have come a long way to their current applications.

One thing that makes this development interesting is the question of whether the specific properties offered by this technology, namely the opportunity to directly touch and interact with virtual objects, can influence our perception of the presented content. Whereas the usage of a computer mouse to navigate online behaviour is clearly distinct from real-world interactions with objects, due to the distance to them it conveys, touchscreens could potentially move peoples' judgments closer to those they would make if they interacted with the object in the real world.

This is important considering that actual haptic interaction is known to tweak people's evaluations of an object into a more positive direction, provided that the haptic experience is a positive or neutral one (Peck & Shu, 2009; Shu & Peck, 2011). Touching the object led participants to attribute higher prices to it compared to participants who were denied that haptic interaction (Peck & Shu, 2009). On top of that, touching the object led participants to report feeling higher levels of psychological ownership over them. Due to the changing circumstances of our consumption behaviour since the introduction of online shopping, studies started testing whether touch interfaces could also yield similar effects to real-world touch.

And indeed, research found that participants who were using a touchscreen to carry out an online shopping task tended to report higher levels of psychological ownership over the depicted objects (Brasel & Gips, 2015). Additionally, the endowment effect, measured by the prices that owners and non-owners attributed to the objects, was more pronounced when participants were using a touch interface compared to other devices (Brasel & Gips, 2014).

These results inspired the setup for Study 1 and 2 in which the effect of varying devices on participants' perceived psychological ownership over and general evaluation of different stimuli was tested. As stated in the beginning the main goal of this dissertation was to distance the construct of psychological ownership away from the often used marketing context, therefore, the design used in the two studies did not involve participants setting prices for the objects. To still be able to capture a general bias in participants' perception of the item they were instead asked to state how positive or negative they perceived the item to be. As touched upon above the nature of touch interfaces incorporates one feature that sets them apart from other devices used to navigate a person's behaviour online - the opportunity to "directly" touch the depicted content during one's interaction with it. While a computer mouse or

keyboard still offer a certain amount of control, they do convey a larger distance to the depicted item.

Thus, both experiments explicitly focused on this aspect of direct touch offered by touch interfaces. In Study 1, participants were either asked to press down with their finger on an item that was presented on a touchscreen or press down on it with the cursor of a mouse. Results showed no significant differences in psychological ownership between the two devices. The same was true for participants' general evaluation of the items. The task used in Study 2 stayed close to the set-up of Study 1 but added a keyboard condition which was supposed to further emphasize the potential benefits of direct touch. Thus, participants were either asked to lay down their finger on a touchscreen, press down on it with the mouse cursor, or hold down the space key on a keyboard. Again, participants had to rate their perceived psychological ownership over the presented items as well as their general evaluation of them. This time the results showed a marginally significant effect of the device on participants perceived psychological ownership, however, the effect went into a different direction than expected. Instead of the touchscreen it was actually the keyboard condition that featured the highest level of psychological ownership whereas participants in the touchscreen condition reported the least amount. This result seemed rather puzzling considering that the keyboard condition neither offered the possibility to directly touch the item nor offered a high level of manual control during the task. A possible explanation for the pattern could lie in the ergonomics of the task. Participants might have experienced the touchscreen interaction as the most tiring one, having to lean forward and press down on the touchscreen instead of simply pressing down the button in front of them, thus reducing their enjoyment of the task. Peck and Shu (2009) did find that a negative haptic interaction with an object can decrease participants' valuation of the item. Even though the direct interaction with the touchscreen did not provide any negative haptic feedback for the participants, the higher physical exhaustion might have

acted in a similar way to the manipulation used in Peck and Shu's (2009) study. Regarding the general evaluation of the depicted items no influence of the device used was found either.

Overall, the results neither suggest a positive effect of touch interfaces on psychological ownership nor on the general evaluation of the presented items, at least not if one only looks at simple direct touch. An explanation for the missing effects could be that for touch interfaces to affect participants' feelings of ownership and their general evaluation the presence of other factors might be necessary. Therefore, the direct touch provided by touchscreens might only provide a supporting role for other variables that increase psychological ownership.

For example, rather than direct touch on its own it could be much more its relation to the interactivity provided by the interface that matters. Considering that one of the main motives behind the emergence of psychological ownership is the drive for effectance (Dittmar, 1992; Furby, 1978a; Pierce et al., 2003; White, 1959), the manual control that is depicted in the usage of a touchscreen might facilitate this aspect and as a consequence lead to higher levels of psychological ownership over the depicted items. Prior studies which found an effect of touch interfaces on psychological ownership did not explicitly control the interaction participants had with the presented content (Brasel & Gips, 2014, 2015). To get a better idea of which aspect of touch interfaces does lead to this increase of psychological ownership, further studies could explicitly split up different interactions on the interface and test them against each other. With regard to the effect of a specific interaction on a touchscreen on participants' general evaluation of an item, Cervera-Torres et al. (2018) showed that the direction in which participants dragged a negatively or positively valenced word over a touchscreen did significantly influence their evaluation of it, thus indicating that the interactivity of a touch device can indeed affect a person's perception of an item. They did, however, not compare their results with other input devices like a computer mouse or a

keyboard which could also be used to control an item on the screen. Therefore, a possible way to go forward with regard to fully understanding how and why touch interfaces influence people's perception, future studies could let participants manipulate an item with different devices, by letting them drag the item over the screen or zoom in or out on them and compare the different devices and different interactions against each other.

Concerning psychological ownership another variable that might play into the effect of touch interfaces could be legal ownership. Prior studies dealing with the effect of touch interfaces on psychological ownership were set in a marketing context, thus participants were always made aware of the prospect of ownership. In these studies participants used different devices to choose between a range of objects and then had to set prices for the items (Brasel & Gips, 2014) or state their reasoning behind their choices (Brasel & Gips, 2015), thus keeping the concept of ownership in the back of participants minds. In conclusion, the effect of touch interfaces on people's perception might only occur as an amplifier in situations in which the construct of ownership is already present, be it through legal ownership itself or a reinforcement of the control motive related to psychological ownership.

Variables within the person: Legal ownership

It has been well documented that legal ownership can influence a person's perception of an item, especially in situations in which owners had to judge the value of their possessions. A series of studies showed that people who hold ownership over an object tend to demand higher prices for selling their possession (seller) compared to people who do not yet have ownership over the item (buyer) are willing to pay for it (Horowitz et al., 1999; Knetsch & Sinden, 1984). This price gap was coined as the so-called endowment effect (Thaler, 1980). Other studies also used a non-monetary measure to assess the endowment effect. Kahneman et al. (1990) for example gave half of his participants prior ownership over

an object and then provided them with the opportunity to switch that item against an alternative. He then compared the choices they made to the choosing behaviour of participants who were not given prior ownership over one of the items. In this paradigm the endowment effect showed itself in owners being disproportionately more likely to choose the item they had ownership over compared to participants without prior ownership. Looking at the price gap between sellers and buyers it has been argued that the phenomenon is due to people's aversion towards losses and them trying to compensate for the experienced pain by demanding a higher price for the item (Kahneman, 1979). This explanation, however, has been called into question with some arguing that rather than the negative experience of losing an item it is much more the positive experience of ownership itself that drives owners to attribute a higher value to their possessions (Morewedge & Giblin, 2015; Shu & Peck, 2011). Support for this claim can be found in the results of Morewedge et al. (2009) who reported that people who are in possession of an identical item (owner/buyer) to the one they were supposed to indicate a price they would be willing to pay for it set similar prices to those set by regular sellers.

This result can be brought in relation to the concept of psychological ownership described by Beggan (1992). He proposed that people have a tendency to perceive their possessions more positively because they include them into their extended self (Belk, 1988). This inclusion leads people to apply the same self-serving biases they would use on their evaluations of themselves on the evaluation of things they feel psychological ownership over, thus seeing them as more valuable than non-owners might. While the pattern found by Morewedge et al. (2009) does fit the expected effect of psychological ownership on a person's behaviour they did not explicitly measure the construct itself. A series of studies that did was carried out by Shu and Peck (2011) who found that the price differences between sellers and buyers were due to higher levels of psychological ownership and a more positive affective reaction towards the object within sellers. Studies 3, 4, and 5 built up on these findings by

also testing the effect of legal ownership on psychological ownership and the behaviour participants showed towards the object (price setting and willingness to part with the item). The results from these experiments showed that the effect of legal ownership on the behaviour of participants and their perceived psychological ownership over an item is more complex than prior studies might suggest.

Study 3 and 4 both used the classical price setting task to measure the endowment effect by asking half of the participants to set prices for selling objects in their possession and the other half to set prices they would be willing to pay for the same items. Study 5, however, excluded any monetary measure from the design simply assessing participants' actual willingness to part with the item. Here participants were given prior ownership over an item and were then presented with the opportunity to switch their item against a comparable alternative (Brenner et al., 2007; Kahneman et al., 1990). To set owners' willingness to part with their possessions into relation to non-owners' preference for the presented items, half of the participants got to freely choose between the items, without having prior ownership over one of them. This setup made it possible to measure the endowment effect without explicitly including money into the picture.

Notably, the results revealed that if a monetary measure was used the classical endowment effect showed itself with sellers always demanding significantly higher prices than buyers (Kahneman et al., 1990, 1991). However, if there was no direct financial component included participants did not show a significant preference for their own possessions, being equally likely to choose the objects they were given initial ownership over as people without ownership over them. Owners and non-owners showing the same choices concerning the item suggests a bias grounded in the material with certain items possibly being more appealing than others. This, however, does bring up the question of why those item attributes did have a stronger effect on participants' behaviour than legal ownership. The

items were used in all three studies, yet the inclusion of a non-monetary measure seemed to have made people more susceptible to item-specific attributes. A possible explanation for this could be that the price setting task might have highlighted the existence of another person in the transaction. There are studies that suggest that the heightened prices sellers set for their possession are not necessarily due to them adjusting the value into an upward direction as a compensation for their loss, but instead result from a judgement error of sellers, with them actually believing that the value they set is congruent with the one other people would set for the item (Van Boven et al., 2000). This would mean that the price gap in reality is a consequence of sellers' inability to judge the situation from a non-owner's perspective. The non-monetary measure used in Study 5 however, did not require participants to consider another person's perspective which could have circumvented this possible judgement error within monetary measures.

Whereas the endowment effect showed itself primarily in the experiments including a monetary measure the effect of legal on psychological ownership was less clear in this regard. Study 3 did not find a significant effect of legal on psychological ownership, Study 4 on the other hand did, with sellers perceiving significantly more psychological ownership over their possessions compared to buyers. An explanation for this could lie in the fact that participants in Study 4 were asked to recall either a past success or failure experience before setting prices for the items. Considering that psychological ownership is defined as the inclusion of a possession into a person’s self (Beggan, 1992) it does seem reasonable that letting participants carry out a task like recalling a past experience would make them more aware of possible self-associations with certain objects. Study 5 also found that participants who were given prior ownership over certain items reported higher levels of psychological ownership over them compared to participants who were not given prior ownership over those items. As argued above, changing the nature of the measure to a non-monetary task also excluded the consideration of another person in the situation which could have drawn participants' attention

more towards their own self. Thus, what differentiates Study 4 and 5 from Study 3 is that the financial aspect of ownership lost its centre stage, possibly re-directing participants focus more towards their own person.

One last insight gained from the results was that feelings of ownership do not necessarily show themselves in the behaviour of a person. Study 5 showed that even though owners did perceive higher levels of psychological ownership over their possessions they did not show a bias in their preferences concerning keeping or switching their respective items. This result does not stand alone - Peck and Shu (2009) also found that even though sellers tended to perceive more psychological ownership over their possessions than buyers, they still set similar prices for them if the valence of the object was negative. Therefore, psychological ownership is not necessarily reflected in a person's behaviour towards an item further supporting the idea of a separation between a cognitive and emotional side of ownership.

Stimulus-inherent attributes

Previous research often asked the question of how variables, like legal ownership or the kind of interaction a person has with an object, influence that person's feelings of ownership over and his or her subsequent valuation of the object.

However, this perspective is stuck on variables which are either depending on the person or the situation but do not necessarily consider the item itself. On top of that, since a lot of studies took place in a marketing context, the stimuli that were used tended to show a bias in their attractivity with most of them being designed to be appealing towards the subjects. This raises the question of what happens if one also includes attributes settled within the item. The present dissertation considered two item attributes in this regard, the size of a depicted object and the valence of an item.

Object size

Study 2 manipulated the size of the objects that were used as items in the task. One reason for the inclusion of the object size in the experimental design was the motive of control related to psychological ownership (Pierce et al., 2003). Even though this sense of control is often thought of in terms of accessibility of the object to allow an effective use of it (Furby, 1978a), thus often being related to legal ownership, physical control over an item could also alter the feeling of an effective use of it. This idea can be linked to the effects of touch found on psychological ownership. Participants who were allowed haptic interaction with an object reported higher levels of psychological ownership over it compared to participants who were not given the chance to touch the object (Peck & Shu, 2009).

Therefore, one would expect that items which convey a higher level of haptic control over them, by being able to be manipulated by hand, would evoke higher levels of psychological ownership.

This idea was supported by the results of Study 2, which did show that participants felt significantly more psychological ownership over smaller than larger items.

Thinking back to Litwinski's (1947) assumption that people's drive for ownership over an item is a result of their perceived future use of it, smaller objects might have made it easier for participants to imagine a future usage, since they provide the chance for an immediate manipulation. One can easily pick up a basketball and throw it at a target, however, picking up a car and doing the same is a different story, assuming one does not have superpowers. The higher levels of manipulability that smaller objects scored on the BOSS (2014) norms also offer support for this idea. Making it easier to imagine oneself using the depicted item should facilitate participants' impression of a possible effective handling of the object which would also play into the motive of control satisfied by psychological ownership. Surprisingly, participants rated smaller objects less favourably compared to larger ones going against the

assumption that a more positive evaluation of an item generally goes along with higher levels of psychological ownership. A possible reason for the more positive evaluation of large compared to small objects could also be found in the information provided by the BOSS (2014) norms. Objects classified as large exhibited higher levels of familiarity which could considering mere exposure literature (Zajonc, 1968) have overruled the effect of psychological ownership on the stimulus evaluation. Furthermore, larger objects are normally related to higher financial values, which could have turned participants' general evaluation in a more positive direction. Considering this, participants' higher levels of psychological ownership over smaller items becomes even more interesting, since objects with a possible higher monetary value should be more desirable to own. While not from a financial perspective, this does make sense from a control perspective in regard to psychological ownership again offering support for a separation between an objective and an emotional side of ownership.

Stimulus valence

Another stimulus-inherent variable that was given attention within the presented work is the valence of the item. As mentioned above the material used in prior studies often included a certain bias in the attractivity of the items used in the tasks, leading to the question of what happens if the ownership over an item is not desirable to a person.

The first time item valence was taken into account was in Study 1 which used adjectives that were either classified as negative, neutral, or positive as material. Even though adjectives seem to be an unusual choice with regard to ownership, the decision was based on several reasons. For one, the study tried to consider the effect of item valence on psychological ownership and adjectives strongly communicate this variable. Furthermore, prior studies showed that participants are able to feel psychological ownership over constructs

like arguments, ideas or letters within one's own name (Baer & Brown, 2012; De Dreu & van Knippenberg, 2005; Nuttin, 1987), so the level of abstraction presented by the items does not necessarily seem to be an issue when it comes to feelings of ownership. On top of that adjectives should be rather easy to process due to their high familiarity and brevity. Concerning participants' felt ownership over the items it seemed reasonable to expect that the stimulus valence would have a significant effect on the perceived amount of psychological ownership participants felt over the items under the assumption that participants would be more motivated to associate themselves with positive compared to negative items (Cialdini & Richardson, 1980; Cialdini & De Nicholas, 1989; Pierce et al., 2003).

The significant main effect of stimulus valence did support this idea, with participants perceiving the highest amount of psychological ownership over positive and the lowest over negative items. An exploratory analysis brought up an even more insightful result. The valence of the adjective did have a significant effect on the relation between psychological ownership and the general evaluation of the item. Positive and neutral adjectives showed the expected positive relation between the two, the more psychological ownership participants reported over the adjectives the more positive was their evaluation of them. However, this relationship was significantly flattened when it came to negative items, indicating an influence of the stimulus valence on the effect of psychological ownership predicted by Beggan (1992). But since this analysis was only of an exploratory nature one needs to be careful with the interpretation of the findings.

Study 1 also tested the effect of the device used on psychological ownership and stimulus evaluation and it was assumed that there would be an interaction between the interface used and the valence of the adjective regarding its general evaluation. Participants were expected to judge the adjectives more positively in the touchscreen compared to the

mouse condition, however, this should only apply to positive and neutral adjectives, for negative adjectives no difference between the devices was expected.

The data did not yield this predicted interaction though, with participants showing no significant difference in their general evaluation of the adjectives depending on the device they used. A reason for this could be that the hypothesis was based on results found for real-world touch. Actual haptic interaction might have had a stronger impact on participants' evaluation than virtual touch (Peck & Shu, 2009; Shu & Peck, 2011). It has also already been discussed with regard to the missing effect of touch devices in general that it is possible that direct virtual touch on its own is not enough and that it is possible that other variables like general awareness of the concept of ownership or a higher interactivity need to be included into the design for the device to take an effect.

The interaction found between item valence, psychological ownership and item evaluation led to a series of experiments focusing more explicitly on the effect of object valence on psychological ownership and participants' behaviour towards an item. As has already been argued in the discussion it is possible that for psychological ownership to arise participants might need to be made aware of the concept of ownership. Because of this Study 3, 4 and, 5 also tested the effect of object valence on the classic endowment effect by giving some participants prior ownership over the items and others the possibility to attain ownership over them. Study 3 and 4 both used the classical price gap between buyers and sellers to measure the endowment effect, whereas Study 5 on the other hand used a non-monetary measure by utilizing the switching paradigm taken out of Brenner's et al. (2007) studies. In addition to the endowment effect, all three studies measured the amount of psychological ownership participants perceived over the items. The results showed that the valence of the item always tended to have a significant effect on the amount of psychological ownership participants perceived over them. Participants consistently perceived more psychological

ownership over positive compared to negative items, matching the effect of adjective valence on psychological ownership found in Study 1.

Looking back at Sartre's (1943/1969) quote "I am what I have… what is mine is myself" it is reasonable that participants would strive to associate themselves with positive belongings and disregard their ownership over negative ones to keep their self-image positive (Cialdini & Richardson, 1980; Cialdini & De Nicholas, 1989), which also relates to the motive of self-identity for psychological ownership (Pierce et al., 2003). Further evidence for this notion is presented in the relation between participants' self-esteem, their perceived psychological ownership and the valence of the item in question found in Study 4. The results showed that participants with higher levels of self-esteem tended to feel more psychological ownership over positive and neutral items than participants with lower levels of self-esteem did, however, the pattern was reversed when it came to negative ones. Therefore, participants with a higher self-esteem could have been better in using psychological ownership as a strategy to boost their positive self-view in general, an idea that can be backed up by self-affirmation literature which showed that high self-esteem individuals generally seem to be better at using strategies to protect and boost their positive self-image (Beauregard & Dunning, 2001; Blaine & Crocker, 1993; Jones & Buckingham, 2005). The result also fits nicely into Beggan's (1991) results that participants with a higher internal focus of control were better at using their possession as protection against self-threats. High self-esteem individuals are also more likely to possess a more internal locus of control (El-Anzi, 2005; Saadat et al., 2012) relating Beggan's (1991) work to the presented results. Therefore, the found pattern does indicate the notion that a positive sense of self and psychological ownership can facilitate one another if used correctly.

The main goal of Study 4, however, was to take a deeper look into the strategic usage of psychological ownership as a response to an immediate threat to a person's self, not their

association behaviour in general. To test this half of the participants were asked to recall a failure from their past which was supposed to pose a threat to their positive self-image, the other half were asked to recall a past success. Afterwards they had to carry out the classical Buyer/Seller task used in prior studies. It was expected that participants would use their ownership over positive items as a means to cope with the self-threat by associating themselves even more with positive and even less with negative possessions if their self was threatened. However, a measure of participants' state self-esteem showed that the threat manipulation seemed to have failed because there was no significant difference between the two groups after the recall task. Therefore, even though the results do suggest that psychological ownership can be used as a means to support a person's positive self-view, no statements can be made about its usefulness in situations of immediate self-threat.

Regarding the endowment effect one would assume from prior studies that the prices set by sellers and buyers in Study 3 and 4 should be similar for negative items but show a significant disparity for positive ones, with sellers demanding higher prices than buyers (Peck & Shu, 2009; Shu & Peck, 2011). However, both experiments only found a significant main effect of legal ownership on the prices participants set with sellers always demanding higher prices than buyers regardless of the valence of an object. This missing interaction might be explained by the nature of the task. Those prior studies used a real-world pen as material and haptic interaction as the valence manipulation. Study 3 and 4 however, used the visual valence of the item and offered no haptic interaction with the stimulus. Using the visual valence instead of the haptic interaction offered the advantage that the effect of stimulus valence could also be tested in a context in which an object is not physically present in the situation. However, it is possible that the negative haptic interaction used in those prior studies could have had a stronger impact on the valuation of participants, especially considering that an unpleasant interaction could have led participants to judge the object as having a lower quality which would objectively reduce its value. Another point that

differentiates the present work from prior research is that Study 3 and 4 used 15 items to test the effect of stimulus valence opposed to only one (Peck & Shu, 2009; Shu & Peck, 2011). Thus, it is possible that the effects found within those prior studies might not hold up if applied to a broader range of situations or items.

Study 5 used the approach taken from Brenner et al. (2007) in which participants got the opportunity to switch their possession against another item with the same valence. However, it also included a condition in which participants could freely choose between the two items without having been given prior ownership over one of them. This was a significant departure from previous studies since none of them contained positive and negative items as well as a free choice condition for both of them in one design (Brenner et al., 2007; Shu & Peck, 2011). The data at first seemed to replicate prior findings, showing that participants in the switch condition were more likely to switch their negative items, but tended to keep their positive ones. When set in relation to the behaviour of non-owners though, the analysis showed that participants in the free choice condition were about as likely to pick items designated as target items (items participants in the switch condition were given prior ownership over) as participants in the switch condition were. This indicates that rather than being driven by the ownership over an item, participants' behaviour was likely sparked by differences present in the material.

It has been touched upon that a possible reason for the absence of the endowment effect in the non-monetary measure could be that the scenario removes the other person's perspective from the task, thus also removing the possible judgement error made by owners concerning the value of their possession in other people's eyes. This ironically could have driven owners' behaviour closer to that of non-owners by leading their focus away from the other person's perspective which in turn could have made them more susceptible towards attributes of the objects.

Conclusion

Overall, the results indicate that aspects like the device a person uses or the legal ownership over an item are less influential for participants' felt ownership over an item, unless they are related to the person her- or himself. Study 1 and 2 neither found an effect of the device participants used on their perceived amount of psychological ownership over nor on their general evaluation of the presented items. In Study 3 the legal ownership participants held over the objects was also not enough to increase their psychological ownership over them. Only after participants' focus was directed more towards themselves by either explicitly asking them to focus on an experience from their past (Study 4) or taking out the financial character of the situation, reducing the consideration of another person (Study 5), did legal ownership show an effect on psychological ownership. This does in broad strokes lean into the definition of psychological ownership as a relation between a person's self and an object (Beggan, 1992), indicating that to actually be aware that an object is related to myself I also need to be aware of me as a person.

While a self-focus seemed to be needed for an influence of legal on psychological ownership the same was not the case for participants' pricing behaviour. If money was involved participants showed the classical endowment effect with sellers demanding higher prices than buyers. However, after taking out the financial aspect in the switching paradigm, the endowment effect disappeared. This again could be related to participants' focus within the situation. While for psychological ownership to arise a more inward directed focus might be needed, with a person being aware of their own self. The endowment effect on the other hand might need a focus directed more towards the outside making one aware of another person's involvement in a situation.

Stimulus-inherent attributes on the other hand always showed an effect on participants' feelings of ownership towards the item. Be it the valence of an object or the size of it, item-

specific attributes always changed to which degree participants felt the items belonged to them. This insight is crucial considering that item attributes have not been given much attention in the past, since most studies focused on the individual and how ownership can be used to change his or her perception of or behaviour towards the item (marketing, also organizational). However, the effect of the object size and the valence of the item does emphasize that ownership is a two-way street.

What has to be considered in the interpretation of all results within the present work is that ownership over the object was randomly assigned to owners, thus no statements about ownership effects that pile up over a longer period of time can be made on the grounds of the presented results. However, seeing that already randomly given ownership can have an influence on how participants feel and act towards an object gives an insight on how central the concept is to the human condition.

Boiling all of this down it seems that ownership and its influence on people's feelings and behaviour are driven by different motives depending on whether someone focuses on the question of how a person acts towards an object or how they feel towards it. It appears that legal ownership does impact the behaviour we exhibit in classical financial transactions, but as soon as one steps outside of those boundaries the lines start to become blurry with people not necessarily favouring their possessions if no money is involved. Also, having legal ownership over an item does not necessarily dictate how a person feels towards it with object-specific attributes apparently playing a larger role for people's emotional response to the object. Thus, while ownership seems to have a rather clear-cut relation to the monetary value attributed to an object, when it comes to people's feelings towards an item one might consider expanding Sartre's (1943/1969) quote "what is mine is myself" by adding the phrase "as long as it suits me" to it.

Summary

The presented dissertation project is primarily concerned with the construct of psychological ownership and how it is influenced by variables such as the technology a person uses, the legal ownership he or she holds or certain attributes of a stimulus. Furthermore, it looks at the "endowment" effect in relation to the valence of an item. Since both constructs are often studied in the field of consumer research, the material used was usually designed to be as appealing to the subject as possible. However, this meant that items with a negative valence often went unnoticed, leading to the question of whether the results found also occur with items that are perceived as unattractive. Furthermore, rapid technological progress makes it possible to test research results, which were found in a certain context, also on new terrain. For example, the shift from real to virtual shopping led to the question of whether effects found concerning the actual haptic interaction with an object can also be generated by touch interfaces. Elements from these two questions were taken up and examined in more detail in 5 studies.

Study 1 and 2 from Chapter 1 investigated whether the use of a touchscreen has a positive effect on psychological ownership and the general evaluation of an item compared to other input devices such as a mouse or keyboard. The results showed no positive effect of touchscreens on the subjects' perceived amount of psychological ownership or on their general rating of the items. Both studies also considered different attributes of the items. Thus, in Study 1, the valence of the items was manipulated, and in Study 2, the size of the presented objects was varied. Both attributes were found to have a significant effect on subjects' perceived psychological ownership. Positive items elicited more psychological ownership than negative items, and small objects elicited more psychological ownership than large objects.

The effects of specific attributes of an item led to another series of studies that looked at the influence of an item's valence on a person's perceived psychological ownership. In addition, the so-called "endowment" effect, which predicts a higher attribution of value to an object by its owner, was also investigated. Studies 3 and 4 showed a general effect of valence on subjects' perceived psychological ownership. Positive items consistently evoked more psychological ownership than negative items. Further, the results showed that subjects with legal ownership consistently set higher prices for the objects than subjects without, but this effect remained constant across valence groups. Subjects' perceived psychological ownership showed a less clear pattern in relation to legal possession. While in Study 4 subjects who legally owned the postcards also reported higher feelings of ownership over them, this was not the case in Study 3. The only difference between the experimental design of the two studies was that subjects in Study 4 were asked to recall an event from their past. This might have motivated subjects to place a higher focus on their self and thus also on possible self-associations with other objects.

Study 5 from Chapter 3 again addressed the effect of stimulus valence on psychological ownership as well as the "endowment" effect, but captured it using a non-monetary measure. With respect to the psychological ownership, it was found that subjects who had legal ownership over an object also felt significantly more psychological ownership over the object than subjects who did not own the object. Thus, the "endowment" effect was absent when a non-monetary measure was used.

Taken together, the results indicate that the technique used to handle an object, or even legal ownership over an object, has a smaller effect on one's emotional attachment to it. Attributes of the stimulus on the other hand, seem to have a stronger impact on the psychological relationship between a person and his or her possession. In view of the frequent neglect of item-specific attributes in previous research, especially with regard to negative

aspects of an object, the presented results make an important contribution in completing the picture of the concept of psychological ownership.

Zusammenfassung

Das präsentierte Dissertationsprojekt befasst sich vorrangig mit dem Konstrukt von psychologischem Besitzgefühl und wie dieses durch Variablen wie die verwendete Technik, den legalen Besitz oder bestimmte Attribute des Stimulus beeinflusst wird. Weiters wird auch der „endowment“ Effekt untersucht, welcher in Relation zu der Valenz des Items gesetzt wurde. Da beide Konstrukte häufig im Bereich der Konsumentenforschung untersucht werden, wurde das verwendete Material meist so gestaltet, das es möglichst ansprechend auf die Person wirkt. Dies bedeutete jedoch, dass Objekte mit negativer Valenz oft unbeachtet blieben, was zu der Frage führt, ob die gefundenen Ergebnisse auch bei Items auftreten, welche als unattraktiv empfunden werden. Weiters ermöglicht es der rasante technologische Fortschritt, Forschungsergebnisse, welche in einem bestimmten Kontext gefunden wurden, auch auf neuem Terrain zu testen. So, führte zum Beispiel der Umschwung von realen zu virtuellen Einkäufen zu der Frage, ob gefundene Effekte, welche die tatsächliche haptische Interaktion mit einem Objekt betreffen, sich zum Beispiel auch durch Touch Interfaces erzeugen lassen. Elemente aus diesen beiden Fragestellungen wurden in 5 Studien aufgegriffen und genauer untersucht.

Studie 1 und 2 aus Kapitel 1 untersuchten, ob die Verwendung eines Touchscreens sich positiv auf das psychologische Besitzgefühl und die generelle Bewertung eines Items auswirkt verglichen mit anderen Eingabegeräten wie einer Maus oder Tastatur. Die Ergebnisse zeigten weder einen positiven Effekt von Touchscreens auf das psychologische Besitzgefühl der Versuchspersonen noch auf ihre generelle Bewertung der Items.
Beide Studien zogen auch unterschiedliche Attribute der Items in Betracht. So wurde in Studie 1 die Valenz der Items variiert und in Studie 2 die Größe der dargestellten Objekte. Es stellte sich heraus, dass beide Attribute einen signifikanten Effekt auf das psychologische Besitzgefühl der Personen hatten. Positive Items riefen ein höheres psychologisches Besitzgefühl hervor als negative Items und kleine Objekte ein höheres als große Objekte.

Die Effekte von spezifischen Attributen eines Items führten zu einer weiteren Studienreihe, welche sich mit dem Einfluss der Valenz eines Items auf das psychologische Besitzgefühl einer Person beschäftigte. Zusätzlich wurde auch der sogenannte „endowment“ Effekt untersucht, welcher eine höhere Wertzuschreibung eines Objekts durch dessen Besitzer vorhersagt.

Studie 3 und 4 zeigten einen generellen Effekt der Valenz auf das psychologische Besitzgefühl der Probanden. Positive Items riefen konsistent ein höheres psychologisches Besitzgefühl hervor als negative. Weiters zeigten die Ergebnisse, dass Personen mit legalem Besitz konstant höhere Preise forderten als Personen ohne, dieser Effekt blieb jedoch über die Valenzgruppen hinweg konstant. Das psychologische Besitzgefühl der Versuchspersonen zeigte ein weniger klares Muster in Bezug zu legalem Besitz. Während in Studie 4 Personen, welche die Postkarten legal besaßen, auch ein höheres Besitzgefühl über diese angaben, war dies in Studie 3 nicht der Fall. Der Versuchsaufbau der beiden Studien unterschied sich nur darin, dass Versuchspersonen in Studie 4 sich an ein Ereignis aus ihrer Vergangenheit erinnern sollten. Dies könnte Versuchspersonen dazu motiviert haben einen höheren Fokus auf ihr Selbst zu legen und so auch auf mögliche Selbstassoziationen mit anderen Objekten.

Studie 5 aus Kapitel 3 befasste sich erneut mit der Auswirkung der Stimulus Valenz auf das psychologische Besitzgefühl sowie den „endowment“ Effekt, erfasste diesen jedoch mit Hilfe eines nicht monetären Maßes. In Bezug auf das psychologische Besitzgefühl zeigte sich, dass Versuchspersonen, die legalen Besitz über ein Objekt hatten auch signifikant mehr psychologisches Besitzgefühl über das Objekt empfanden als Versuchspersonen, denen das Objekt nicht gehörte. Der „endowment“ Effekt blieb daher bei einer Verwendung eines nicht monetären Maßes aus.

Zusammengenommen zeigen die Ergebnisse, dass die Technik, die für den Umgang mit einem Objekt verwendet wird oder auch der legale Besitz über ein Objekt einen geringeren Einfluss auf die emotionale Bindung mit diesem haben. Attribute des Stimulus

andererseits, scheinen sich stärker auf die psychologische Beziehung zwischen einer Person und seinem oder ihrem Besitz auszuwirken. In Hinblick auf die häufige Vernachlässigung von Item spezifischen Attributen in vorangegangener Forschung, gerade im Hinblick auf negative Aspekte eines Objekts, leisten die vorgelegten Ergebnisse einen wichtigen Beitrag darin, das Bild des Konzepts von psychologischem Besitzgefühl zu vervollständigen.

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Dear reader,

In science we always try to understand the causes for the events we encounter in this world. One event I want to look at in this section is the evolution of the present dissertation. How did it come to be? Well, let's start at the beginning, my parents fell in love, decided to start a family and a couple of months later I entered this mortal coil. Flash forward 18 years of love and support I made the faithful decision, again backed up by my parents, to go and study psychology. Leading to another couple of years of learning, self-discovery and meeting friends who stayed with me until this very day supporting me through it all. From my best friend Vanessa who endured me as a flatmate for more than three years, to my three musketeers who made my time in Graz a bliss to Sandra who motivated me to apply for a PhD position in Tübingen at a place called "Leibniz-Institut für Wissensmedien" and convinced me to move to this strange country.

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Appendix

Table 1.8. *Statistical summary of linear mixed models looking at the effect of device on psychological ownership controlling for autotelic need for touch*

	Model 1			**Model 2**			**Model 3**		
Predictors	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*
(Intercept)	5.05	[4.77, 5.33]	**<.001**	4.96	[4.61, 5.32]	**<.001**	4.97	[4.61, 5.33]	**<.001**
Touch				0.18	[-0.27, 0.63]	.442	0.19	[-0.27, 0.64]	.421
NFT_auto							0.03	[-0.10, 0.15]	.668
Random Effects									
σ^2	1.49			1.49			1.49		
τ_{00}	0.64 $_{word}$			0.64 $_{word}$			0.64 $_{word}$		
	0.88 $_{id}$			0.89 $_{id}$			0.90 $_{id}$		
ICC	0.51			0.51			0.51		
N	69 $_{id}$			69 $_{id}$			69 $_{id}$		
	90 $_{word}$			90 $_{word}$			90 $_{word}$		
Observations	6210			6210			6210		
Marginal R^2 / Conditional R^2	.000 / .506			.003 / .508			.003 / .510		

Table 1.9. *Statistical summary of linear mixed models looking at the effect of device on psychological ownership controlling for instrumental need for touch*

	Model 1			**Model 2**			**Model 3**		
Predictors	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*
(Intercept)	5.05	[4.77, 5.33]	**<.001**	4.96	[4.61, 5.32]	**<.001**	4.94	[4.59, 5.30]	**<.001**
Touch				0.18	[-0.27, 0.63]	.442	0.13	[-0.32, 0.59]	.567
NFT_inst							0.09	[-0.06, 0.24]	.259
Random Effects									
σ^2	1.49			1.49			1.49		
τ_{00}	0.64 $_{word}$			0.64 $_{word}$			0.64 $_{word}$		
	0.88 $_{id}$			0.89 $_{id}$			0.88 $_{id}$		
ICC	0.51			0.51			0.51		
N	69 $_{id}$			69 $_{id}$			69 $_{id}$		
	90 $_{word}$			90 $_{word}$			90 $_{word}$		
Observations	6210			6210			6210		
Marginal R^2 / Conditional R^2	.000 / .506			.003 / .508			.008 / .510		

Table 1.10. *Statistical summary of linear mixed models looking at the effect of device and object size on psychological ownership controlling for autotelic need for touch*

	Model 1			**Model 2**			**Model 3**			**Model 4**		
Predictors	Estimates	95% CI	p	Estimates	95% CI	p	Estimates	95% CI	p	Estimates	95% CI	p
(Intercept)	2.94	[2.64, 3.23]	**<.001**	3.04	[2.61, 3.46]	**<.001**	2.78	[2.32, 3.24]	**<.001**	2.79	[2.33, 3.26]	**<.001**
Mouse				0.21	[-0.34, 0.77]	.454	0.21	[-0.34, 0.77]	.454	0.22	[-0.34, 0.78]	.442
Touch				-0.47	[-1.02 – 0.07]	.085	-0.47	[-1.02, 0.07]	.085	-0.50	[-1.04, 0.05]	.075
Small							0.51	[0.15, 0.88]	**.006**	0.51	[0.15, 0.88]	**.006**
NFT_auto										0.03	[-0.09, 0.15]	.631
Random Effects												
σ^2	3.04			3.04			3.04			3.04		
τ_{00}	1.36 $_{id}$			1.28 $_{id}$			1.28 $_{id}$			1.27 $_{id}$		
	0.82 $_{pic\_num}$			0.82 $_{pic\_num}$			0.76 $_{pic\_num}$			0.76 $_{pic\_num}$		
ICC	0.42			0.41			0.40			0.40		
N	100 $_{id}$			100 $_{id}$			100 $_{id}$			100 $_{id}$		
	90 $_{pic\_num}$			90 $_{pic\_num}$			90 $_{pic\_num}$			90 $_{pic\_num}$		
Observations	9000			9000			9000			9000		
Marginal R^2 / Conditional R^2	.000 / .418			.016 / .418			.028 / .418			.029 / .418		

Table 1.11. *Statistical summary of linear mixed models looking at the effect of device and object size on psychological ownership controlling for instrumental need for touch*

	Model 1			**Model 2**			**Model 3**			**Model 4**		
Predictors	Estimates	95% CI	p	Estimates	95% CI	p	Estimates	95% CI	p	Estimates	95% CI	p
(Intercept)	2.94	[2.64, 3.23]	**<.001**	3.04	[2.61, 3.46]	**< .001**	2.78	[2.32, 3.24]	**< .001**	2.73	[2.25, 3.21]	**< .001**
Mouse				0.21	[-0.34, 0.77]	.454	0.21	[-0.34, 0.77]	.454	0.22	[-0.33, 0.78]	.434
Touch				-0.47	[-1.02, 0.07]	.085	-0.47	[-1.02, 0.07]	.085	-0.49	[-1.03, 0.05]	.077
Small							0.51	[0.15, 0.88]	**.006**	0.51	[0.15, 0.88]	**.006**
NFT_inst										0.07	[-0.10, 0.23]	.431
Random Effects												
σ^2	3.04			3.04			3.04			3.04		
τ_{00}	1.36 $_{id}$			1.28 $_{id}$			1.28 $_{id}$			1.27 $_{id}$		
	0.82 $_{pic\_num}$			0.82 $_{pic\_num}$			0.76 $_{pic\_num}$			0.76 $_{pic\_num}$		
ICC	0.42			0.41			0.40			0.40		
N	100 $_{id}$			100 $_{id}$			100 $_{id}$			100 $_{id}$		
	90 $_{pic\_num}$			90 $_{pic\_num}$			90 $_{pic\_num}$			90 $_{pic\_num}$		
Observations	9000			9000			9000			9000		
Marginal R^2 / Conditional R^2	.000 / .418			.016 / .418			.028 / .418			.030 / .418		

Table 1.12. *Statistical summary of linear mixed models looking at the effect of device and object size on the valence ratings controlling for autotelic need for touch*

	Model 1			**Model 2**			**Model 3**			**Model 3**		
Predictors	Estimates	95% CI	p	Estimates	95% CI	p	Estimates	95% CI	p	Estimates	95% CI	p
(Intercept)	6.09	[5.89, 6.29]	**<.001**	6.22	[5.95, 6.49]	**<.001**	6.42	[6.11, 6.73]	**<.001**	6.42	[6.11, 6.73]	**<.001**
Mouse				-0.21	[-0.53, 0.10]	.179	-0.21	[-0.53, 0.10]	.179	-0.21	[-0.53, 0.10]	.181
Touch				-0.18	[-0.48, 0.13]	.258	-0.18	[-0.48, 0.13]	.257	-0.18	[-0.48, 0.13]	.255
Small							-0.41	[-0.72, -0.09]	**.011**	-0.41	[-0.72, -0.09	**.011**
NFT_auto										0.00	[-0.06, 0.07]	.899
Random Effects												
σ^2	2.80			2.80			2.80			2.80		
τ_{00}	0.39 $_{id}$			0.38 $_{id}$			0.38 $_{id}$			0.38 $_{id}$		
	0.59 $_{pic\_num}$			0.59 $_{pic\_num}$			0.55 $_{pic\_num}$			0.55 $_{pic\_num}$		
ICC	0.26			0.26			0.25			0.25		
N	100 $_{id}$			100 $_{id}$			100 $_{id}$			100 $_{id}$		
	90 $_{pic\_num}$			90 $_{pic\_num}$			90 $_{pic\_num}$			90 $_{pic\_num}$		
Observations	9000			9000			9000			9000		
Marginal R^2 / Conditional R^2	.000 / .260			.002 / .260			.013 / .260			.013 / .260		

Table 2.5. *The effect of item valence on the relationship between psychological ownership and state self-esteem of a person*

	Model 1			Model 2			Model 3		
Predictors	Estimates	95% CI	p	Estimates	95% CI	p	Estimates	95% CI	p
(Intercept)	2.06	[1.83, 2.30]	**<.001**	2.06	[1.83, 2.30]	**<.001**	2.06	[1.83, 2.30]	**<.001**
Neutral	0.39	[0.10, 0.68]	**.009**	0.39	[0.10, 0.68]	**.009**	0.39	[0.10, 0.68]	**.009**
Positive	1.36	[1.04, 1.68]	**<.001**	1.36	[1.04, 1.68]	**<.001**	1.36	[1.04, 1.68]	**<.001**
Self-esteem				-0.00	[-0.14, 0.13]	.986	-0.05	[-0.19, 0.09]	.477
Neutral*Self-esteem							0.12	[0.00, 0.24]	**.049**
Positive*Self-esteem							0.17	[-0.01, 0.34]	.059
Random Effects									
σ^2	1.17			1.17			1.17		
τ_{00}	0.82_{id}			0.82_{id}			0.82_{id}		
	0.05_{pic}			0.05_{pic}			0.05_{pic}		
τ_{11}	$1.14_{Positive}$			$1.14_{Positive}$			$1.13_{Positive}$		
	$0.31_{Neutral}$			$0.31_{Neutral}$			$0.30_{Neutral}$		
ρ_{01}									
ρ_{01}									
ICC	0.43			0.43			0.43		
N	203_{id}			203_{id}			203_{id}		
	15_{pic}			15_{pic}			15_{pic}		
Observations	3045			3045			3045		
Marginal R^2 / Conditional R^2	.138 / .507			.138 / .507			.141 / .508		

Table 2.6. *The effect of item valence on the relationship between psychological ownership and state self-esteem of a person*

	Model 1			**Model 2**			**Model 3**		
Predictors	Estimates	95% CI	p	Estimates	95% CI	p	Estimates	95% CI	p
(Intercept)	1.09	[0.85, 1.32]	**<.001**	1.09	[0.85, 1.32]	**<.001**	1.09	[0.85, 1.32]	**<.001**
Neutral	-0.06	[-0.36, 0.24]	.691	-0.06	[-0.36, 0.24]	.691	-0.06	[-0.36, 0.24]	.691
Positive	0.93	[0.61, 1.25]	**<.001**	0.93	[0.61, 1.25]	**<.001**	0.93	[0.61, 1.25]	**<.001**
Self-esteem				0.02	[-0.10, 0.13]	.797	0.02	[-0.10, 0.14]	.756
Neutral*Self-esteem							0.00	[-0.10, 0.10]	.945
Positive*Self-esteem							-0.05	[-0.19, 0.10]	.520
Random Effects									
σ^2	0.79			0.79			0.79		
τ_{00}	0.65 $_{id}$			0.65 $_{id}$			0.65 $_{id}$		
	0.05 $_{pic}$			0.05 $_{pic}$			0.05 $_{pic}$		
τ_{11}	0.80 $_{Positive}$			0.80 $_{Positive}$			0.80 $_{Positive}$		
	0.20 $_{Neutral}$			0.20 $_{Neutral}$			0.20 $_{Neutral}$		
ρ_{01}									
ρ_{01}									
ICC	0.47			0.47			0.47		
N	203 $_{id}$			203 $_{id}$			203 $_{id}$		
	15 $_{pic}$			15 $_{pic}$			15 $_{pic}$		
Observations	3045			3045			3045		
Marginal R^2 / Conditional R^2	.121 / .535			.121 / .535			.121 / .535		