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Preference Magnitude Affected by Context, Range, and Categorization

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Abstract

Previous studies have shown that when subjects view hedonically positive stimuli followed by stimuli of lesser hedonic value their preference for the stimuli of lesser hedonic value decreases. This is hedonic condensation. In addition, its opposite, an increase in preference judgment, occurs when subjects view a less hedonically positive stimuli followed by hedonically positive stimuli. Experiment 1 showed that condensation and its opposite, an increase in preference judgments, were produced using unattractive and moderately attractive faces. Experiment 2 showed that when instructed to view the stimuli as coming from two different groups the participants rating the attractive faces did not show an increase in preference judgments, however hedonic condensation was still present. Experiment 3 showed that increasing the difference on the hedonic scale between the attractive and unattractive faces eliminated the effect of context on subjects' preference judgments. Experiment 4 showed that forcing subjects to categorize the extremely attractive and unattractive faces into the same group introduced a context effect on participants' ratings for the pairs of attractive faces, with a greater preference shown; however condensation was not found for the unattractive faces.
Preference Magnitude Affected by Context, Range, and Categorization

by

Matthew Forsythe

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PREFERENCE MAGNITUDE AFFECTED BY CONTEXT, RANGE, AND CATEGORIZATION

A THESIS

Submitted in partial fulfillment of the requirements
For the degree of Master of Arts

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Montclair State University
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Preference Magnitude Affected by Context, Range, and Categorization

Perceptual contrast occurs when the judged value of a stimulus shifts away from the value of the stimuli preceding the judged stimulus. So for example, a stimulus will be judged as more intense when judged after a very weak stimulus and as less intense after a very strong stimulus. Wundt (1907) in his book, *Outlines of Psychology*, identified contrast as a fundamental principle of perception and noted that the phenomenon termed contrast has most thoroughly been investigated when dealing with visual sensations. Wundt also noted that the contrast phenomenon appeared in other areas of sensation such as feelings, spatial, and temporal ideas.

**Contrast in Stimulus Intensity**

Contrast effects have been found with stimulus intensity in a number of different sensory modalities. For example, when a set of taste stimuli are presented that contain many stimuli with high levels of sucrose, mean sweetness ratings for the solutions with lower levels of sucrose are rated less sweet than they would be otherwise. The opposite also occurs when subjects experience low sucrose level drinks more frequently; in this situation the solutions of higher sucrose concentration were judged sweeter. Thus, the judgments of sweetness depend upon the stimuli the subject is previously exposed to (Riskey, Parducci, & Beauchamp, 1979). Conner, Land, and Booth (1987), again using taste stimuli, found that sweetness intensity was influenced by the range of the stimuli presented in the study. In this study two ranges of either high or low levels of sugar concentrations in beverages affected judgments of sweetness intensity. Ratings of high intensity stimuli were rated even higher in the presence of low intensity stimuli and vice versa.
Similar contrast effects have been found with odor intensity. Pol, Hijman, Baare, and van Ree (1998) showed that when subjects were first exposed to odors of low intensity they tended to rate subsequent odors as more intense than did people who did not have a first exposure to weak stimuli.

**Contrast in Hedonics**

Contrast effects are not limited to stimulus intensity, but have also been shown in hedonics. The law of hedonic contrast, which Beebe-Center (1932/1965) attributed to Fechner (1876) states that when a hedonically pleasant stimulus is presented after a less hedonically pleasant stimulus the second stimulus will be rated as more pleasant (positive hedonic contrast). However when a less hedonically pleasant stimulus is presented after a hedonically pleasant stimulus the second stimulus will be rated as less hedonically pleasant (negative hedonic contrast).

Recently, hedonic contrast has been found in the pleasantness ratings of juices. In Experiment 1 of Zellner, Rohm, Bassetti, and Parker (2003) and in Experiment 1 of Zellner, Allen, Henley, and Parker (2006), when subjects were asked to rate diluted drinks (less hedonically positive) after drinking full strength drinks (very hedonically positive) they rated the dilute drinks as being less hedonically positive than did groups which rated just the diluted drinks.

Similar hedonic contrast effects have been found using pictures of birds. Subjects in Experiment 2 of Zellner et al. (2003) were presented with a series of pictures of North American birds or Tropical birds followed by a second set of North American birds. Subjects were asked to rate the attractiveness of all the birds. Individuals who saw the Tropical birds before the North American birds rated the North American birds as less
attractive than did individuals who were shown only the two groups of North American birds.

While many studies have looked at contrast effects using context stimuli rated as hedonically positive, some studies have used context stimuli rated as hedonically negative and found positive hedonic contrast. For example, in Dolese, Zellner, Wasserman, and Parker (2005) and Experiment 1 of Zellner, Jones, Morino, Cogan and Jennings (2010) subjects were asked to rate their liking of Goya paintings. The test paintings were slightly hedonically positive and the context paintings were hedonically negative. Results showed that subjects who viewed the context paintings before the test paintings rated the test paintings as significantly more attractive than did subjects who only rated the test paintings.

Parker, Bascom, Rabinovitz, and Zellner (2008) attempted to show both positive and negative hedonic contrast using a single set of stimuli. Participants were asked to rate their liking of music rated as less hedonically positive (bad music) and music rated as more hedonically positive (good music). Participants who heard the good music followed by the bad music showed negative hedonic contrast with results showing that the bad music which had originally been rated on the positive side of the hedonic scale was now being rated by participants on the negative side of the hedonic scale. Participants who heard the bad music followed by the good music showed positive hedonic contrast with results showing an increase in liking ratings on the hedonic scale for the ratings of the good music. So the study demonstrated that positive and negative hedonic contrast can be produced with the same sets of stimuli presented in different orders.

**Context Effect on Intensity Differences and Preference Magnitude**
Research suggests that a change in the ability to discriminate stimuli co-occurs with intensity contrast. This change in the ability to discriminate has been found with auditory stimuli and affects a participant’s ability to judge differences between softer stimuli when a loud stimulus is introduced. In Parker, Murphy, and Schneider (2002) subjects were instructed to identify a set of four stimuli which differed in their loudness. Later, a fifth tone was added to the set of stimuli which was considerably louder in intensity than all of the other stimuli. After the addition of this fifth stimulus to the set, participants had a harder time discriminating the lower intensity stimuli from one another.

A similar phenomenon, condensation, has been shown in hedonics. Hedonic condensation is a reduction in preference between stimuli. It occurs in conjunction with negative hedonic contrast when less hedonically positive stimuli follow more hedonically positive stimuli. In this case, in addition to judging subsequent stimuli as less hedonically positive subjects also judged them as less hedonically different. In Zellner et al. (2006), using the same juice stimuli that produced hedonic contrast in Experiment 1, they showed hedonic condensation, a reduction in the degree of preference a subject had for one juice stimulus compared to another juice stimulus. This was done by giving subjects pairs of juices and asking them to rate how much more they liked one juice in the pair over the other. Subjects in the experimental group who rated their preference for the diluted test drinks following the full strength context drinks showed a significantly smaller preference for one diluted drink over the other than did participants in the control groups who rated their preference for just the diluted drinks. Hedonic condensation has also been found with visual stimuli. Subjects showed less of a preference for one North American bird over the other.
after rating Tropical birds than did subjects who did not rate the tropical birds first (Zellner, Mattingly, & Parker, 2009).

While hedonic condensation has been shown to co-occur with negative hedonic contrast, the opposite, an increase in the size of the preference judgments, has been found to accompany positive hedonic contrast. For example in Experiment 2 of Zellner et al. (2010), using the same Goya paintings as used in Experiment 1, it was shown that when participants viewed Goya’s dark period paintings (hedonically negative) followed by paintings from his pastoral period (slightly hedonically positive) participants had a significantly larger preference for one painting over the other than did the control group who just rated their preference for the pastoral period paintings.

**Categorization Effects on Hedonic Contrast**

Categorization affects whether or not context influences liking judgments. Fechner (1898) (according to Beebe-Center, 1932/1965), when discussing context and target stimuli pointed out that, “the two factors had to bear a certain resemblance to each other”. If the context and target stimuli differed too much contrast would not occur. An example of how categorization can influence contrast is seen in one experiment done by Rota and Zellner (2007), where participants were asked to rate their liking of flowers. Participants who were flower experts grouped the flowers into irises and orchids which they saw as separate categories. Results showed that when these experts were rating context and test stimuli which were both orchids contrast was seen, however when they were shown irises (context stimuli) and then orchids (test stimuli) contrast did not occur. Flower novices were thought to create an overall flower group and did not see the irises and orchids as being different
categories. For this group hedonic contrast did occur when irises were the context flowers and orchids were the test flowers (Rota & Zellner, 2007).

Similarly in Experiment 2 of Zellner et al. (2003) hedonic contrast was found using pictures of birds. However in this experiment a second experimental group was used which looked at how categorization would affect hedonic contrast. Here the participants were given the same procedures as the first experimental group, however now they were informed that they would be rating distinct categories of birds (Tropical and North American birds). Results showed that instructing participants to categorize the birds into two separate groups reduced the degree of hedonic contrast.

**Categorization Effects on Preference**

Categorization has also been shown to reduce the effects of context on preference judgments. As previously discussed, a reduction in preference magnitude, hedonic condensation, occurred when subjects were asked to rate their preference for one North American bird over another after rating context Tropical birds. A second set of participants were also asked to rate their preference for North American birds after rating their preference for the context Tropical birds. This second set of participants followed the same set of procedures as the first set except that they were told that the birds were from different categories (Tropical and North American). Results showed that there was no significant reduction in preference between the context North American birds and the test North American birds when categorization was introduced (Zellner, Mattingly, & Parker, 2009).

**Extreme Context Stimuli**

When context stimuli and test stimuli are very extreme we do not find contrast. Sarris (1967 & 1968) showed that when participants were asked to judge how heavy weights were
when context stimuli and test stimuli differed only slightly, contrast was seen; however when
the context weights were very much heavier or lighter than the test weights contrast did not
occur. This is probably an example of categorization. When the two sets of stimuli are
extremely different they are probably placed into different categories.

A similar effect of extreme context stimuli has been found with hedonics. In
Experiment 1 of Cogan, Zellner, and Parker (2012) using a single set of stimuli, ratings of
moderately attractive pictures of female faces, show both positive and negative hedonic
contrast. These significant effects were found even though the context and test stimuli
occupied different sides of the hedonic scale. In Experiment 2 the context and the test
stimuli were located even farther apart in attractiveness rating on the hedonic scale and in
this part of the study no hedonic contrast was seen. In Experiment 3 using the same stimuli
as in Experiment 2 the researchers attempted to make participants categorize the extreme
context and test stimuli into the same group, by instructing participants that the individuals
seen in the pictures belonged to the Montana State University Choir. Results showed that
positive and negative hedonic contrast did occur when subjects were instructed that
individuals came from the same group and thus made to consider them to be in the same
category.

Current Study

Our present study was done to see if we could find both hedonic condensation and an
increase in preference using the same two sets of (attractive and unattractive) images of faces
used as stimuli in Cogan et al. (2012). We were also looking to see if increasing the
magnitude of hedonic difference between the two sets of stimuli would eliminate the context
effects on preference judgments as it did with hedonic judgments in Cogan et al. (2012).
Finally, we were looking to see if instructions to categorize stimuli can influence the effects caused by context stimuli.

In Experiment 1 we attempted to show an increase in preference when moderately hedonically positive faces followed hedonically negative faces and hedonic condensation if hedonically negative faces followed moderately hedonically positive faces. In Experiment 2, using the same stimuli, we attempted to create two separate categories by instructing the participants that one set of stimuli were from the Montana State University Choir and that others were from the University of Alabama Marching band. This was expected to diminish the contrast effects in preference judgments seen in Experiment 1 when using the moderately hedonically positive stimuli and the hedonically negative stimuli. In Experiment 3 we tested to see if sets of faces that were extremely different hedonically would produce a context effect on preference judgments since in prior research these faces did not produce contrast effects (Cogan, Zellner, & Parker, 2011). Finally in Experiment 4 we attempted to force participants to categorize all of the stimuli, from Experiment 3, into one category by instructing participants that all of the individuals came from the Montana State University Choir. This was done to reverse the effects of the extreme stimulus sets seen in Experiment 3 where no context effects were seen.

Experiment 1

This experiment attempted to show both an increase in preference judgments and condensation using a set of unattractive and moderately attractive faces, previously shown to produce hedonic contrast in both directions (Cogan et al., 2012).

Method

Participants
Participants were recruited from Montclair State University's undergraduate research subject pool. Forty-four undergraduate participants took part in the experiment (34 females and 10 males), with subjects ranging in age from 18 to 47 years of age ($M = 20.86$ years).

**Materials**

Eight pictures of female faces were the same as those used in Experiment 1 of Cogan et al. (2012). Four of the pictures of faces were rated as unattractive (Unattractive $M = -19.32$, $SD = 27.42$) and four of the images were rated as moderately attractive (Moderately Attractive $M = 30.62$, $SD = 20.64$) when rated alone.

**Procedure**

The participants were divided into two groups based on which sets of pictures they would see first. Half of the participants viewed the two pairs of unattractive faces first followed by the two pairs of moderately attractive faces (UA group). The other half of the participants were shown two pairs of attractive faces first followed by the two pairs of unattractive faces (AU group).

Participants were shown one pair of pictures at a time, and asked if they found one face more attractive than the other. If so, they were asked to indicate which one and then rate their preference for one face over the other using a 10 point preference scale. On the scale a rating of 1 meant that the participant found one face to be slightly more attractive than the other, a 4 meant that the participant found one face to be somewhat more attractive than the other, a 7 meant that the participant found one face to be a lot more attractive than the other, and a 10 meant that the participant found one image very much more attractive than the other image. No preference was recorded as a 0.
The pairs of unattractive and attractive images of faces were counterbalanced so that in groups UA and AU half of the individuals were shown pair A first followed by pair B and the other half of individuals were shown pair B first followed by pair A.

**Results**

We calculated each subject's average preference rating for the two pairs of attractive faces along with the subject's average preference rating for the two pairs of unattractive faces. Subjects in group AU who saw the attractive faces first \((M = 2.16, SD = 1.47)\), had significantly less preference between attractive faces than did subjects in group UA who saw attractive faces second \((M = 3.30, SD = 2.00)\) \([t(42) = -2.15, p = .04; \omega^2 = .08]\).

Subjects in group UA who saw the unattractive faces first showed a significantly greater preference for one unattractive face over another \((M = 2.05, SD = 1.53)\) than subjects in group AU who saw the unattractive faces second \((M = .80, SD = 1.36)\) \([t(42) = 2.86, p = .01; \omega^2 = .14]\). The group means for the attractive and unattractive faces presented first or second are in Table 1.

**Discussion**

These results show that hedonic condensation and its opposite, an increase in preference, occur when using the same two sets of images of faces, which occupy opposite sides of the hedonic scale. Results also support the idea that hedonic condensation and an increase in preference accompanies both positive and negative hedonic contrast such as was seen in Experiment 1 of Cogan et al. (2012).

**Experiment 2**

This experiment attempted to diminish the contrast effects in preference judgments seen in Experiment 1 by creating two separate categories of faces. Since having subjects
think of the context and the test stimuli as being from distinct categories reduces hedonic contrast we investigated whether it will also eliminate context effects on preference judgments.

**Method**

**Participants**

Participants were recruited from Montclair State University’s undergraduate research subject pool. Forty-four undergraduate participants took part in the experiment (36 females and 8 males), with subjects ranging in age from 18-25 years of age ($M = 19.55$ years).

**Materials**

The same materials that were used in Experiment 1 were used in Experiment 2.

**Procedure**

The same procedure that was used in Experiment 1 was used in Experiment 2. However in this study participants were informed that the first two pairs of faces they were rating and the second two pairs of faces they were rating were members of two different organizations (either the Montana State University Choir or the University of Alabama Marching Band). What the groups were called was balanced across conditions.

**Results**

We calculated each subject’s average preference rating for the two pairs of moderately attractive faces along with the subject’s average preference rating for the two pairs of unattractive faces. There was no significant difference in preference ratings for the attractive faces between group AU who saw the attractive faces first ($M = 3.50$, $SD = 1.68$) and group UA who saw the attractive faces second ($M = 3.36$, $SD = 2.04$) [$t(42) = 0.24$, $p = .81$; $\omega^2 = 0.00$].
However subjects in group UA showed a significantly greater preference for one unattractive face over the other \((M = 1.73, SD = 1.24)\) than did subjects in group AU \((M = .86, SD = .95)\) \([t(42) = 2.59, p = .01; \omega^2 = .11]\). The group means for the attractive and unattractive faces presented first or second are in Table 2.

An analysis was also performed to make sure that instructing participants to think of the faces as being from the University of Alabama marching band and the Montana State University choir did not have some unforeseen bias on their preference ratings. Individuals who rated the pretty faces and were told that they were from the Montana State University choir \((M = 3.32, SD = 2.06)\) did not give significantly different preference judgments than participants who were told the faces were from the Alabama State marching band \((M = 3.55, SD 1.65)\) \([t(42) = -.40, p = .69; \omega^2 = 0.00]\). Individuals who rated the unattractive faces and were told that they were from the Montana State University choir \((M = 1.07, SD = 1.06)\) did not give significantly different preference judgments than participants who were told the faces were from the Alabama State marching band \((M = 1.52, SD = 1.27)\) \([t(42) = -1.29, p = .20; \omega^2 = 0.01]\).

**Discussion**

These results show that when subjects were instructed to categorize stimuli into two separate categories the effect of context on hedonic preference judgments was eliminated for the attractive faces. However the effect of categorization had no effect on preference judgments for the participants viewing the unattractive faces. Hedonic condensation still occurred.

**Experiment 3**
This experiment attempted to see if extremely attractive faces and unattractive faces would produce the same increase in preference judgments and condensation as seen in Experiment 1. The stimuli used here were previously shown not to produce hedonic contrast in either direction (Cogan et al., 2012).

Method

Participants

Participants were recruited from Montclair State University’s undergraduate research subject pool and the Montclair State University campus. Forty-four undergraduate participants took part in the experiment (30 females and 14 males), with subjects ranging in age from 18-29 years of age ($M = 21.34$ years). Four additional subjects older than 30 were tested but their data was discarded, because it was discovered that they were not students, but visitors to the campus.

Materials

The unattractive pictures were those used in the previous study (Unattractive $M = -19.32, SD = 27.42$) and the set of extremely attractive pictures (Extremely Attractive $M = 58.10, SD = 19.80$) were those used in Experiment 2 of Cogan et al. (2012).

Procedure

The same procedure that was used in Experiment 1 was used in Experiment 3, except that the set of attractive faces were replaced by the set of extremely attractive faces.

Results

We calculated each subject’s average preference rating for the two pairs of extremely attractive faces along with the subject’s average preference rating for the two pairs of unattractive faces. Subjects in group AU did not rate their preference for the attractive faces
Subjects in group UA did not rate the unattractive faces \( (M = 1.34, SD = 1.22) \) as significantly different from subjects in group AU \( (M = .80, SD = 1.25) \) \([t(42) = 1.47, p = .15; \omega^2 = .03]\). The group means for the attractive and unattractive faces presented first or second are in Table 3.

**Discussion**

When the difference in magnitude between the attractive faces and unattractive faces was increased on the hedonic scale we saw an elimination of the condensation that accompanies negative hedonic contrast and also an elimination of the increase in preference judgments that accompanies positive hedonic contrast. These results parallel what was found in Cogan et al. (2012) that when the hedonic difference between the test and context stimuli is increased both positive and negative hedonic contrast were not found. This suggests a relationship between hedonic contrast and context effects on preference judgments.

**Experiment 4**

This experiment attempted to force participants to categorize the very attractive and the unattractive faces used in Experiment 3 into one group. We anticipated that this manipulation of categorization by labeling the faces would produce effects on preference judgments like those seen in Experiment 1. The categorization manipulation was the same as that used in Experiment 3 of Cogan et al. (2012) with the extremely different stimuli. This manipulation resulted in hedonic contrast in that study. We investigated whether it will also result in context effects with preference judgments.

**Method**
Participants

Participants were recruited from Montclair State University’s undergraduate research subject pool. Forty-four undergraduate participants took part in the experiment (32 females and 12 males), with subjects ranging in age from 18-23 years of age ($M = 18.98$ years).

Materials

The same materials that were used in Experiment 3 were used in Experiment 4.

Procedure

The same procedure that was used in Experiment 3 was used in Experiment 4. However in this study all of the participants were told that they would be rating pictures of faces of individuals from the Montana State University Choir.

Results

We calculated each subject’s average preference rating for the two pairs of extremely attractive faces along with the subject’s average preference rating for the two pairs of unattractive faces. Subjects in group AU showed significantly less of a preference for one extremely attractive face ($M = 3.23$, $SD = 1.62$) over the other compared to subjects in the group UA ($M = 4.27$, $SD = 1.65$) [$t(42) = -2.17$, $p = .04$; $\omega^2 = .08$].

Subjects in group UA ($M = 1.57$, $SD = 1.44$) and AU ($M = 1.07$, $SD = 1.55$) did not differ significantly in their preference ratings of the unattractive faces [$t(42) = 1.11$, $p = .28$; $\omega^2 = .01$]. The group means for the attractive and unattractive faces presented first or second are in Table 4.

Discussion

Categorization of the stimuli into one group resulted in an increase in hedonic preference judgments in stimuli which did not show a context effect before (Experiment 3).
Subjects who rated the attractive faces after the unattractive faces showed an increase in preference between one image over the other. However categorization did not have an effect on the judgments of the unattractive faces which followed attractive faces. Subjects did not show hedonic condensation when the unattractive faces were shown after the very attractive faces. These results are different from the corresponding findings on hedonic contrast (Experiment 3 of Cogan et al., 2012). There instructing participants to categorize stimuli together produced both positive and negative hedonic contrast where it had not occurred in Experiment 2 of Cogan et al. (2012). We found a similar effect with preference judgments only in one direction.

**General Discussion**

Experiment 1 expanded on the findings of previous research by showing that hedonic condensation and its opposite, an increase in preference judgments, occur using images of faces. Previous research looking at preference judgments have used stimuli including: juices, images of birds, and paintings (Zellner et al., 2006; Zellner et al., 2009; Zellner et al., 2010). Experiment 1 was also an attempt to show that context effects on hedonic preference judgments occurs using the same stimuli as those used when finding hedonic contrast in Experiment 1 of Cogan et al. (2012). Experiment 1 of Cogan et al. (2012) showed both positive and negative hedonic contrast using a single set of stimuli. In Experiment 1 of the present study, using those same face stimuli, we attempted to show that an increase in preference judgments would be seen with the same stimulus presentation that produced positive hedonic contrast and a decrease in preference judgments, hedonic condensation, would be seen with the same stimulus presentation which produced negative hedonic contrast. Results showed that the stimulus sequence which produced negative hedonic
contrast in Cogan et al. (2012) also produced hedonic condensation in the current study and the stimulus sequence that produced positive hedonic contrast in Cogan et al. (2012) produced an increase in the size of preference judgments.

Experiment 2 expanded on the findings of Zellner et al. (2009) which showed that hedonic condensation of hedonically positive stimuli could be eliminated when participants thought of the context and test stimuli as being in two different groups. Here we attempted to show that preference judgments of both positive and negative stimuli can be influenced or eliminated by instructing participants to categorize stimuli into separate groups. Results for Experiment 2 showed that for attractive faces, which had previously displayed an increase in preference judgments, instructions to categorize stimuli were enough to eliminate context effects on preference, with no significant difference between pairs of attractive faces viewed first and those viewed second. However for the unattractive faces, which had previously been shown to produce hedonic condensation, instructions to categorize stimuli did not have an effect on preference judgments. Participants still showed a greater preference for unattractive faces viewed first compared to unattractive faces viewed after seeing attractive faces.

Results for participants' preference judgments of attractive faces parallel the findings of Zellner et al. (2003) and their work with hedonic contrast by showing that when subjects view the context and test stimuli as belonging to two separate groups the effect of context on contrast effects is eliminated. However the results for participants' preference judgments of unattractive faces did not parallel the results of previous experiments involving categorization and contrast effects. Participants in our study still showed context effects in their preference judgments of unattractive faces (Zellner et al., 2003).
Experiment 3 showed that increasing the difference on the hedonic scale between context and test stimuli eliminated the effects of context on hedonic condensation and its opposite, an increase in hedonic preference judgments. Here, the extremely attractive faces shown after the unattractive faces did not produce an increase in preference judgments and the unattractive faces shown after the extremely attractive faces did not produce hedonic condensation. These results parallel those found by Cogan et al. (2012) with hedonic contrast, which attempted and failed to show both positive and negative hedonic contrast using picture stimuli of extremely attractive faces and unattractive faces. They are also similar to results found by Sarris (1970) in his research with loudness contrast. Our findings with preference judgments show that hedonic preference judgments, like hedonic contrast effects, are influenced by the range of the stimuli being rated. That is, when context and test stimuli are farther apart on the hedonic liking scale, preference judgments are made independent of the context in which they are viewed.

Experiment 4 expanded on the findings of Cogan et al. (2012) by showing that forcing participants to categorize extremely attractive and unattractive faces into one group results in context effects on preference judgments for attractive faces. Using the same stimuli as in Experiment 3 of the current study, this study showed that when subjects viewed the unattractive faces followed by the extremely attractive faces and were instructed to think of the faces as belonging to the same group, an increase in preference judgments was found. These effects of telling subjects to put these stimuli into one category are similar to what was shown in Cogan et al. (2012) with positive hedonic contrast. Although putting stimuli into the same category resulted in context effects with the attractive faces, it did not show the same effect with unattractive faces. Subjects giving preference judgments of unattractive
faces after being instructed to categorize the faces into one group failed to show hedonic condensation after the manipulation was introduced. These findings are in contrast to Cogan et al. (2012) and her findings with categorization and negative hedonic contrast, which showed negative hedonic contrast after instructions to participants to think of the faces as belonging to the same group.

Categorization has been shown in previous research to influence participants' hedonic contrast ratings by influencing (both positive and negative contrast) effects (Cogan et al., 2012; Rota & Zellner, 2007; Zellner et al., 2003). More recently categorization has also been shown to influence context effects on preference judgments (Zellner et al., 2009) and in our current study Experiments 2 and 4 showed that categorization can influence a participant's preference judgments of attractive faces. Experiment 2 used categorization to eliminate the effects of context on preference judgments by separating the unattractive faces and attractive faces into two separate groups so that the participants would rate the pairs of faces independently of one another. Results for Experiment 2 showed that instructing participants to categorize images of unattractive faces and attractive faces into two separate groups can remove the effect of context on participants' preference judgments of stimuli that had previously shown an increase in preference judgments. These results are parallel to Zellner et al's. (2009) work with categorization and preference judgments, which showed that categorization of stimuli into two groups can eliminate context effects. In Experiment 4 we attempted to create one group which we hoped would force participants to base their preference judgments on the context in which they saw the stimuli. Results for Experiment 4 showed putting all the faces into one category resulted in subjects reporting greater
preference for one very attractive face over another after viewing the unattractive than when viewed first.

Our efforts to influence preference judgments of unattractive faces using categorization did not follow the findings of previous research. The results for Experiment 2 and 4 are in contrast to Zellner et al. (2009) and their findings of categorization and its influence on less hedonically positive stimuli. In Experiment 2 we were unable to eliminate the effects of context for the unattractive faces. Even after telling subjects to put the attractive and unattractive into different categories hedonic condensation was still found. In Experiment 4 for the unattractive faces we were unable to introduce context effects by instructing participants to put the attractive and unattractive faces into one group, which should have introduced hedonic condensation.

Thus our efforts to introduce hedonic condensation and eliminate it using pairs of unattractive faces were less successful than those for effects on size of hedonic preference judgments for the attractive faces. Instead of any effect of categorization, what we see across all four studies is the same pattern (see Figure 1). Subjects gave lower preference judgments for the unattractive faces, after seeing the attractive ones. Sometimes this effect was significant and sometimes it was not significant, but it always in the same direction.

It should be noted that this study was the first noted instance where the stimuli in the unattractive category were rated as hedonically negative. In previous studies involving preference judgments the unattractive test stimuli were considered to be hedonically less positive than the hedonically positive stimuli, but they were still rated as slightly hedonically positive. Preference judgments for these less hedonically positive stimuli when judged first were $M = 3.60$ for the diluted juices, $M = 4.30$ for the images of North American Birds, and
$M = 3.40$ for Goya's dark period paintings rather than between $M = 1.34$ and $M = 2.05$ for the unattractive faces in the present studies (Zellner et al., 2006; Zellner et al., 2009; Zellner et al., 2010).

This might have affected our results by producing a basement effect. The ratings in our present studies for unattractive faces had little room to move, whereas the average preference judgment for the attractive and very attractive faces did ($M = 2.85$ & $M = 3.75$). The lower preference scores between the pairs of unattractive faces were not due to smaller hedonic differences between the pairs of unattractive faces compared to the moderately and very attractive faces. When we computed the difference in hedonic ratings for one of the pair of stimuli over the other using the data from Cogan et al. (2012) we found that the differences in hedonic ratings between the unattractive faces in a pair ($\text{Mean Pair A} = 23.21$ & $\text{Pair B} = 37.57$) were not smaller than the moderately attractive ($\text{Mean Pair A} = 39.29$ & $\text{Pair B} = 25.00$) and very attractive female faces ($\text{Mean Pair A} = 19.50$ & $\text{Pair B} = 14.50$). So, the lower preference scores for the unattractive faces was not the result of smaller hedonic differences between the faces used in the unattractive pairs.

The low preference ratings of the unattractive faces might be an effect of attention. Research has shown that when participants are shown images of faces, they spend more time looking at attractive faces than unattractive faces (Aharon et al., 2001). When asked to judge attractiveness, participants take longer to make judgments when asked for attractiveness ratings of attractive faces than when asked for attractiveness ratings of unattractive faces (Kranz & Ishai, 2006). Previous research has found that participants in sound identification and intensity tasks focus their attention on a small band of intensity ranges, and any tone that falls outside of this range is paid little attention to with subjects showing a decreased ability
to discriminate between those stimuli (Luce, Green, & Weber, 1976; Nosofsky, 1983). We propose that when subjects are presented with unattractive images of faces they pay less attention to the image being presented. Subjects will therefore be unable to notice any substantial differences in hedonic value for one unattractive face over the other. This idea is supported by the large number of "no preference" ratings given for unattractive faces compared to the moderately attractive or very attractive faces.

Recently in current research, we have found using cheese odors that when subjects were instructed that the stimuli were samples of body odor this produced a negative hedonic rating and also lower preference judgments than when they were told they were cheese. This is similar to what we seen in the four studies here with unattractive face. These recent findings lend support to the idea that if an individual judges a stimulus to be hedonically negative they will give significantly lower preference judgments than if they considered the stimulus to be hedonically positive (Zellner, 2012).

The conclusions for the present study show that preference judgments for attractive faces can be influenced by the context in which they are viewed, with subjects showing a greater preference for attractive faces when they first are exposed to unattractive faces. These findings however disappear when the hedonic range between the attractive and unattractive faces is increased or when subjects are asked to put the context and test stimuli in different categories. In addition subjects instructed to categorize together stimuli originally seen as being in different categories when told to put those stimuli in the same category now compare them. Results for the effect of context, range, and categorization on preference judgments of unattractive faces is a bit more inconclusive. Future research should focus on the role of attentional factors in judgments of hedonically negative stimuli.
References


Cogan, E.S., Zellner, D.A., & Parker S. (2012). Beyond compare: When are stimuli too remote to produce contrast? Unpublished manuscript, Department of Psychology, Montclair State University, Montclair, New Jersey.


Table 1

*Mean Preference Judgments for Experiment 1*

<table>
<thead>
<tr>
<th>Presentation Order of Facial Pairs</th>
<th>Unattractive Faces Mean (SD)</th>
<th>Attractive Faces Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment 1 First</td>
<td>2.05 (1.53)</td>
<td>2.16 (1.47)</td>
</tr>
<tr>
<td>Experiment 1 Second</td>
<td>0.80 (1.36)*</td>
<td>3.30 (2.00)*</td>
</tr>
</tbody>
</table>

*Note.* Mean preference judgments notated with an (*) indicated preference judgments which are significantly different from the mean preference judgments of participants who viewed the pairs of faces first.
Table 2

Mean Preference Judgments for Experiment 2

<table>
<thead>
<tr>
<th>Presentation Order of Facial Pairs</th>
<th>Unattractive Faces Mean(SD)</th>
<th>Attractive Faces Mean(SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment 2 First</td>
<td>1.73 (1.24)</td>
<td>3.50 (1.68)</td>
</tr>
<tr>
<td>Experiment 2 Second</td>
<td>0.86 (0.95)*</td>
<td>3.36 (2.04)</td>
</tr>
</tbody>
</table>

Note. Mean preference judgments notated with an (*) indicated preference judgments which are significantly different from the mean preference judgments of participants who viewed the pairs of faces first.
Table 3

*Mean Preference Judgments for Experiment 3*

<table>
<thead>
<tr>
<th>Presentation Order of Facial Pairs</th>
<th>Unattractive Faces Mean (SD)</th>
<th>Attractive Faces Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment 3 First</td>
<td>1.34 (1.22)</td>
<td>4.27 (1.97)</td>
</tr>
<tr>
<td>Experiment 3 Second</td>
<td>0.80 (1.25)</td>
<td>3.39 (1.62)</td>
</tr>
</tbody>
</table>

*Note.* Mean preference judgments notated with an (*) indicated preference judgments which are significantly different from the mean preference judgments of participants who viewed the pairs of faces first.
Table 4

Mean Preference Judgments for Experiment 4

<table>
<thead>
<tr>
<th>Presentation Order of Facial Pairs</th>
<th>Unattractive Faces Mean (SD)</th>
<th>Attractive Faces Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment 4 First</td>
<td>1.57 (1.44)</td>
<td>3.23 (1.62)</td>
</tr>
<tr>
<td>Experiment 4 Second</td>
<td>1.07 (1.55)</td>
<td>4.27 (1.65)*</td>
</tr>
</tbody>
</table>

*Note.* Mean preference judgments notated with an (*) indicated preference judgments which are significantly different from the mean preference judgments of participants who viewed the pairs of faces first.
Figure 1. The average preference ratings for participants viewing the pairs of faces first or second across all four experiments. Error bars display +/- 1 S.D.
Abstract

Previous studies have shown that when subjects view hedonically positive stimuli followed by stimuli of lesser hedonic value their preference for the stimuli of lesser hedonic value decreases. This is hedonic condensation. In addition, its opposite, an increase in preference judgment, occurs when subjects view a less hedonically positive stimuli followed by hedonically positive stimuli. Experiment 1 showed that condensation and its opposite, an increase in preference judgments, were produced using unattractive and moderately attractive faces. Experiment 2 showed that when instructed to view the stimuli as coming from two different groups the participants rating the attractive faces did not show an increase in preference judgments, however hedonic condensation was still present. Experiment 3 showed that increasing the difference on the hedonic scale between the attractive and unattractive faces eliminated the effect of context on subjects' preference judgments. Experiment 4 showed that forcing subjects to categorize the extremely attractive and unattractive faces into the same group introduced a context effect on participants' ratings for the pairs of attractive faces, with a greater preference shown; however condensation was not found for the unattractive faces.