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Touched by vision and emotion: advancing the understanding of the endowment effect

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Abstract
This research extends previous work by looking at the relationship between emotions, visually based tactile cues and different needs for tactile input in inducing the endowment effect. Increasingly products are sold online and thus it is important to establish how alternate cues can be used to substitute touch. In four conditions; vision only, combined vision and touch, and two visual conditions after either a positive or negative emotive inducement, participants evaluated two products on perceived value and feelings of ownership. One product had visually prominent tactile cues and the other did not. Participants also completed a need for touch scale to test if tactile need differences affect the outcome of perceived value and ownership. The findings show that visually based tactile properties are instrumental in guiding how stimuli are perceived and that this interacts with induced emotion. Furthermore, there is an interactive pattern for those with different types of tactile needs and whether the stimuli have visual based tactile properties. We discuss the results within a framework of understanding consumer perception.
Keywords: touch, emotion, endowment effect, consumer perception

1. Introduction

The endowment effect is when an increase in perceived value takes place as the result of taking ownership of possessions (Franciosi, Kujal, Michelitsch, Smith, & Deng, 1996; Kahneman, Knetsch, & Thaler, 1990). Such ownership does not have to be real and the effect can also occur when people take psychological ownership of possessions, i.e. they don't actually own it (Peck & Shu 2009; Pierce, Kostova, & Dirks, 2003). The fact that psychological ownership can be generated by simply touching possessions has captured the interest of consumer behaviourists and marketers, as it is a simple tool to increase likelihood of purchase (Jansson-Boyd, 2011). In this study we wanted to try and further the understanding for how psychological ownership of material possessions may be generated. And by doing so, making it clearer to consumer behaviourists how the endowment effect can be utilised to communicate with consumers. To enhance the ecological validity of the outcome of this work it is important to compare multiple factors from a within participant perspective as consumers are usually faced with multiple influencing variables at any one time. Thus we needed to ensure that emotion was effectively compared to other variables to clearly establish its role in generating the endowment effect. Specifically, we wanted to compare combined vision and touch to just visual input as well as how visual input may be influenced by emotion. Additionally, we wished to explore whether visual cues that clearly give away information about an object's tactile properties can influence how it is perceived. Hence, three different concepts are explored here.

1.1 The three constructs

Firstly, the role of emotion. Here we hypothesise that emotive input can be used to generate the endowment effect. The underpinnings for this is that neurological data has highlighted that there is a close connection between emotion and touch (Hadland, Rushworth, Gaffan, & Passingham, 2003; Rolls et al., 2003; McGlone, Wessberg, & Olausson, 2014). Furthermore, tactile interaction has also been found to produce emotional attachment (Atakan, 2014; Essick et al., 2010; Peck & Wiggins, 2006; Peck & Shu, 2011). Thus the endowment effect may occur as a result of an emotive experience that takes place when touching an object. This raises the question whether emotions can be used to induce the endowment effect without tactile interaction.

Secondly, we wanted to explore the relationship between different needs for tactile input and different kinds of emotive priming**.** Consumers can generally be categorised as being high or low on autotelic and instrumental need for touch (Peck & Childers, 2003; for an overview see Jansson-Boyd, 2016). Those with an autotelic need for touch are hedonically orientated in their tactile approach and are therefore driven by the pleasure they experience trough tactile interaction. Consumers with an instrumental need for touch differ in that they are goal-directed in their tactile interaction and they utilise tactile properties to help evaluate them. For example, they may hold two products at the same time to estimate which one is heavier. People with high tactile needs tend to become frustrated if they are deprived the opportunity to engage haptically with stimuli (Peck &

Childers, 2003). Such a frustration is representative of a strong negative emotion (Frijda, 1993). Negative emotions triggered by lack of tactile input can be offset by a positive emotion when making judgements about products. In particular, those with a high need for touch are influenced more by negative emotions than those with a low need for touch. This is because a negative mood blocks the ability for people with a high need for touch to process haptically based feature information (Yazdanpaast & Spears, 2013). As negative moods interfere with highly tactile individuals, it is expected that negative emotion would influence the two evaluative variables that composite the endowment effect, feelings of ownership and increased perceived value of an item. Consequently, we wanted to evaluate to what extent positive and negative emotions may hinder or increase feelings of ownership and perceived value for people with different needs for touch.

The final construct explored is if products with visually based haptic cues have a role to play when looking at the role of emotion in stimulating the endowment effect. It has been found that consumers respond differently to products that are visually perceived to be tactile in nature (touch-ability) even when no direct touch is experienced (Klatzky & Peck, 2012). When objects are perceived to 'invite' touch, evaluations vary based on their structural attributes. This is important as research has found that simply imagining touch can produce psychological ownership of objects and thus basically mimics actual touch of an object (Peck, Barger & Webb, 2013). Hence, it should be possible to use visually salient haptic product properties as cues to boost the ease of imagination, which in turn would lead to higher feelings of ownership (Schlosser, 2003) and perceived increased value. Interestingly, those that have a high need for autotelic touch are more affected by information provided in the presence of haptic cues (Peck & Wiggins Johnson, 2011). Thus suggesting that high touch-ability cues can lead to an increase in perceived value and ownership and this being particularly applicable to those with a high autotelic need for touch.

2. Method

2.1 Participants

Ninety undergraduate students and staff from a university in Cambridge, UK, took part in the study (age: M = 27.9, SD = 3.3). Seventy-five were women (age: M = 28.2, SD = 3.8) and 15 were men (age: M = 26.4, SD = 2.8). We determined the number of participants on the basis of previous studies investigating similar perceptual elements (e.g. Marlow & Jansson-Boyd, 2011). All gave their written consent for participation in the study and the procedures were approved by the Department of Psychology ethics committee at the Anglia Ruskin University.

2.2 Preliminary tests

Two pre-tests were conducted, the first determined which products were going to be used in the study. The researchers chose 20 products that were deemed to be high or low on touch-ability (when there are clear visually based tactile cues present). Then, 25 participants were asked to rate, on a 7-point Likert scale, how much they wanted to touch each one. The two products with the highest (M = 5.26) and lowest (M = 2.16) means score were used as stimuli in the study (stimulus A and stimulus B respectively).

The second test determined the 'perceived value' for the two identified stimuli. Hence, 20 participants were asked to state how much they were prepared to pay for stimulus A and B. The mean value was then used as the mid-point and the highest and lowest values were used as the end-points. This resulted in a scale ranging from £1-3 (and the mean value and mid-point on the scale was £2) for stimulus A and £1.50-3.50 for stimulus B (and the mean value and mid-point on the scale was £2.5). Thus both scales were a 5 point scale with 50p increments.

2.3 Design, stimuli and procedure

The study used a 2 (number of target stimuli rated) x 4 (different conditions) design and employed a within-subject design so that each participant took part in all four evaluative conditions. This was essential as we wanted to see if differences occurred for any one individual based on the different variables in this study. Condition one, was a visual only condition. In the vision only condition, participants could only look at the stimuli**.** The second condition was the combined vision and touch condition in which participants were asked to hold and haptically explore the stimuli whilst evaluating it. The third and fourth conditions were also visually based, however, prior to conducting the evaluations the participants were shown a pictorially based PowerPoint presentation that induced either positive or negative emotions, thus there were two different presentations used. All images were from the International Affective Picture System, a database consisting of natural pictures of emotionally charged stimuli that has been commonly used in research as an emotive induction tool (e.g. Greenwald, Cook, & Lang, 1989; Modinos et al., 2012; Weinberg & Hajcak, 2010). The presentations contained 20 happy images or 20 negative images. Examples of happy images included laughing kittens and two older

ladies with parrots all over them. Examples of negative images included people in a flooded area and a building on fire. The presentation of the pictures followed the same format as previously used (e.g. Lang, Greenwald, Bradley, & Hamm, 1993) when obtaining emotive ratings for pictures selected from the IAPS. Each picture was presented for 6 seconds, followed by a 15 second interval. Whilst seeing the pictures, participants were asked to provide three ratings (per picture) on the Self-Assessment Manikin (SAM) pictorial system for pleasure, arousal and dominance (Lang, 1980; Hodes, Cook, & Lang, 1985; Bradley & Lang, 1994). The three constructs are measured by using five figures to symbolize each emotion (Lang, Bradley, & Cuthbert, 2008). Pleasure is represented with a range from a smiling happy figure to a frowning unhappy figure. Arousal is measured using figures ranging from excited and wide-eyed to a relaxed and sleepy looking figure. The dominance dimension represents changes in control and is done by using a range of different sizes from large to small. A large sized figure represents maximum control and the small minimum control. In the paper and pencil version, participants place an 'x' over any of the five figures, or between any two figures, they think best demonstrates how they feel about the pictorial stimuli, this results in a 9-point rating scale for each dimension. SAM was used as a confirmatory tool to assess that the pictorial stimuli induced positive and negative emotions.

Within each condition, participants had to evaluate two target stimuli and three foils. The three foils were different in each condition. Four evaluations had to be made in regards to perceived value, ownership, touch-ability and likeability. To increase the ecological validity of this study we wanted to avoid excessive consideration of each stimulus as in most real-life settings consumers would have instant and often subconscious responses in regards to ownership and perceived value. Thus we used one and two items scales and informed participants that they should provide a rapid response to each question. The perceived value scale was established from the pre-test and were different for stimuli A and B (as per pre-test). Ownership was measured using the same scales that has previously been used by Peck & Shu (2009) and Peck, Barger & Webb (2012). Hence participants had to rate whether they felt personal ownership for the stimulus and if they felt as if it belonged to them. Apart from the 'perceived value' measure, all other evaluations were measured using a 7-point Likert scale. In-between each evaluative condition participants had to engage in a timed four-minute long word search that acted as a distractor task.

After the evaluations, participants also had to a complete a Need-for-touch scale that evaluated whether they had a high or low need for instrumental or autotelic need for touch.

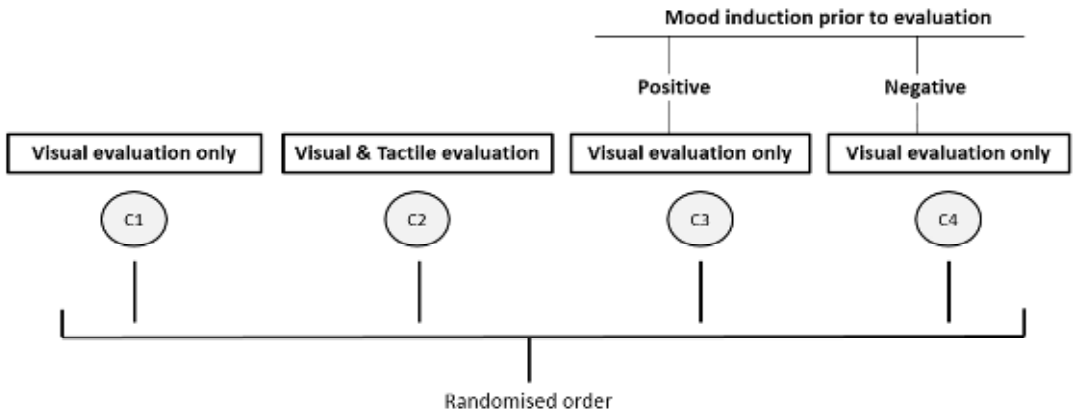

Fig 1. The four conditions: In each condition participants evaluated 2 target stimuli and 3 foils. In between each condition they did a distractor task. Condition 1 (C1), was visual evaluation only, so participants were not allowed to touch the stimuli. Condition 2 (C2), participants did a combined visual and tactile evaluation. In condition 3 (C3) and 4 (C4) participants were exposed to pictorial stimuli that induced a positive (C3) or negative (C4) mood prior to conducting a visual evaluation of stimuli.

The two target stimuli used were a small candleholder (stimulus A), and a mug (stimulus B). Stimulus A was 5.5 cm high and 9 cm in diameter across the middle (which was the widest point). The object was 7.3 cm in diameter at the top and 6 cm at the bottom. Object B was 8.5 cm high, 8.5 cm in diameter at the top and 7cm in diameter at the bottom. Photos of the stimuli can be seen in Figure 2a, and 2b. Three different foils were also used in this study to make it less ostensible which the target stimuli were. The order of the conditions as well as the order in which the stimuli were presented were randomised to avoid order effect.

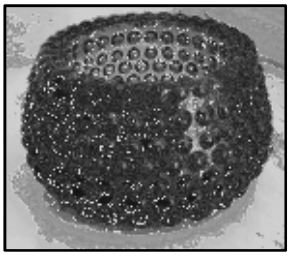

Fig 2a. High touch-ability stimulus. This stimulus has visually prominent tactile features in that it provides the viewer with visually based information in regards to what the object feels like. The candle holder is coated in small rounded protruding glass droplets.

Fig 2b. Low touch-ability stimulus. Stimuli not containing any visually noticeable tactile features. The surface of the mug is entirely smooth.

3. Results

3.1 Control measures

A low variability in the pleasure, arousal and dominance ratings for the positive images was found. All the participants found the pictures to be pleasurable even though they did not rate them high on arousal and dominance. More variability was found on the pleasure and dominance ratings for the negative images. However, no variability was found for arousal. See Table 1 for mean, minimum and maximum ratings.

		Mean	*Minimum*	*Maximum*
Positive	Pleasure	2.12	1.00	3.15
	Arousal	1.33	1.00	2.30
	Dominance	1.29	1.00	1.85
Negative	Pleasure	3.63	1.35	8.00
	Arousal	1.27	1.00	2.80
	Dominance	1.68	1.00	4.90

Table 1. Overall ratings for positive and negative emotive imagery used. The highest possible rating was 9 and the lowest was 1. On the Pleasure scale 1 = high pleasure and 9 = low pleasure. On the other two scales 9= high arousal/dominance and 1 = low arousal/dominance.

3.2 Emotive input

To identify if emotive input can induce the endowment effect we looked at the relationship between ownership and perceived value for the two products tested. For stimulus A, a significant relationship was found between the two variables in the in the negative emotive priming condition $r(90) = .557$, $p < .001$ as well as in the positive emotive priming condition $r(90) = .670$, $p < .001$. However, no significant relationship was found in the emotive priming conditions for stimulus B. It was also found that for stimulus A, there was a significant relationship between ownership and perceived value in the visual condition $r(90) = .588$, $p < .001$, and additionally in the combined visual and tactile condition $r(90) = .741$, $p < .001$. A significant correlation was only found between pay and ownership in the combined visual and tactile condition for stimulus B, $r(90) = .268$, $p < .05$.

3.3 Need for touch

For stimulus A, a significant difference was found between the four testing conditions and willingness to pay depending on whether participants had a high or low ANT ($F(3, 258) = 12.11$, $p = 0.000$) or a high or low INT. ($F(3, 258) = 3..80$, $p = 0.011$. Post hoc independent sample t-tests for high and low ANTs demonstrated that there were significant differences in evaluation for all the conditions: visual t(88) = 3.5, p = .001, tactile t(88) = 3.60, p = .001, negative priming t(88) = 4.65, p = .05 and positive priming t(88) = 6.17, p = .000. It was also found that the post hoc testing for high and low INTs were significant in all four conditions, visual t(88) = -1.91, p = .05, tactile t(88) = -3.07, p = .003, negative priming t(88) = -2.49, p = .014 and positive priming t(88) = -2.33, p = .022.

Additionally, for stimulus A, significant results were found for ownership and instrumental need for touch ($F(3, 258) = 8.87$, $p = 0.000$) as well as ownership and autotelic need for touch ($F(3, 258) = 4.66$, $p = 0.003$). Post hoc t-tests revealed that there was a significant difference between high and low INTs in the touch condition t(88) = -4.08, p = .000, negative emotive priming t(88) = -2.25, p = .027, and in the positive emotive priming condition t(28) = -3.72, p = .000. Moreover, the post hoc testing showed that there were significant differences for high and low ANTs in all the conditions: visual t(88) = 2.85, p = .005, tactile t(88) = -3.27, p = .002, negative priming t(88) = 4..10, p = .000 and positive priming t(88) = 4.14, p = .000. The mean values for stimulus A can be seen in Table 2. No significant results were found for stimulus B between autotelic need for touch, instrumental need for touch, ownership and perceived value.

		Vision	*Touch*	*Positive emotion*	*Negative emotion*
Perceived value	High ANT	2.21	2.32	2.15	2.27
	Low ANT	1.50	1.60	1.30	1.20
	High INT	1.57	1.62	1.40	1.37
	Low INT	2.05	2.30	2.05	2.10
Ownership	High ANT	3.40	4.25	4.35	4.10
	Low ANT	1.95	2.25	2.20	1.85
	High INT	2.1	2.15	2.45	1.90
	Low INT	3.25	4.35	4.10	4.05

*ANT = Autotelic need for touch and INT = Instrumental need for touch

Table 2. Mean ratings for stimulus A – high touch-ability product. The table shows the difference in ratings between participants that had a high and low need for autotelic touch and high and low need for instrumental touch for both perceive value and ownership. It can be noted that across all four conditions those with a high and low instrumental need for touch have rated the items in the reverse from those with a high and low autotelic need for touch.

3.4 Visually based haptic cues

In order to see whether visually based haptic cues altered the evaluation for ownership and perceived value we looked at the overall ratings for both stimuli. A significant interaction effect was found between increased feelings of ownership and the four conditions for stimulus A ($F(3, 258) = 11.55$, $p = 0.000$) as well as for stimulus B ($F(3, 258) = 5.64$, $p = 0.000$). For stimulus A, the highest value was produced in the positive emotive condition (M = 3.27) and this was closely followed by the combined visual and tactile condition (M = 3.25). The lowest ownership rating occurred in the vision only condition (M = 2.67). For stimulus B, the highest mean rating was for the combined visual and tactile condition (M = 3.02) and the lowest rating was for the negative emotive condition (M = 2.57) (see Figure 3a).

Significant differences were also found between the four conditions and perceived value for both stimulus A ($F(3, 258) = 15.34$, $p = 0.000$) and stimulus B ($F(3, 258) = 8.65$, $p = 0.000$). For both stimuli the combined vision and touch condition generated an overall higher rating followed by the visual evaluation (see Figure 3b for mean values).

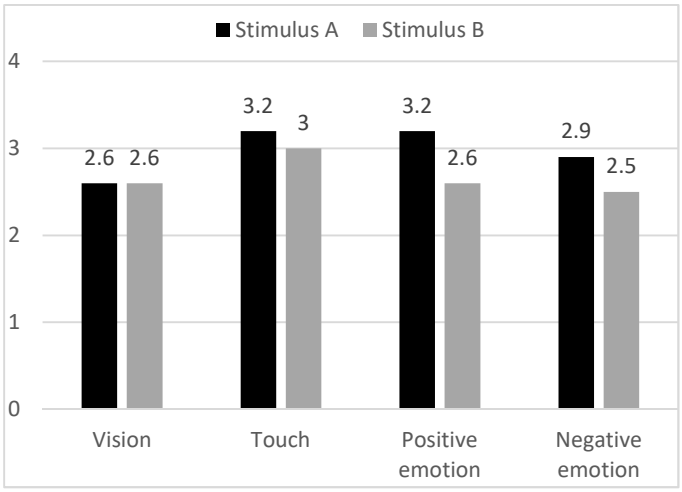

Fig 3a. Ownership: Overall ratings for both stimuli. For stimulus A the highest ratings of ownership occurred in the combined vision and touch condition and in the positive emotive condition. Whilst for stimulus B the highest rating occurred in the combined vision and touch condition.

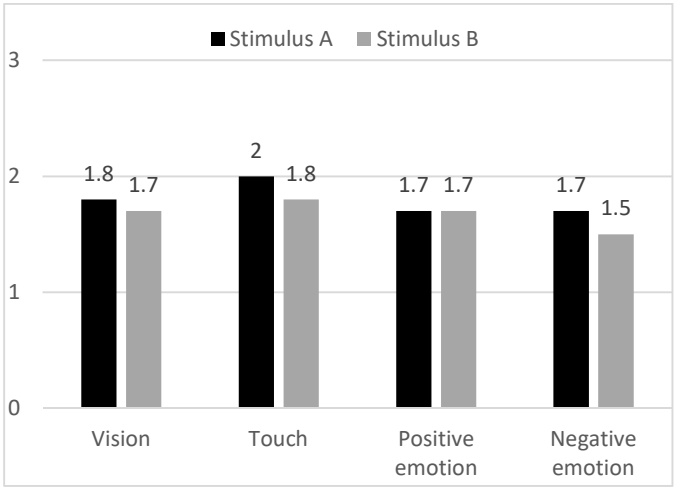

Fig 3b. Perceived value: Overall ratings for both stimuli. The highest rating for stimulus A occurred in the combined vision and touch condition, followed by the vision only condition. For stimulus B, the highest ratings occurred in the combined vision and touch and in the vison only condition.

4. Discussion

Emotions, need for tactile input and visual information about tactile properties are not elements that would normally come together to influence how consumers perceive stimuli. By taking the aforementioned three aspects into account, the present study allows us to infer several conclusions.

The data shows that there is a relationship between perceived value and ownership in both the positive and negative priming conditions for stimulus A. The relationship is a bit stronger in the positive condition (.670) than it is in the negative condition (.557). Hence it would seem that the endowment effect can indeed occur when emotion is used as a substitute to tactile input. However, as relationships between perceived value and ownership are also found to be significant for stimulus A in the other two conditions but only in the combined visual and tactile condition (.268) for stimulus B, we deduce that it is the visually based tactile cues that are present on stimulus A that is the driving factor in generating the endowment effect. We also conclude on the basis that there was a relationship between the factors in the combined vison and touch condition for stimulus B, even though very weak, in conjunction with the fact that the strongest relationship was identified in the same condition for stimulus A (.741) that actual tactile input plays an instrumental part in generating the strength of the relationship found for stimulus A. However, had it purely been due to the tactile input then the strength of the relationship for stimulus B should have reflected this. Thus, it is can be deduced that it is the type of stimuli that is the deciding factor in regards to whether the endowment effect occurs. As stimulus A was the high-touchability stimulus, it seems that the visually prominent haptic features are guiding participants' perception on this.

The fact that the stimuli itself (i.e. touch-ability versus non touch-ability) is a driving factor in altering how the participants perceived them is also evident from differences in need for tactile input. Clear differences in how those with a high or low autotelic need for touch as well as those with a high or low instrumental need for touch rates the value of stimulus A were found. Consistently, those with a high autotelic need for touch perceives the value as higher in all the conditions than those with a low need for autotelic touch. Whilst the opposite occurs for those with a high and low instrumental need for touch. The communality between all four types of need for touch is that they all rated stimulus A as being more valuable in the combined vision and touch condition.

The same overall pattern in differences in ratings between high and low autotelic and instrumental need for touch was also found for ratings of ownership. However, the ratings of ownership were influenced by different variables in that positive mood induction generated higher ratings for those with high need for autotelic and instrumental need for touch. For stimulus B, differences in need for touch was not found to play a role in the ratings of ownership and perceived value. Thus showing that there is an interactive relationship between touch-ability, emotion and feelings of ownership and as such it can be concluded that positive emotions have the capacity to influence the perception of ownership. As there were no significantly different findings for stimulus B that were influenced by differences in need for touch but there were for stimulus A, it shows that visually based cues influences the perception differently depending on your need for touch. The mean values for those with a high autotelic need for touch were generally higher across all the conditions and thus demonstrating their receptiveness to visually based tactile cues.

The relationship between touch-ability and emotion is also evident from the overall ownership ratings for both stimuli A and B where a significant difference in rating was found between the four conditions (see Figure 3a). The highest ratings were produced in the positive mood induction and the combined vision and touch condition for stimulus A. Thus showing that emotion coupled with visually based haptic cues can rival the influence of actual touch. Whilst for stimulus B, that lacked visually based tactile cues, the highest rating occurred in the combined visual and tactile condition. Interestingly, the responses for stimulus A shows that ratings are lower in the negative emotive condition and decrease further in the vision only condition. Presumably, the higher negative rating stems from the fact that participants experienced emotive arousal rather than no arousal as in the visual only condition. We infer from this that the ratings of ownership are overall more susceptible to emotive influences. However, this does not seem to be the case for ratings of perceived value as there was no real difference between positive emotive induction and vison only ratings. The overall ratings for perceived value generated higher values in the combined visual and tactile evaluations for both stimulus A and B. However, the differences in ratings were closer together than for ownership ratings. Again demonstrating that touch is an influential factor in guiding consumer perception.

The SAM ratings for the emotive pictorial stimuli used showed that there were some inconsistencies in ratings. The overall mean for pleasure for the positive imagery used was 2.12 and thus showing that they produced validating results in that most participants experienced the pictures as inducing positive mood, even though they did produce low arousal levels. However, the negative pictorial stimuli used did not produce the low pleasured ratings that would clearly reflect that a negative mood induction had taken place. This may explain (at least partially) the fluctuation that can be noted in the evaluative ratings for stimuli after having been exposed to emotive induction. Consequently, the influence of negative mood induction should be explored in more detail in future studies with the aim of using stimuli that more clearly differentiate between positive and negative mood induction stimuli.

Future studies should look at whether it is possible to determine what exactly is required to create visually prominent haptic cues. Are there specific criteria for making a product a high touch-ability stimulus? Furthermore, research should also investigate how to best provide people with emotive cues in an online context.

5. Conclusion

This is the first time that emotive priming and visually based tactile cues have been used as a factors to influence the two variables of perceived value and ownership which combined constitutes the endowment effect. Here we have demonstrated that visually based tactile cues have a significant role to play in perception of ownership and value. We found that emotions can induce the endowment effect but only when there are visually based tactile cues present on the stimulus. Hence we can conclude that positive emotions increase feelings of ownership when products have visually based tactile cues present. This should be taken into consideration when marketers promote products that consumers are less likely to touch as it can be used as a means to increase likelihood of purchase. Those with a high autotelic need for touch are also more susceptible to positive emotive cues in combination with visual tactile cues. Thus may be a sufficient tool for offsetting lack of touch when shopping online.

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