‘Most advanced, yet acceptable’: Typicality and novelty as joint predictors of aesthetic preference in industrial design

Paul Hekkert*, Dirk Snelders¹ and Piet C. W. van Wieringen²

¹Department of Industrial Design, Delft University of Technology, The Netherlands
²Faculty of Human Movement Sciences, Vrije Universiteit, The Netherlands

Typicality and novelty have often been shown to be related to aesthetic preference of human artefacts. Since a typical product is rarely new and, conversely, a novel product will not often be designated as typical, the positive effects of both features seem incompatible. In three studies it was shown that typicality (operationalized as ‘goodness of example’) and novelty are jointly and equally effective in explaining the aesthetic preference of consumer products, but that they suppress each other’s effect. Direct correlations between both variables and aesthetic preference were not significant, but each relationship became highly significant when the influence of the other variable was partialed out. In Study 2, it was furthermore demonstrated that the expertise level of observers did not affect the relative contribution of novelty and typicality. It was finally shown (Study 3) that a more ‘objective’ measure of typicality, central tendency – operationalized as an exemplar’s average similarity to all other members of the category – yielded the same effect of typicality on aesthetic preference. In sum, all three studies showed that people prefer novel designs as long as the novelty does not affect typicality, or, phrased differently, they prefer typicality given that this is not to the detriment of novelty. Preferred are products with an optimal combination of both aspects.

When consumer products are on the market for a longer period of time, their technical specifications tend to become less and less varied and the importance of product design as an opportunity for differential advantage in the marketplace increases (Kotler, 2000; Urban & Hauser, 1993). Consequently, more attention will be paid to their aesthetic appeal. With regard to the aesthetic appeal of consumer products, the literature has reported effects of typicality, defined as ‘goodness of example’, on aesthetic preference (Veryzer & Hutchinson, 1998), while, at the same time, the attraction of novelty has been emphasized (Bianchi, 1998; Simonson & Nowlis, 2000). Since a preference for

*Requests for reprints should be addressed to Paul Hekkert, Department of Industrial Design, Delft University of Technology, Landbergstraat 15, 2628 CE Delft, The Netherlands (e-mail: p.p.m.hekkert@io.tudelft.nl).
typical products seems incompatible with a desire for the new (e.g. Whitfield, 1983), the present study is designed to clarify how these two features jointly determine the aesthetic preference for human artefacts.

According to the preference-for-prototypes theory (Whitfield & Slatter, 1979), the more prototypical an object is, the more it will be aesthetically preferred. Empirical evidence for such a linear relation has been obtained for a variety of human artefacts, such as cubist paintings (Hekkert & van Wieringen, 1990), houses (Purcell, 1984), interior designs (Pedersen, 1986), musical performances (Repp, 1997), and consumer products (Verryzer & Hutchinson, 1998). Because, generally speaking, typicality will increase with familiarity, the preference-for-prototypes theory is compatible with Zajonc’s mere exposure hypothesis that positive affect increases with repeated unreinforced exposure (Zajonc, 1968), and thus familiarity of a stimulus. Bornstein (1989) conducted a meta-analysis of research testing Zajonc’s hypothesis. He concluded that a significant, positive relationship exists between exposure frequency and reported affect (aesthetic preference) for all eight categories of stimuli used in the reviewed studies except one, which consisted of abstract paintings, drawings and matrices. Moderate through strong effects were obtained for photographs, meaningful words and polygon stimuli, whereas somewhat weaker effects were obtained for ideographs, nonsense-words and real person/object stimuli.

In an attempt to explain the mere-exposure effect Bornstein suggests that it is adaptive for adults to prefer the familiar over the novel, because some risk is inherent in any venture in the unknown. On the other hand, it is also adaptive, especially for children (e.g. Fantz, 1964; Richards, 1997), to seek out novel stimuli in that they facilitate learning. Bornstein therefore concludes that both preference for the familiar and preference for the novel have evolved into the behavioural repertoire.

With the concept of novelty a second factor being related to aesthetic appraisal has been introduced. The fact that the mere exposure effect could not be demonstrated for abstract paintings and drawings is well compatible with the fact that novelty is a very important feature in the appreciation of fine arts, where the striving for novelty is a dominant force in its development (Martindale, 1990) and originality is highly valued, especially among expert judges (Hekkert & van Wieringen, 1996a). In the case of these ‘aesthetic’ stimuli, a preference for familiar instances may thus be suppressed by a simultaneous preference for novel instances. Given the fact that consumer products, although functional and utilitarian, are often also perceived with an aesthetic attitude, i.e. its aesthetic properties are deemed important, the same two variables may play a role in the aesthetic appreciation of these objects.

At this point it is important to emphasize that, in spite of the fact that typicality (in terms of ‘goodness of example’) will tend to correlate substantially with familiarity, the latter variable should not be construed as a single defining characteristic of typicality (Barsalou, 1985; Loken & Ward, 1990). It is logically possible that an instance of a category will be rated as more novel (or less familiar) than another one without being judged as a less good example of the category in question. The degree to which typicality and novelty will covary is an empirical question, and will depend on the object features taken into account when judging the two characteristics. Take for example Philippe Starck’s table lamp (Fig. 1) that can be designated as novel because of its synthetic material, while, at the same time, it can be seen as a typical table lamp due to its overall form. Therefore, typicality and novelty are not to be conceived as opposite poles of one and the same continuum, although a high (negative) correlation will often be found.
Based on the above considerations it was hypothesized that aesthetic preference will be determined by the joint influence of typicality and novelty. Since the two variables will be negatively related, the positive effect of increasing typicality will be counteracted by the concomitant decrease of novelty, whereas the positive effect of increasing novelty will in its turn be limited by a concomitant decrease of typicality. Therefore, our hypothesis implies that both novelty and typicality will be positively related to aesthetic preference when the counteracting influence of these concomitant changes in the other variable is controlled for.

**STUDY 1**

In Study 1, the latter hypothesis was tested with respect to consumer products. To that effect, the relation between novelty and typicality on the one hand and aesthetic preference on the other hand was investigated in three experiments with different product categories. The categories varied in the extent to which their aesthetic appeal is considered an important design feature, namely sanders (aesthetic appeal not important), telephones and singing teakettles (aesthetic appeal important).

**Method**

**Participants**
The three product categories were rated by three different groups of respectively 28 (14 males and 14 females), 24 (12 males and 12 females), and 27 (13 males and 14 females).

![Figure 1. Table lamp ‘Miss Sissi’ (1990) designed by Philippe Starck.](image)
participants. The first two groups were recruited from the student population of Delft University of Technology (age range from 18 to 27 years) and the third group from Delft’s general population (age range from 20 to 40 years).

**Procedure**

In each experiment a number of instances of one of the three products had to be evaluated, namely 19 sanders, 14 telephones, and 14 teakettles. The products were selected to cover a wide range of typicality and novelty. Pictures of the products (see Fig. 2) were presented by means of a carousel slide projector. At the beginning of each session all slides were presented in random order for 3 s each to familiarize participants with the stimulus set. Next, they were presented again in a participant-paced tempo and rated on the following 9-point rating scales: Poor example — Good example of the category in question (operationalizing typicality), Not original — Original (operationalizing novelty), and Ugly — Beautiful (operationalizing aesthetic preference). For the first scale, participants had to indicate how good an example each model was as an instance of the category ‘sandars/telephones/teakettles’. To clarify the concept of goodness of example, the same elaborate instructions were given to the participants as in the study of Rosch and Mervis (1975, p. 588).

**Results**

For each product, the mean of the ratings for typicality, novelty, and aesthetic preference was calculated over the participants. Intra-class correlations (Shrout & Fleiss, 1979) showed that these mean ratings were reliable and varied from ICC(2, 28) = .79 for the preference ratings of the sanders to ICC(2, 27) = .97 for the typicality ratings of the teakettles.

As was to be expected, the mean typicality and mean novelty ratings showed a high negative correlation for each of the three products, the Pearson product-moment correlations were $- .85 (p < .01)$ for sanders, $- .89 (p < .01)$ for telephones, and $- .65 (p < .05)$ for teakettles. Neither the correlations between the mean typicality and mean preference scores ($r = .06, .09, \text{and} .39$, respectively), nor the correlations between the mean novelty and mean preference scores ($r = .33, .29, .27$, respectively) reached statistical significance ($p \geq .05$).

Given the high negative correlations between typicality and novelty, either of these variables may have functioned as a suppressor variable with respect to the relation between the other one and aesthetic preference. The values of the partial correlation coefficients confirmed this. After partialing out their common variance with novelty the mean typicality scores showed substantial relationships with the mean preference scores, namely .76, .82, and .78, whereas the mean originality scores correlated about as high with mean preference when controlling for the influence of typicality: .78, .84, and .75 (all $p$-values < .01), for sanders, telephones and teakettles, respectively.

In order to assess how much variance in the ratings of the dependent variable aesthetic preference can be explained by the two predictor variables typicality and novelty, a regression analysis was performed on the mean beauty ratings of each product. This analysis revealed that the predictor variables explained 56, 70, and 63% of the variance in the beauty ratings of the sanders, telephones, and teakettles, respectively. A closer look at the regression weights of the variables typicality and
novelty revealed that the relative importance of both variables was almost similar for each product. For the sanders and telephones, the beta weight for novelty (1.44 and 1.85, respectively) was slightly higher than the beta weight for typicality (1.29 and 1.74), whereas for the teakettles, the beta weight for novelty was somewhat smaller than the beta weight for typicality (0.91 vs. 0.98, all $p < .01$). The results of these regression analyses thus point out that both predictor variables are (almost) equally important in explaining aesthetic preference and that their relative contribution is only marginally affected by product type.

In order to ascertain whether the correlational trends are representative for the individual participants, the mean intra-individual correlations between typicality and aesthetic preference and between novelty and aesthetic preference were calculated, both before and after partialing out the common variance with novelty and typicality (Table 1). Not surprisingly the mean intra-individual correlation coefficients are lower than those between the rating scales scores averaged over participants, but the same tendencies are present here: for all three products the partial correlation coefficients are higher than the correlation coefficients per se. The marginal importance of aesthetic considerations in the design and evaluation of sanders, as indicated by a smaller standard deviation in the beauty scores (0.82 vs. 1.19 and 1.17 for the telephones and teakettles

*Figure 2. Examples of the products used in the three studies: (a) sanders, (b) telephones, (c) teakettles, and (d) medium-sized cars.*
respectively), could explain the fact that both partial correlations were considerably lower for these products.

### Discussion

On the basis of these results one may infer that the aesthetic preference for consumer products is the result of a process in which typicality and novelty are jointly taken into account. The results also strongly suggest that both factors are equally important in explaining aesthetic preference for all kinds of consumer products and for student and non-student participants alike. Even for a product for which the aesthetic appeal may not be considered an important design feature, i.e. the sanders, novelty is at least as strong a predictor of aesthetic preference as typicality. Nevertheless, it remains likely that the relative contribution of both factors may depend on other factors, such as observer characteristics. In fact, correlations at the individual level demonstrate that individuals can vary highly as to the relative effect of typicality and novelty. One likely candidate for explaining these individual differences is the expertise level of the participants.

### STUDY 2

In the realm of art, it has often been demonstrated that experts’ aesthetic preference judgments differ considerably from those of lay people (see e.g. Getzels & Csikszentmihalyi, 1976; Hekkert & van Wieringen, 1996a, b; Locher, Smith, & Smith, 2001). To explain such findings, it has been argued that experts tend to suppress their initial, affective response in favour of an intentional and reflective mode of evaluation (e.g. Cupchik & Winston, 1992). Whereas the ‘automatic’, initial response may reflect the

---

**Table 1. Mean intra-individual correlations between rating scale scores**

<table>
<thead>
<tr>
<th></th>
<th>Typicality—Aesthetic preference</th>
<th>Novelty—Aesthetic preference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Original correlation</td>
<td>Partial correlation</td>
</tr>
<tr>
<td>Study 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sanders</td>
<td>.18</td>
<td>.23</td>
</tr>
<tr>
<td>Telephones</td>
<td>.16</td>
<td>.46</td>
</tr>
<tr>
<td>Teakettles</td>
<td>.35</td>
<td>.52</td>
</tr>
<tr>
<td>Study 2: Cars</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experts</td>
<td>.41</td>
<td>.51</td>
</tr>
<tr>
<td>Non-experts</td>
<td>.45</td>
<td>.56</td>
</tr>
<tr>
<td>Study 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephones</td>
<td>.28</td>
<td>.52</td>
</tr>
</tbody>
</table>

*Note.* Fisher’s $z'$ transformations of the individual correlation coefficients were used in calculating the mean intra-individual correlations.
preference for familiar or typical instances, the intentional mode is characterized by a striving for novelty. In the area of product design, it has also been proposed that expert consumers are more likely than non-experts to search for new information, because they have a more fine grained conceptual structure and require less cognitive effort to classify new information (Alba & Hutchinson, 1987). This leads to the hypothesis that the relative contribution of novelty is greater for experts than for non-experts.

In order to test this hypothesis, cars were chosen as stimulus material because they allow for a clear selection of experts and non-experts. With respect to cars, a considerable gap can be observed between people who love these products and those who see them as useful vehicles at best. Car lovers talk a lot about cars, read car magazines, visit car shows, and know all kinds of details about former and recent car models. Such interest in a particular product class is often referred to as product involvement (e.g. Laurent & Kapferer, 1985; Zaichkowsky, 1985). Product involvement, a multi-faceted concept, covering a.o. the perceived importance of a product and the functional and status risk of product purchase/ownership, will lead to more detailed product class knowledge. Park, Mothersbaugh, and Feick (1994) show that such knowledge is best measured by an objective knowledge test. Therefore, we use a set of objective knowledge questions to separate car experts from non-experts.

With the selection of cars as stimulus material, Study 2 can also be considered as a replication of Study 1 with a different type of product. More than for the products used in Study 1, cars are designed with a view to their aesthetic appeal. The main hypothesis of Study 1 will thus be put to another test in this second study.

**Method**

**Participants**

Students from the department of Industrial Design Engineering from Delft University of Technology were asked to fill out a car expertise questionnaire. The questionnaire contained 25 items measuring the participants’ knowledge of car design and the automotive industry (e.g. ‘From which country is SEAT?’ or ‘Who designed the Citroen BX?’). Students giving 19 or more right answers were considered as car experts, students scoring 12 or less as non-experts. On the basis of this questionnaire, 22 male participants (age range from 21 to 28 years), 11 experts (mean score = 21.0) and 11 non-experts (mean score = 10.1), were selected for participation.

**Stimuli**

Twenty medium-sized cars were selected as stimulus material. The restriction ‘medium-sized’ was chosen to avoid too many differences in aesthetic quality as a result of extreme price differences. Within this class, however, a wide as possible selection of typical and less typical designs was made (see Fig. 2).

**Procedure**

Rating scales and procedure were similar to the ones used in Study 1.

**Results**

Intra-class correlations were almost similar for the experts and non-experts and varied from moderate ($\text{ICC}(2, 11) = .71$ and $.75$, respectively) for the typicality ratings to high
(ICC(2, 11) = .91 for both groups) for the originality ratings. These correlations warranted calculation of mean scores for both groups separately.

Whereas typicality and novelty were again highly intercorrelated ($r = -.67, p < .01$) for the group of non-experts, the two predictor variables were not significantly correlated for the expert group ($r = -.31$).

In line with the results from Study 1, for the non-experts neither the correlation between the mean typicality and mean preference scores ($r = .14$), nor the one between the novelty and preference scores ($r = .40$) was significant. After partialing out each other’s effect, both variables correlated significantly with aesthetic preference ($pr = .59$ and .67, both $p < .01$).

For the group of experts, a positive direct correlation was found between novelty and preference scores ($r = .56, p < .01$), whereas the correlation between typicality and preference scores ($r = .42$) was not significant. These relatively high, direct correlations were possible because of the low intercorrelation between typicality and novelty. Although the two predictor variables were not significantly related, they still suppressed each other’s effect on beauty as indicated by the respective partial correlations, $pr = .75$ between typicality and aesthetic preference and $pr = .80$ between novelty and aesthetic preference. For both the experts and non-experts, the mean original and partial intra-individual correlations again show the same trend, i.e. the partial correlation coefficients are higher (Table 1).

The relative importance of typicality and novelty in explaining aesthetic preference was furthermore tested by regression analyses on the mean ratings for both groups separately. As could be expected on the basis of the partial correlations, for both the non-experts and the experts, the beta weight for typicality (.73 and .66, $p < .01$) was slightly smaller than the beta weight for novelty (.89 and .77, $p < .01$). The two groups, however, differed remarkably as to the amount of variance in the beauty ratings explained by both predictor variables, namely 46% for the non-experts and 71% for the experts.

These results indicate that the expertise level of the observer does not affect the relative importance of typicality and novelty as a predictor of aesthetic preference, a finding that runs counter to our hypothesis.

**Discussion**

Generally speaking, like the results of Study 1, the results of Study 2 confirm the main hypothesis of both studies that a product’s typicality and its novelty jointly determine the aesthetic preference for a product, but that each one of them suppresses the positive effect of the other. When the effect of the other predictor is statistically controlled for, i.e. partialed out, each predictor is positively and linearly related to aesthetic preference.

In Study 2 it is furthermore demonstrated that experts in a particular design domain, i.e. car design, discriminate more strongly between typicality and novelty than non-experts. For experts, more than for non-experts, typical designs may be novel, and novel designs may be typical. As a result, the two predictors of aesthetic preference suppress each other’s effect to a lesser degree, and a significant direct linear relationship between novelty and aesthetic preference could be observed. A possible explanation for this effect may be that experts in a particular domain possess more differentiated and elaborate categories than non-experts (e.g. Alba & Hutchinson, 1987; Gaver & Mandler, 1987; Hekkert & Snelders, 1995). As a result, experts make different typicality
judgments than non-experts and their typicality ratings are not predominantly determined by (a lack of) novelty. This explanation is supported by the finding that the experts strongly agree with the non-experts on the originality of the car models ($r = .93, p < .01$), a finding in line with observations in the arts (Hekkert & van Wieringen, 1996a), but substantially less so on their typicality ($r = .47, p < .05$).

Nevertheless, partial correlations and a regression analysis revealed that the typicality effect was still suppressed by variations in novelty, and that, both for the experts and non-experts, novelty is only a slightly stronger predictor of aesthetic preference than typicality. These results do not support the contention that experts favour novelty more over typicality than non-experts do.

STUDY 3

Earlier studies, reporting a significant (direct) correlation between (proto)typicality and preference, have been criticized because the correlations in question may have been due to circularity, i.e. participants may have been inclined to designate the most beautiful products as being the most prototypical ones (Boselie, 1991). Although no direct relationship between typicality and aesthetic preference was found in the present experiments, such circularity might still have played a role under the condition of constant novelty. In order to avoid this possibility, Study 3 was designed to find a more ‘objective’ operationalization of typicality than the subjective impression of ‘goodness of example’. Set up as a partial replication of the first experiments, non-experts were required to evaluate the same 14 telephones as used in Study 1. Apart from the ratings given in the latter experiments, however, participants now also rated the degree of similarity between all possible pairs of the telephones, which enabled us to calculate the central tendency of each item. Barsalou (1985) demonstrated that central tendency, a member’s average similarity to other category members (family resemblance), is an important determinant of typicality. Given that the operationalisation of central tendency is more ‘objective’, it was deemed interesting to introduce this variable into the present study.

Method

Participants

Participants were 24 students (13 males and 11 females, age range from 18 to 25 years) from Delft University of Technology.

Stimuli

Stimuli were the same 14 telephones as used in Study 1.

Measures

The same rating scales as used in Study 1 measured the variables typicality (goodness of example), novelty, and aesthetic preference. 

Next to these ratings of single models, central tendency scores were obtained by similarity ratings of pairs of models. All possible pairs (91) were randomly formed and rated on a scale ranging from ‘not similar at all’ to ‘very similar’.
Procedure
As in Study 1, at the beginning of each session all slides were presented randomly for 3 s each to familiarize participants with the stimulus set. Twelve participants first rated all 91 possible pairs in a random order on similarity (central tendency). After a short break, the 14 models were presented one by one, again in a randomized order. The participants now rated each model on the other three rating scales. The other 12 participants first started with the ratings of each model separately and then rated the 91 pairs on similarity.

Results
Mean scale ratings and a mean similarity score were calculated for each product. Intraclass correlations again showed that these mean ratings were reliable (all ICC(2, 24) > .80).

As expected, no direct significant correlations were found between typicality or novelty ratings and the mean preference scores ($r = .38$ and $-.07$, respectively). Typicality and novelty were, however, highly negatively intercorrelated ($r = -.91$, $p < .001$), i.e. they share a significant amount of common variance. When the shared variance was removed, both factors became good predictors of aesthetic preference. After novelty was partialed out, typicality accounted for a significant amount of variance in the beauty ratings ($pr = .75$, $p < .01$). Similarly, after typicality was partialed out, novelty also explained a significant amount of variance in the beauty ratings ($pr = .70$, $p < .01$). The mean original and partial intra-individual correlations again show the same trend, i.e. the partial correlation coefficients are considerably higher (Table 1).

A multiple regression analysis of typicality and novelty on rated beauty revealed that typicality and novelty jointly explain 56% of the variance in the beauty scores. This time, typicality was a slightly stronger predictor of aesthetic preference than novelty as indicated by their respective beta weights, namely 1.76 and 1.53 (both $p < .01$).

Central tendency
The central tendency scores correlated very highly with the typicality ratings ($r = .95$, $p < .001$) and also, but negatively, with the novelty scores ($r = -.83$, $p < .001$). The direct correlation between central tendency and beauty was .48 (ns), whereas this correlation increased to .77 ($p < .01$) when novelty was partialed out.

Together, central tendency and novelty explain 60% of the variance in beauty scores, which is slightly (but not significantly) more than the amount (56%) explained by typicality (operationalized as ‘goodness of example’) and novelty.

Discussion
The results of Study 3 confirm the earlier finding that typicality and novelty each explain a significant amount of variance in aesthetic preference when the effect of the other variable is held constant. The very high correlation between typicality (‘goodness of example’) and central tendency reinforces Barsalou’s (1985) finding that the latter variable is a strong predictor of typicality. It is quite interesting to note how the subjective rating of a product’s ‘goodness of example’ almost perfectly reflects the average similarity score of that product based on the ratings of its similarities with each of the other products in the sample. Since it is unlikely that the similarity judgments providing the central
tendency estimates are consistently influenced by aesthetic preference, this finding provides strong evidence against a circularity criticism (Boselie, 1991).

**GENERAL DISCUSSION**

The findings of all three studies demonstrate that typicality and novelty are jointly and equally effective in explaining the aesthetic preference of consumer products. But, since these two predictors are to a large extent each other’s opposite, each suppresses the positive effect of the other. When the effect of the other predictor is statistically controlled for, i.e. held constant, both predictors are in a positive and linear way related to aesthetic preference. This finding suggests that the often-observed linear relationship between aesthetic preference and prototypicality is due to a restriction of range in novelty. That is, if the stimulus set mainly contains well-known instances of a category or if all exemplars are equally novel (or old), a direct effect of typicality on aesthetic preference can be expected.

As argued elsewhere (Hekkert & Snelders, 1995; Hekkert & van Wieringen, 1990; Whitfield, 1983, 2000), typicality can only be a predictor of aesthetic preference when stimuli are categorizable or meaningful. For most real-life stimuli, such as paintings, houses, or consumer products, a typicality effect therefore interferes with, and sometimes overshadows, arousal effects due to stimulus complexity or novelty (Berlyne, 1971). This may explain why Berlyne’s classic prediction of an inverted U-shaped relation between aesthetic preference and arousal potential could often not be observed for paintings and other real-life stimuli (e.g. Berlyne, 1975; Martindale, Moore, & Borkum, 1990; Whitfield, 1983).

**A dual process model of aesthetic preference**

The main finding of two conflicting factors jointly determining aesthetic preference may be seen as tentative evidence for the operation of two separate mechanisms. Such an operation of two mechanisms has been suggested earlier (Hekkert and Snelders, 1995; Murphy & Zajonc, 1993) and seems to be consistent with an evolutionary account (Bornstein, 1989; see also Kaplan, 1987). In line with a preference-for-prototypes model there is an ‘automatic’, adaptive trait to favour easy-to-classify or typical stimuli (Alley & Cunningham, 1991; Bornstein, 1989). This process is called automatic or immediate because it does not require awareness or intention. Evidence for this is provided by the finding that preference is positively related to exposure frequency, even when participants fail to recall that they have actually seen the stimuli (e.g. Janiszewski, 1993; Kunst-Wilson & Zajonc, 1980; Murphy & Zajonc, 1993).

Opposing this ‘tension-reducing’ mechanism there is a ‘tension-heightening’ striving towards novel or atypical instances, a striving that must preclude habituation and enables processing of incongruous or novel stimuli (Mandler, 1985). This latter mechanism is more ‘controlled’ and cognitively mediated (Schneider & Shiffrin, 1977; Stern, Marrs, Millar & Cole, 1984) and can thus complement, and possibly counteract, the attitude changes due to typicality or mere exposure. This mechanism may account for the fact that subliminal stimulus exposures produce greater affect changes than those induced by stimuli that are clearly recognised. In the latter case, the positive effect of repeated exposure may have been attenuated by the conscious, novelty seeking, ‘countercontrol’ mechanism (Bornstein, 1989).

Given the joint operation of these two, admittedly still hypothetical, mechanisms, an aesthetic judgement ‘will be effected by an equilibrium between these opposing forces’
(Hekkert & Snelders, 1995; p. 157). Whether one of these mechanisms dominates the aesthetic appreciation of a stimulus, or whether both are equally effective possibly depends on a number of contextual factors, like the available processing time, the context in which an item is presented, and observer characteristics. A variable that is likely to affect the relative contribution is the time a participant has available to make his or her evaluations. Since it has been argued that a preference for typicality reflects an automatic or immediate reaction towards easy-to-classify stimuli, it can be predicted that typicality will be a stronger predictor of aesthetic preference when there is less time to process the stimulus. Kruglanski, Freund, and Bar-Tal's (1996) finding that high-exposure frequencies of slides of abstract paintings resulted in higher liking scores than low-exposure frequencies under high, but not under low time pressure conditions, seems in agreement with this hypothesis.

A second factor that could account for the relative strength of the two appraisal processes is the ‘aesthetic function’ of the stimulus (Hekkert, 1995). Objects, such as works of art, that are first of all produced with the intention to evoke an aesthetic experience are presumed to be processed more cognitively and hence rely more on novelty than objects that are not perceived with an aesthetic attitude. This assumption is backed up by the finding that the mere exposure effect is strong for all types of stimuli, except for ‘aesthetic’ stimuli, such as paintings and drawings (Bornstein, 1989). Furthermore, Hekkert (1995) demonstrated that even when people are tuned to perceive an object aesthetically—the object is presented as if it should be installed at a conspicuous location in a living room—the effect of repeated exposure is weaker than when the object is presented in a neutral context.

Thirdly, observer characteristics may affect the dominance of one mechanism over the other. With respect to observer expertise, this effect was tested in Study 2 where no evidence was found for the prediction that experts favour novelty more over typicality than non-experts do. Of course the possibility cannot be ruled out that another operationalisation of expertise, e.g. in terms of car magazine subscribers, would have resulted in the predicted difference between experts and non-experts. However, given their knowledge scores, the experts in our group also seem to deserve this qualification. Therefore, other explanations for the null result seem more plausible. Since we are daily exposed to consumer products such as cars, it may be that the proposed expertise effect is confined to the fine arts where experts and non-experts differ to a much larger degree in confrontations with the artefact and where novelty is highly valued among experts (Hekkert & van Wieringen, 1996a).

In sum, it seems that our results provide an empirical basis for the industrial design principle coined MAYA by Raymond Loewy (1951), MAYA being an acronym for Most Advanced Yet Acceptable. In order to create a successful design, the designer should strike a balance between novelty and typicality in trying to be as innovative as possible while preserving, as much as possible, the typicality of the design. The fact that this is feasible is due to the fact that the correlation between novelty and typicality, although highly negative, falls short from being perfect. The unshared variance enables, at least to a certain degree, independent manipulation of these variables.

Acknowledgements
The authors gratefully acknowledge the assistance of Rene van Egmond, Julian de Groot, Niels van der Linden, Kaj and Pierre Morel. Further thanks are due to Agnes van den Berg, Peter Lloyd, Paul Locher, and Sandra Zwier for their thoughtful comments on earlier drafts of this manuscript.
References


Received 19 July 2001; revised version received 23 January 2002