

Creativity at Work:

Antecedents and consequences of creativity and beauty judgements in consumer products.

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Abstract

The literature in consumer psychology has tended to lack a clear separation between theoretical models of creativity and beauty evaluations of products. The present study examined whether creativity and beauty affected willingness to pay jointly or separately. In three experiments using paintings, wrist watches and designer lamps as stimuli, the present study shows how creativity and beauty both positively influence consumer willingness-to-pay for the product, but each explains different parts of the variance. Further, product complexity differentially affects consumer judgments of creativity and beauty. The results show that it is essential to develop separate models of creativity and beauty evaluations in consumer psychology, in that they seem to be distinct factors, explaining different parts of the variance in their consequences on willingness to pay, and are affected differentially by antecedent factors, such as complexity.

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The aesthetic qualities of consumer products are increasingly becoming important factors in consumer behavior and preference formation. The design of products has been shown to be important in determining the success of a new product (Bruce & Whitehead, 1988). Consumer products, one of the 4 P's in the marketing mix, are not only differentiated by price and functionality, but equally so by their aesthetic qualities (Holbrook, 1980).

Consumer judgments of aesthetic value in products may take several forms, two of the important ones being *beauty*, which is perhaps the generic sort of aesthetic excellence (Zangwill, 2003) and *creativity*, which is a hallmark of art generally (Alpeson, 2003). Both concepts are honorific and carry with them notions of positive value in making product judgments.

Scholars have argued that consumer judgments of both product creativity and beauty are of importance in consumer psychology because they influence preference formation and consumer choice (Besemer & Treffinger, 1981). Consumer preferences are typically not well-defined but may become articulated in the process of making a decision (Slovic, 1995; Hoeffler & Ariely, 1999). Importantly, people often are unable to reflect their mental processes directly (see Nisbett & Wilson, 1977) so that they do not know what influences their willingness to pay a certain price for a product. Therefore, it becomes important to know what consumers base their purchase decisions on, either by manipulating or assessing the underlying variables.

Despite research on judgments of both beauty and creativity, it has remained unclear what the relation is between the two judgment types. Beauty is central to most theories of aesthetics as well as the lay-persons understanding

of the term aesthetics (Jacobsen, Butcha, Köhler, & Schröger, 2004), whereas originality (a defining characteristic of creativity) was the first property of beautiful art to Kant (1929/1790). Although both are clearly related to aesthetics, the literature on consumer psychology is inconclusive as to whether they are independent qualities, or whether one of the two qualities subsumes the other. We first describe approaches that claim that creativity and beauty are related – positively or negatively – and then discuss factor-analytic evidence that supports the notion that creativity and beauty are independent dimensions.

The relationship between beauty and creativity

Beauty as part of creativity

While a standard consensual definition of creativity lists the two most important qualities of creative products as being their novelty and usefulness (Mayer, 1999), some authors in consumer psychology literature has added aesthetics (e.g., beauty, elegance, or attractiveness) as a third factor of product creativity (Burroughs & Mick, 2004; Burroughs, Moreau, & Mick, 2008). Burroughs & Mick (2004) thus proposed a three dimensional conceptualization of creativity, where the most creative acts of consumption are high in novelty, functionality and aesthetics. Similarly, other authors have suggested that product creativity should incorporate aesthetics as one of the core product features, and further that creativity judgments have a strong affective component that allows customers to feel an emotional impact and identity with the products (e.g., Horn & Salvendy, 2006; 2009). This affective component is shared by beauty. As such, beauty and creativity have become theoretically entangled in the consumer psychology literature, thus challenging their conceptual independence. Furthermore, both concepts have been argued to lead to the same positive effects of consumer preference formation and consumer choice. And finally, it has also been argued that both creativity and beauty judgments are affected in the same way by antecedent factors, such as stimulus variability (Young & Racey, 2009). Finally, Hekkert and colleagues (Hekkert & Leder, 2008; Hekkert, Snelders, & van Wieringen, 2003) suggested the MAYA (Most Advanced Yet Acceptable) principle of aesthetics, which holds basically that designers need to find a balance between innovation or novelty (most advanced), and a certain amount of typicality (acceptable). As such, the MAYA principle in a sense integrates creativity and beauty evaluations into the same aesthetical framework. Hekkert, Snelders & Wieringen (2003) tested the MAYA principle by using products such as telephones and teakettles, which differed along the dimensions of typicality and novelty. Participants rated all objects according to typicality, novelty, and aesthetic preference; novelty and typicality showed strong negative correlations, but each was correlated poorly with preference. Importantly, however, the relationship of preference to both typicality and novelty was positive and significant when the influence of the other variable was partialled out. Thus, attractive designs comprise a thoughtful balance between novelty and typicality.

Keeping these arguments in mind, some authors may not see much point in separating the two concepts in future research because the concepts creativity and beauty cover the same processes or are at least positively correlated.

Beauty and creativity as opposites

In contrast to proponents of a positive correlation between creativity and beauty, some scholars claim that there is an antagonism between creativity and beauty. Originality, and therefore novelty, is an integral part of creativity (Mayer, 1999). Indeed, in making creativity evaluations, people tend to make categorical comparisons, for example by noting original or unusual features. Therefore, creativity has been closely linked to judgments of originality: The more original and novel, the more creative.

Beauty, on the other hand, has been linked with the opposite end of the familiarity-originality dimension. Theories of perceptual fluency hold that familiarity increases fluency, which is the ease with which input information flows through the cognitive system. Perceptual fluency, in turn, has been shown to be affectively positive (Reber, Winkielman, & Schwarz, 1998; Winkielman & Cacioppo, 2001; see Reber, Schwarz, & Winkielman, 2004; Schwarz, 2004 for reviews). Studies in consumer research have documented that variables that result in perceptual fluency, such as prototypicality and unity (Veryzer & Hutchinson, 1998) or familiarity (Janiszewski, 1993) influence aesthetic responses or affect. Therefore, beauty judgments have been closely linked to judgments of familiarity: The more familiar, the more beautiful.

As such, constructs relating to originality-familiarity have the potential to inform us whether creativity and beauty indeed in some cases may be distinctly influenced by antecedent factors, and maybe even (in the case of originality-familiarity), that they may be driven in opposite directions. For example, Purcell (1984) and Christiaans (2002) suggested that product prototypicality would indeed lead to differences in beauty and creativity evaluations. Cho and Schwarz (2006) found in their study that when participants low in Need for Cognition made beauty judgments, they liked products more when the product description was easy to read, but the same participants subsequently judged the same product as being less innovative. However, if participants had first to indicate whether a product was innovative, Cho and Schwarz found a carry-over effect in that participants judged products whose description was difficult to read as being both innovative and beautiful.

Although theoretical models of creativity are scarce, it seems relevant to point towards at least three key theoretical distinctions between models of creativity and beauty: 1) Whereas beauty judgments may in some cases be perceptual in nature, creativity judgments are mainly analytical, drawing on conceptual comparisons with product categories. For example, Hekkert, Schnelders & Wieringen (2003) proposed a dual process model of aesthetics, suggesting two separate mechanisms: An automatic, adaptive trait that favors easy-to-classify or typical stimuli (Bornstein, 1989), opposed to a controlled or cognitively mediated mechanism that complements and possibly counteracts the attitude changes due to typicality or mere exposure. 2) Although the above

mentioned theories from consumer psychology (Horn et al., 2006; Burroughs et al., 2004) claim that emotional impact is a part of creativity judgments, it seems clear that this affective component is linked more strongly to beauty than to creativity. Theoretically, it is possible to offer an emotionally detached creativity judgment, whereas it seems unlikely that the same thing could happen in a beauty evaluation. 3) Beauty judgments have been argued to cover the whole (typically visual) gestalt (Hasselzahl, 2008), whereas creativity is sometimes restricted to a feature-based evaluation, where the creativity judgment can then be changed by adding novel features.

These differences between creativity and beauty led researchers to examine the possibility that the two notions are independent of each other. We discuss this research next.

Creativity and beauty as empirically distinct constructs

Several recent empirical studies that examined the link between beauty, creativity and other factors by using factor analytic studies, consistently found that beauty and creativity load on different factors.

Two studies in art perception have conducted factor analyses on beauty and creativity items. Kozbelt (2004) studied originality and technical skill as components of artistic creativity (judging 72 drawings), and found that whereas both creativity and beauty items loaded onto the product quality dimension in art, the creativity and beauty items loaded on different factors in the factor analytic study. As such, even though Kozbelt had hypothesized that beauty would be on the originality factor, in fact it was shown that beauty did not load on the same dimension as items such as 'original, creative, imaginative, surprising, possibility of interpretation', etc. Hagtvedt, Hagtvedt & Patrick (2008) used five figurative paintings as stimuli, and found in the perceived attributes factor loadings that creativity and aesthetic appeal (e.g., beauty) appeared to be two different factors, incidentally with the two items of 'beauty' and 'creativity' having the highest factor loadings in their respective factors. The creativity factor consisted of the following items: imaginative, creative, inventive, innovative, original, novel, distinct (Cronbach's Alpha = .92); whereas the aesthetic appeal factor consisted of these items: beautiful; aesthetically pleasing; attractive; elegant (Cronbach's Alpha = .90). Two further studies have tested components of creativity, and are of interest here because they document that the dimensions originality and beauty loaded onto different factors. Horn & Salvendy (2009) found that in student responses to previous experience with creative products six distinct factors emerged (novelty, resolution, emotion, centrality, importance and desire). Important here is that, again, originality appears to be a distinct factor from factors dealing with affective value. Finally, Zeng, Salvendy & Zhang (2009) tested the factor structure for web site creativity, and found that beauty loaded on an aesthetics appeal factor, whereas originality loaded onto the novelty factor.

These studies present empirical evidence that creativity and beauty are two different factors, at least in art evaluation. However, the comparison

between creativity and beauty has not been directly made in the consumer products category. In the present study we tried to test whether creativity and beauty correlate in consumer products when comparing averaged by-item responses (as opposed to the by-subject responses usually used in this line of research) for consumer ratings.

Much past research has relied on multiple individual responses to a restricted range of products (leading to examinations of naïve theories of the relation of the concepts). Our approach instead focused on by-item correlations leading to examinations of how product characteristics on average affect judgments like creativity and beauty (Hasselzahl, 2008). The present study did not attempt yet another factor analytic study, but rather tried to document construct separation between creativity and beauty in by-item correlations of consumer products.

Creativity and beauty as predictors of consumer behavior

Whereas both creativity and beauty have been argued to be predictors of consumer behavior, it is for different theoretical reasons. Although consumer psychology models would hold that both creativity judgments and beauty judgments should predict consumers' willingness to pay for the product, they should not explain the same variance. Consumers are not always after easy processing - sometimes they tend to prefer novel or original instances (Bianchi, 1998; Simonson & Nowles, 2000; Hekkert et al., 2008).

The marketing literature on innovativeness has tended to focus on how different consumers have a preference for adopting products early in the product life cycle, whereas others tend to postpone adoption, or not adopt at all (e.g., Rogers, 1976). In directing the argument towards the perception of innovativeness or originality in products, some authors have argued that consumers hold a preference for novelty in consumer products (see e.g., Hirschman, 1980). In three studies of consumer products (such as chairs and lamps), for example, Horn & Salvendy (2009) showed that at least some of the dimensions of product creativity successfully predicted consumer attitudes (consumer satisfaction, and their willingness to purchase). In such models, product differentiation and novelty of product features are at the forefront, in comparing to what was before, and what the competition may have to offer. As such, categorical comparisons of the typicality of products may possess a marketing advantage, in that consumers tend to prefer products with original and unique features.

Similar to judged creativity, perceived beauty has been linked to increases in valuation in consumer behavior. Bloch, Brunel & Arnold (2003) showed consumers two different pictures of toasters equal in functionality, but differing in beauty. Consumers rated their willingness to pay for the toasters. Participants were willing to pay on average \$37.20 on the beautiful toaster, but only \$24.05 on the less beautiful toaster - or about 55% more for the beautiful one. Similar results have been obtained by Hasselzahl (unpublished study, quoted in Hasselzahl, 2008) with mobile phones. The series of experiments

conducted by Bloch et al. (2003) further suggested that the beauty effect on valuation was moderated by individual differences in what he called 'centrality of visual product aesthetics' (CVPA). CVPA moderated both the overall evaluation, the purchase intention, and the willingness to pay in the above mentioned toaster study. High CVPA individuals were willing to pay \$40.09 for the beautiful toaster to be contrasted with £34.32 for low CVPA individuals.

As such, there exists evidence that both creativity and beauty judgments would predict consumer's willingness to pay for the product. However, to our knowledge, it has not yet been tested whether creativity and beauty predict the same or differing parts of the variance. It is possible that creativity and beauty would predict the same consumer behavior variance, if for example preference formation for consumer products was influenced in the same way by creativity and beauty judgments; this would be the case if there was a strong correlation between creativity and beauty. Alternatively, if creativity and beauty judgments drew on distinct theoretical models of evaluation, and since creativity and beauty judgments have been shown empirically to load on distinct factors, they would explain different parts of the willingness to pay variance. Based on this alternative rationale, creativity and beauty judgments would both be predictors of consumers' willingness to pay for consumer products, and would predict different parts of the variance.

Creativity and beauty as differentially affected by product complexity

We were primarily interested in how creativity and beauty influence willingness to pay for a product. A secondary interest was how product complexity is related to judged creativity and perceived beauty. Even creativity and beauty judgments relied on different theoretical models of evaluation, they have both been argued to rely on - or be influenced by - the subjective experience of originality or familiarity.

Beyond testing the effects of creativity and beauty on willingness to pay, we varied the complexity of the consumer product in order to examine how this variable influences judgments of creativity and beauty.

The relation between complexity and creativity has been supported in previous research. Complexity has been found to relate to subjective estimates of originality. For example, Besemer & O'Quinn (1989) found in a factor analytic study of the components of creative products, that complexity loaded heavily on the originality dimension. In a direct test of the relation between complexity and judgments of originality and familiarity in a study using simple shapes as materials, Christensen, Ball & Reber (in preparation) found that complexity indeed related positively to judgments of originality - but negatively to judgments of familiarity. In a study of creativity in art, Young & Racey (2009) hypothesized an inverted U shape between stimulus variability (one measure of complexity) and judged creativity, but found rather a strong linear positive relation between stimulus variety and judged creativity. Finally, research on individual differences has shown how creative people are attracted to

complexity and have a high tolerance for ambiguity (see e.g., Ziv & Keydar, 2009 for a review).

Much previous research has been devoted to the relation between beauty judgments and complexity. Whereas some researchers found that simplicity leads to aesthetic preference (Birkhoff, 1933), others – most famously Berlyne (Berlyne, 1971) – predicted and found an inverted U-shaped curve, with low preference for simple and complex stimuli and highest preference for stimuli with intermediate complexity (see also Munsinger & Kessen, 1964). Hekkert and Wieringen (1990) also found an inverted U shape relation between creativity and complexity in paintings – but only for paintings that were low on categorizability (measured by the time it took to identify a human figure in the painting). For the intermediate and high categorizable paintings, no significant relation between beauty and complexity was found. Martindale, Moore, and Borkum (1990), however, challenged the notion of an inverted U relation between complexity and aesthetic preference by showing that complex stimuli may be preferred if they are more meaningful than simple stimuli. It has thus been found that aesthetic preference increases with simplicity (e.g., Birkhoff, 1933), increases with complexity (e.g., Martindale et al., 1990), or follows an inverted U-shaped function (Munsinger & Kessen, 1964). In sum, these studies leave open whether creativity and beauty are correlated positively, negatively, or not at all.

The present study

Experiments have shown that both judged creativity and perceived beauty contribute to consumer judgments. However, as the effects of creativity and beauty have not been tested within the same experiment on consumer judgments, it has remained unclear whether the two variables contribute jointly, but independently to the willingness to pay a certain price for a consumer product. Three different predictions are possible: First, if creativity and beauty showed a strong negative relationship, we would expect that willingness to pay varies positively with one dimension, but negatively with the other. For example, if consumers are willing to pay a high price for a creative product, they would pay a lower price for beautiful products. Second, if creativity and beauty showed a strong positive relationship, we would expect that willingness to pay varies positively with both dimensions, which are seen as having positive value. However, the effects of creativity and beauty would not be independent. Third, if creativity and beauty were not or only weakly related, we would predict that the two variables exert a joint, but independent effect on willingness to pay. To anticipate the findings, the present set of experiments provides compelling evidence that in the domain of consumer products, consumers clearly distinguish between creativity and beauty; their evaluations of creativity and beauty explains different parts of the variance in their willingness to pay.

Experiment 1

Method

Subjects

Fifty-nine undergraduates from the University of Bergen (38 female; mean age 21), and 21 participants from Copenhagen Business School (11 female; mean age 49) were asked to judge Picasso paintings, for a total of 80 subjects.

Materials

In a pre-study, 20 subjects who did not participate in the main study judged 129 Picasso paintings for complexity. The 129 paintings were selected to represent a mixture of styles, and excluded some of the most well known Picasso paintings. Based on the responses, the images were divided into five evenly spaced categories of complexity with six pictures in each, a total of 30 Picasso paintings. The mean complexity scores for the five categories are presented in Table 1. The pictures were selected for each category to represent a mixture of painting styles and for having low standard deviations. The 30 pictures in five evenly spaced complexity categories constituted the materials used in the experiment.

Table 1

Complexity ratings for image categories based on pre-study data in Experiment 1.

Complexity category	Experiment 1		
	Range	Mean	SD
1	-35	28.8	19.9
2	35-45	40.4	18.9
3	45-55	50.4	20.4
4	55-65	59.7	19.3
5	65-	71.7	17.9

Procedure

Pictures were presented for 2 s on a 17" computer monitor using E-prime[®] presentation software (Psychology Software Tools Inc., www.pstnet.com). Sixty-three participants rated the same series of 30 Picasso pictures twice, for a total of 60 judgments. Prior to judging the experimental Picasso pictures the participants saw two test-images of varying complexity of Picasso images to familiarize them with the task. In the experiment about half of the 63 participants first made beauty judgments ('how beautiful is the picture') on an on-screen 10 cm long visual analogue scale ranging from 0, 'ugly' to 100, 'beautiful'. Then they made creativity judgments ('how creative is the picture') on a visual analogue scale ranging from 0, 'uncreative' to 100, 'creative'. For the other subjects, the ordering of judgments was reversed. An additional 17 participants made 'willingness-to-pay' judgments by indicating how much they were willing to pay for a poster depicting the paintings shown to the other

participants on a Visual Analogue Scale ranging from NOK 0 to NOK 200 (around US\$ 35)¹. Each picture was preceded by a fixation point presented for 500 ms. The ordering of the presentation of the 30 pictures was randomized for each participant.

Results and discussion

To examine whether creativity and beauty judgments of Picasso paintings were related we averaged consumer responses to creativity and beauty by each item. For each person, only the first evaluation made was used for the by-item measure. As such, evaluation averages for distinct groups of subjects could then be calculated for individual Picasso items for their creativity ($M = 60.0$, $SD = 11.6$), beauty ($M = 50.5$, $SD = 7.4$) and willingness-to-pay ($M = \text{NOK } 87.4$, $SD = \text{NOK } 24.0$, range from NOK 50.4 to NOK 131.2).

A by-item correlation between creativity and beauty evaluations showed a coefficient of $r(30) = -.36$ ($p = .05$). As such, a small *negative* correlation between creativity and beauty was found, suggesting that creativity and beauty are distinct factors. To test for naïve understandings of the relation between creativity and beauty, individual correlations were calculated for each subject. These within-subject correlations were transformed to z-scores, averaged across subjects, and transformed back to coefficient $r(63) = .21$ ($p = .10$). As such, within-subject correlations appear to display a small *positive* (but marginally insignificant) correlation between creativity and beauty. It is interesting to note that the two types of correlations yielded coefficients going in opposite directions.

To test whether creativity and beauty evaluations explained different parts of consumers' willingness-to-pay for the product, we ran a multiple regression analysis on the by-item averages with willingness-to-pay as the dependent factor, and both creativity and beauty evaluations as the independent factors. As such, again, distinct group evaluations of the consumer products were used, rather than the typical approach which estimates the relation between the constructs within-subject. Creativity significantly predicted willingness-to-pay scores, $\beta = .67$, $t(29) = 5.11$, $p < .001$, as did beauty, $\beta = .69$, $t(29) = 5.22$, $p < .001$. Creativity and beauty combined also explained a significant proportion of variance in willingness-to-pay, $R^2 = .59$, $F(2, 29) = 19.58$, $p < .001$. To illustrate the impact of creativity and beauty on willingness-to-pay, we show the ten least beautiful/creative paintings and the most beautiful/creative paintings in terms of how much the subjects on average were willing-to-pay for them (see Table 2). Thus, creativity and beauty both predicted willingness-to-pay, but explained different parts of the variance.

¹ An error in the programmed software caused the 17 subjects judging 'willingness-to-pay' to view one of the experimental images as a test-image also (causing them to rate that image twice). We checked whether this repetition made a difference to the analyses involving willingness to pay by running these analyses twice (one for each rating). The error did not make a difference to the analyses, and so only the results involving the experimental data is reported in the result section.

Table 2

Average willingness-to-pay for the ten least/most beautiful and ten least/most creative products in all three experiments.

	Average willingness to pay			
	Ten products judged as least beautiful	Ten products judged as most beautiful	Ten products judged as least creative	Ten products judged as most creative
Experiment 1 (posters)	NOK 78	NOK 105	NOK 75	NOK 100
Experiment 2 (watches)	DKK 807	DKK 1144	DKK 836	DKK 1067
Experiment 3 (lamps)	DKK 1435	DKK 1687	DKK 1476	DKK 1673

Finally, to test whether complexity differentially affected creativity and beauty, a repeated measures analysis was conducted. Order did not interact with complexity, neither for the creativity and beauty judgments, $F_s(4, 236) < 1.57$; therefore the judgments from both orders were combined for subsequent analyses. The expected interaction effect between judgment condition (creativity/beauty) and complexity was significant, $F(4, 248) = 73.84, p < .001, \eta^2_p = .544$. The planned contrast for the linear trend for creativity judgments was highly significant $F(1, 62) = 158.50, p < .001, \eta^2_p = .72$, and increasing. The planned contrast for the quadratic trend (displaying an inverted U shape) for beauty judgments was also significant $F(1, 62) = 20.47, p < .001 (\eta^2_p = .25)$, while the planned contrast for a linear effect for beauty judgments was not significant $F(1, 62) = 0.47$.

Although the experiment demonstrated how both creativity and beauty predicted different parts of the variance of willingness-to-pay, and showed a differential effect of complexity on creativity and beauty judgments, the design had some shortcomings.

First, it cannot be completely ruled out that painting style and complexity were confounded in the present experiment. Even though a mixture of styles were sought in each category, it was not possible to have the same painting styles represented in all categories. Some styles tended to be judged as being complex (as in Picasso's cubist paintings) whereas others were judged to be simple (as in Picasso's drawings). Second, even though subjects judging willingness-to-pay were asked to imagine buying a poster, the task still revolved around art perception, rather than focusing directly on consumer products. Third, the sampling combined two data sets from diverse groups of subjects, differing in age and country in which the experiment was performed; this could potentially have affected the results. To rectify these issues, we conducted a second experiment with wrist watches as stimuli.

Experiment 2

Method

Subjects

Seventy undergraduates from Copenhagen Business School (50 female; mean age 23) were asked to judge pictures of wrist-watches.

Materials

In a pre-study, ten subjects who did not participate in the main study judged pictures of 120 wrist watches (60 male and 60 female watches) for complexity. The 120 pictures of watches were downloaded from the JC Penney website (<http://www.jcpenney.com>; retrieved in February 2009) to represent a mixture of brands and styles. In each picture the brand name and logo (if present) were digitally removed.

Based on the responses, the images were divided into three evenly spaced categories of complexity with ten images in each for both men and women, a total of 60 watch images that were used in the experiment. The mean complexity scores for the three categories are presented in Table 3. The pictures were selected for each category to represent a mixture of watch styles, for having low standard deviations in the complexity ratings, and for being in the same price range across categories.

Procedure

Female participants only rated female watches and male participants only male watches. Seventy participants rated the same series of 30 pictures of watches three times, for a total of 90 judgments. Prior to judging the experimental set of watches, the participants saw three test-images of varying complexity of watches to familiarize them with the task. In the experiment, 22 participants first made (B) beauty judgments ('how beautiful is the watch'), followed by (W) willingness-to-pay judgments ('how much would you be willing to pay for this watch'; ranging from DKK 0 to DKK 3000 - around US\$ 590), followed by (C) creativity judgments ('how creative is the watch'). For the other subjects, the ordering of judgments was reversed, with 23 subjects judging CWB, 13 judging PCB and 12 judging PBC. Otherwise the procedure was identical to experiment 1.

Table 3

Complexity ratings for image categories based on pre-study data and list price data in Experiment 2.

Watch Category	Complexity category	Experiment 2				
		Complexity			List price	
		Range	Mean	SD	Mean	SD
Male	1	-40	29.9	5.1	\$239	105
	2	40-60	49.6	5.4	\$258	154
	3	60-	70.6	9.1	\$264	167
Female	1	-38	28.6	4.5	\$162	111
	2	38-54	44.9	5.4	\$206	167
	3	54-	65.1	9.5	\$220	208

Results and discussion

The by-item averages of the watches were again done only for the first rating each subject made. Males and females rated only male and female watches respectively for a total of 60 items. The watch pictures had the following by-item means: creativity ($M = 46.5$, $SD = 14.4$), beauty ($M = 39.1$, $SD = 9.8$), willingness to pay ($M = \text{DKK } 966$, $SD = \text{DKK } 273$, ranging from DKK 453 to DKK 1827). The by-item correlation between creativity and beauty evaluations was not significant, $r(60) = -.11$ (NS). The averaged within-subject correlation showed a positive correlation between beauty and creativity of $r(70) = .34$ ($p < .004$). Again we find the two types of correlation coefficients going in opposite directions, although the by-item correlation was insignificant in this experiment.

Regressing creativity and beauty onto willingness-to pay yielded the following results: Creativity significantly predicted willingness-to-pay scores, $\beta = .32$, $t(59) = 2.79$, $p < .01$, as did beauty, $\beta = .46$, $t(59) = 4.04$, $p < .001$ (see Table 2, for an illustration). Creativity and beauty combined also explained a significant proportion of variance in willingness-to-pay, $R^2 = .28$, $F(2, 59) = 10.99$, $p < .001$. In order to test whether subjects were inferring either creativity or beauty judgments from a perceptual evaluation of how expensive the watches looked, we ran a further regression which included the list price of each watch. Here, again, creativity significantly predicted willingness-to-pay scores, $\beta = .30$, $t(59) = 2.79$, $p < .01$, as did beauty, $\beta = .40$, $t(59) = 3.61$, $p < .001$, and list price $\beta = .27$, $t(59) = 2.48$, $p < .02$. Creativity, beauty, and list price combined again explained a significant proportion of variance in willingness-to-pay, $R^2 = .35$, $F(2, 59) = 10.03$, $p < .001$. Including list price in the analysis did not significantly reduce the explanatory power of either creativity or beauty, but list price was an independent contributor to willingness to pay.

To examine the relation of complexity to creativity and beauty, a repeated measures analysis was conducted. No ordering were detected effects for the creativity, beauty and willingness to pay judgments, and therefore the judgments from all orders were combined for subsequent analyses ($F_s(6, 120) <$

2.32). Likewise, no significant effect of sex was detected ($F_s(2, 130) < 2.77$); therefore, judgments from male and female participants were combined for the subsequent analysis.

The expected interaction effect between judgment condition (creativity/beauty) and complexity was significant $F(4, 244) = 36.11, p < .001$ ($\eta_p^2 = .372$). The planned contrast for the linear trend for creativity judgments was highly significant $F(1, 66) = 132.28, p < .001$ ($\eta_p^2 = .67$), and increasing. The planned contrasts for the quadratic trend (displaying an inverted U shape) $F(1, 67) = 0.00, NS$ and the linear trend $F(1, 67) = 1.21, NS$ for beauty were not significant.

Here we again found support for the notion that creativity and beauty are differentially affected by complexity. This time there was a linear positive relationship between complexity and creativity, but no relation between complexity and beauty.

The watch experiment replicated the basic finding from the first experiment: Both creativity and beauty predicted jointly, but independently, willingness to pay. In order to try to generalize these findings to other consumer products, we conducted a third experiment using yet another consumer product category of stimuli: designer lamps.

Experiment 3

Method

Subjects

One-hundred undergraduates from Copenhagen Business School (34 female; mean age 23) were asked to judge pictures of designer lamps.

Materials

In a pre-study, 10 subjects who did not participate in the main study judged pictures of 100 designer hanging lamps for complexity. The 100 pictures of lamps were downloaded from Danish lamp traders on the internet (e.g., <http://www.luksuslamper.dk>; www.lampeland.dk; all retrieved in February 2009) to represent a mixture of brands and styles. The pictures were converted into black and white.

Based on the responses, the images were divided into three evenly spaced categories of complexity with 12 images in each, a total of 36 lamp images that were used in the experiment. The mean complexity scores for the three categories are presented in Table 4. The pictures were selected for each category to represent a mixture of lamp styles, for having low standard deviations in the complexity ratings, and for being in the same price range across categories.

Table 4

Complexity ratings for image categories based on pre-study data and list price data in Experiment 3.

Complexity category	Experiment 3				
	Complexity			List price	
	Range	Mean	SD	Mean	SD
1	-37.5	25.2	5.9	\$980	509
2	37.5-62.5	50.4	5.9	\$965	773
3	62.5-	74.6	6.2	\$998	839

Procedure

One-hundred participants rated the same series of 36 pictures of lamps three times, for a total of 108 judgments. Thirty-four participants first made (B) beauty judgments ('how beautiful is the lamp'), followed by (W) willingness-to-pay judgments ('how much would you be willing to pay for this lamp'; ranging from DKK 0 to DKK 6000 - around US\$ 1180), followed by (C) creativity judgments ('how creative is the lamp'). For the other subjects, the ordering of judgments was reversed, with 32 subjects judging CWB, 18 judging PCB and 16 judging PBC. In all other respects, the procedure was identical to Experiment 2.

Results and discussion

For the by-item averages of the lamps, we again report only for the first rating each subject made. The lamp pictures had the following by-item means: creativity ($M = 57.2$, $SD = 12.3$), beauty ($M = 45.9$, $SD = 12.1$), willingness to pay ($M = \text{DKK } 1596$, $SD = \text{DKK } 318$, ranging from DKK 1020 to DKK 2322). The by-item correlation between creativity and beauty was marginally negative, $r(36) = -.32$, $p = .054$. The averaged within-subject correlation was again small and positive $r(100) = .37$ ($p < .001$).

Regressing creativity and beauty onto willingness-to-pay yielded the following results: Creativity significantly predicted willingness-to-pay scores, $\beta = .46$, $t(35) = 2.90$, $p < .01$, as did beauty, $\beta = .42$, $t(35) = 2.65$, $p < .02$ (see Table 2, for an illustration). Creativity and beauty combined again explained a significant proportion of variance in willingness-to-pay, $R^2 = .26$, $F(2, 35) = 5.86$, $p < .01$. In order to test whether subjects were inferring either creativity or beauty judgments from a perceptual evaluation of how expensive the lamps looked, we ran a further regression which included the list price of each lamp. Here, again, creativity significantly predicted willingness-to-pay scores, $\beta = .46$, $t(35) = 2.87$, $p < .01$, as did beauty, $\beta = .43$, $t(35) = 2.59$, $p < .02$, while list price failed to contribute to willingness-of-pay, $\beta = .05$, $t(35) = 0.04$, NS. Creativity, beauty, and list price combined again explained a significant proportion of variance in willingness-to-pay, $R^2 = .26$, $F(2, 35) = 3.82$, $p < .02$. Again, including list price in the analysis did not significantly reduce the explanatory power of either creativity or beauty.

For the test of the relation of complexity to creativity and beauty, ordering effect were found for both beauty $F(6, 178) = 5.37$, $p < .001$, creativity $F(6, 176) = 2.74$, $p < .03$, and willingness to pay $F(6, 180) = 8.30$, $p < .001$. Therefore it

made sense to restrict the analysis to only the first judgments made of each individual. The planned contrast for the linear trend for creativity judgments was highly significant $F(1, 31) = 80.35, p < .001 (\eta^2_p = .72)$, and increasing. The planned contrasts for the quadratic trend (displaying a U shape) $F(1, 31) = 22.35, p < .001 (\eta^2_p = .42)$ and linear decreasing trend $F(1, 31) = 61.61, p < .001 (\eta^2_p = .67)$ for beauty judgments were both significant. Thus, complexity had a significant positive linear effect on creativity judgments, while having a significant negative linear plus U-shaped effect on beauty judgments.

General discussion

The present set of experiments demonstrated that judged creativity and perceived beauty contributed independently to willingness to pay and therefore should be treated separately in models of product evaluation in consumer psychology.

Our research supports factor analytical studies from consumer research and art perception research that consistently show creativity and beauty as loading on different factors. This was supported in the present set of experiments by the separate contributions of judged creativity and perceived beauty. Note that controlling for list prices did not influence this finding. In addition, by-item correlations between creativity and beauty in all cases displayed a small negative (albeit not always significant) correlation coefficient. Interestingly, averaged within-subject correlations of the relation between creativity and beauty in all cases showed a small positive correlation, indicating that the naïve theories that subjects hold of this relation is not that they are uncorrelated or negatively related, but rather that they expect a positive relation. This result nicely fits Cho and Schwarz's (2006) finding that people prefer a product after having judged it as being innovative.

A secondary finding was that the antecedent factor of complexity differentially affected creativity and beauty in all three experiments. Complexity in all cases had a strong linear positive effect on judgments of creativity. The relation between complexity and beauty was less consistent, with an inverted U-shaped function in Experiment 1 (Picasso paintings), no relation in Experiment 2 (watches), and finally a negative linear effect plus a U-shaped function in Experiment 3 (lamps). As such, the inconsistent findings mirror the mixed literature on the relation between complexity and beauty.

The relevance of our findings is limited to classes of products that either are bought predominantly for their aesthetic appeal, as the Picasso posters (Experiment 1), or are assumed to be equivalent in function. Consumers assume that wrist watches tick with the same pace, and that they do not have to evaluate timing quality; therefore they can consider qualities like beauty and creativity (Experiment 2). Likewise, consumers do not question the assumption that lamps provide light and therefore are willing to pay for design (Experiment 3). It would be interesting to include products where consumers assume that there may be differences in the quality of function, such as cars, hi-fi systems or digital cameras. It may be interesting to examine how much beauty and

creativity contribute to willingness-to-pay when entering perceived functionality. Further research may examine an assumption made plausible by our research: That consideration of both beauty and creativity contribute to willingness-to-pay within the same class of functionality, or the same price class for a certain product.

Our findings have deep implications for applications in product design and market research. As the simplistic assumption is wrong that either creativity or beauty alone determine willingness to buy, designers have the obligation to consider both creativity and beauty of the product. This obligation, however, can be turned into a chance because creativity and beauty are only weakly related, and they explain different parts of the variance for willingness-to-pay. Therefore, they can try to maximize both dimensions independently. Market researchers may help designers develop a product by finding out what the prospective clients of their products find creative and what they find beautiful. Besides considering the distinction between creativity and beauty, product designers have to attend to product complexity. The reason is that the level of product complexity instilled in the product during design can be expected to differentially affect creativity (positive linear) and beauty (inverted U-shape, or negative linear). And since both creativity and beauty evaluations positively relate to willingness-to-pay, then considering carefully which level of complexity to instill seems appropriate. Here designers may apply Hekkert et al.'s principle "Most Advanced, Yet Acceptable": To find the level of complexity and beauty that yield the highest combined effect on willingness-to-pay, which Hekkert et al. did not assess. When creativity increases linearly and beauty shows an inverted U-shaped function, as we found in Experiment 1, the maximum of the combined effect on willingness-to-pay is to be expected between medium and high complexity. This point of maximal joint effect moves to a lower degree of complexity if more complex products are found to be less beautiful, as we found in Experiment 3 in addition to a U-shaped function. When there is no relationship between complexity and beauty, as we found in Experiment 2, the point of maximal joint effect beauty and creativity is the point of maximal complexity.

The main insight of this study is that both creativity and beauty contribute to willingness to pay measures, suggesting the strong need for the development of distinct theoretical models of judged creativity and perceived beauty in consumer research.

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