Prototypes are attractive because they are easy on the mind

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Abstract

People tend to prefer highly prototypical stimuli – a phenomenon referred to as "beauty-in-averageness" effect. A common explanation proposes that prototypicality signals mate value. Here we present three experiments testing whether prototypicality preference results from more general mechanisms – fluent processing of prototypes and preference for fluent stimuli. In two experiments, participants categorized and rated the attractiveness of random dot patterns (Experiment 1) or common geometric patterns (Experiment 2) that varied in levels of prototypicality. In both experiments, prototypicality was a predictor of both fluency (categorization speed) and attractiveness. Critically, fluency mediated the effect of prototypicality on attractiveness, although some effect of prototypicality remained when fluency was controlled. These findings occurred whether or not participants explicitly considered the pattern's categorical membership, and whether or not categorization fluency was salient when rating attractiveness. Experiment 3, using a psychophysiological technique of facial electromyography, confirmed that viewing of abstract prototypes elicits quick positive affective reactions.

People tend to prefer highly prototypical stimuli over more unusual exemplars – a phenomenon referred to as "beauty-in-averageness" effect. One well-known illustration of this phenomenon is preference for prototypical or average faces (Langlois & Roggman, 1990; Rhodes & Tremewan, 1996). The "beauty-in-averageness" effect is often theoretically explained as reflecting a biological predisposition to interpret prototypicality as a cue to mate value (Symons, 1979). For example, facial prototypicality may be predictive of current or prior health, lending individuals with a prototypicality preference a reproductive advantage (Thornhill & Gangestad, 1993). However, recent research questions the strength of the relationship between facial prototypicality and health (Kalick, Zebrowitz, Langlois, & Johnson, 1998; Rhodes, Zebrowitz, Clark, Kalick, Hightower, & McKay, 2000). Furthermore, if people prefer prototypicality because it signals reproductive fitness, this phenomenon should not necessarily extend to fitness-irrelevant stimuli. Yet several studies show comparable effects in a wide variety of natural and artificial categories, including dogs, birds, fish, automobiles, and even watches (Halberstadt & Rhodes, 2000, 2003).

Prototypicality and Fluency

These theoretical and empirical considerations motivate a search for more general cognitive mechanisms underlying preference for prototypicality. One promising candidate comes from findings that prototypes are processed fluently, i.e., with greater speed and efficiency. For example, when presented with random dot patterns that are prototypical vs. distorted, people classify prototypical patterns faster (Posner & Keele, 1968), and recruit fewer neural resources to perceive prototypical patterns (Reber, Stark, & Squire, 1998).

Interestingly, research also suggests that fluent processing elicits positive reactions. Thus, manipulations that enhance fluency (e.g., priming, clarity, stimulus duration, multiple prior exposures) yield more favorable judgments (Winkielman et al., 2003). Greater fluency might also elevate mood, as suggested by effects of multiple repetitions (Monahan, Murphy, & Zajonc, 2000) and enhanced reading speed (Pronin & Wegner, in press). Importantly, the increase in favorability occurs whether participants judge stimuli on positive dimensions (e.g., liking, goodness, prettiness) or negative dimensions (e.g., disliking, badness, ugliness; Reber, et al., 1998; Seamon, McKenna, & Binder, 1998). Further, psychophysiological methods, such as facial electromyography, reveal more positive reactions to fluent stimuli, as reflected in greater activity over the region of the zygomaticus major – the cheek muscle responsible for smiling (Harmon-Jones & Allen, 2001; Winkielman & Cacioppo, 2001). Presumably, these positive reactions occur because fluency indicates error-free processing and successful recognition of a stimulus. Fluency is also a probabilistic cue to previous experience, indicating that the stimulus is likely to be relatively benign (for review, see Winkielman et al., 2003).

If prototypical stimuli are fluent, and fluent stimuli are attractive, then perhaps prototypes are attractive because of their fluency. If so, fluency could provide a parsimonious mechanism for the attractiveness of prototypes across a variety of biological and non-biological categories that does not rely on assumptions about their reproductive value.

Current Research

We conducted three experiments to assess the effects of prototypicality on preference. Experiments 1 and 2 examined the relation between preference (measured by attractiveness ratings) and fluency (measured by categorization speed). Experiment 3 examined the link between prototypicality and positive affect with facial electromyography (EMG).

Following earlier research, we manipulated prototypicality in all three experiments by mathematically distorting dot pattern prototypes (Posner & Keele, 1968). Experiments 1 and 3 used prototypes of abstract patterns (random dots) to eliminate any resemblance to reproductively relevant categories, and to minimize issues inherent in using distortions of meaningful stimuli, such as prior experience and symmetry (Rhodes, Sumich, & Byatt, 1999). Experiment 2 used prototypes of geometric patterns (squares and diamonds) to assess whether the findings with abstract patterns generalize to meaningful material. This is important because (i) previous demonstrations of prototype attractiveness have relied on meaningful stimuli, and (ii) people may not draw on fluency, a non-analytic source of information, when other diagnostic sources of information about the stimulus are available (Schwarz & Clore, 1996). Together, the use of both meaningless and meaningful material provides a strong test of the role of fluency in the attractiveness of prototypes.

In Experiments 1 and 2, we expected that with both random and meaningful patterns, participants would (i) prefer prototypical patterns, and (ii) process prototypical patterns more fluently. More important, we expected that the second effect would explain the first – that is, that fluency would account for a significant degree of participants' preference for prototypes. In Experiment 3 we expected that prototypical patterns would elicit more spontaneous positive reactions, as measured by activation of the zygomaticus major (smiling) muscle.

Experiment 1

Experiment 1 examined the role of fluency in attractiveness of random prototypes. Participants first judged the attractiveness of dot patterns differing in their distance from prototypes of two categories. Next, participants rapidly classified the patterns into their respective categories. Using classification speed as a measure of fluency, we analyzed whether fluency mediated the prototypicality-attractiveness relationship.

In addition, Experiment 1 tested whether fluency effects on attractiveness require that participants explicitly refer to the stimulus' category. Outside the laboratory, judgments of attractiveness may or may not refer explicitly to the stimulus category (e.g., Finches are attractive birds vs. Finches are attractive). To test the importance of category reference, for half the participants the attractiveness question included a category name (i.e., How attractive is this pattern for [its category]?), whereas for the other half of participants it did not (i.e., How attractive is this pattern?). If similar effects occur in both conditions, we can be more certain that fluency underlies attractiveness regardless of whether participants explicitly consider the stimulus category.

Method

Sixty-eight students participated for course credit. Stimuli, presented on 15-inch monitors, represented four levels of distortions of two random dot prototypes. Prototypes were generated by randomly selecting eight dots within a 30 x 30-unit grid. Distortions were generated by independently moving each dot in the prototype to one of four concentric rings using the formula, shown in Table 1 (Posner, Goldsmith, & Welton, 1967). See Figure 1 for examples.

The experiment had three sequential phases – training, attractiveness, and fluency. In the training phase, participants saw 10 exemplars from each of the two categories, described as "Acks" and "Blubs." The assignment of labels to categories and presentation order were randomized. In the attractiveness phase, participants rated 120 new stimuli representing four distortion levels of each category (i.e., 15 per level). The 10-point rating scale was anchored at "very unattractive" and "very attractive". For half the participants, judgment instructions included a reference to the stimulus category (How attractive each Ack is for an Ack, and how attractive each Blub is for a Blub), and for half they did not (How attractive is each pattern). In the fluency phase, participants classified the 120 patterns, presented in a new random order, as "Acks" or "Blubs" by clicking on appropriately labelled keys, with instructions to respond as quickly as possible.

Results

Preliminary analyses. Trials on which participants classified patterns incorrectly or responded extremely quickly or slowly (less than 170 ms or more than 3866 ms, three SDs above the mean) were not analyzed. The remaining 92% of the data was collapsed across participants to create average attractiveness ratings and fluency estimates for each of the 120 patterns. Because preliminary analyses revealed no effects of the particular prototype used to generate the stimuli, subsequent analyses collapsed across this variable.

Main analyses. The effects of distortion on fluency and attractiveness were analyzed in two separate linear contrasts using distortion level as an independent variable. As predicted, when patterns were close to their respective prototypes, participants categorized them more quickly and judged them as more attractive, Fs(1,116) = 30.29 (fluency) and 18.52 (attractiveness), p-rep = .99 (Figure 2, top panel). Expressing this result in terms of zero-order correlations, lower distortion correlated with faster RT (r = .45) and greater attractiveness (r = -.37). Critically, the less time it took participants to classify a pattern, the more attractive they judged it (r = -.48; for all zero-order correlations dfs = 120, p-rep = .99).

Given that the conditions for mediation were met (Baron & Kenny, 1986), we then tested our critical hypothesis that fluency mediates the distortion-attractiveness relationship. A test for mediation was significant, indicating that the relationship between distortion and attractiveness significantly decreased when fluency was controlled (Sobel's $z = 3.45$, p-rep =.99). Interestingly, some effect of distortion on attractiveness remained even when fluency was partialled out, $r(117) = -.20$, p-rep = .92.

Finally, we examined whether the relations among distortion, fluency, and attractiveness depended on whether or not the attractiveness instructions explicitly referred to the pattern's category membership. We found no effects for the instruction condition, indicating that the relation between fluency and attractiveness did not depend on the salience of categorization (all ps-rep $< .77$).

Discussion

The findings from Experiment 1 suggest that fluency indeed contributes to the appeal of prototypicality. As in previous work, prototypical stimuli were both more attractive and more fluently processed. As a novel contribution, Experiment 1 shows that the second effect partially accounts for the first, as demonstrated by a decrease in the prototypicality-attractiveness relationship when fluency was controlled. Interestingly, even with fluency controlled, distortion continued to predict attractiveness independently. Importantly, the observed relationships among fluency, prototypicality, and attractiveness did not differ depending on whether or not participants were explicitly instructed to consider the patterns' category membership. Notably, these findings occurred for patterns that were abstract and random, with no direct functional or reproductive value.

Experiment 2

Experiment 2 replicated Experiment 1 with the following modifications. First, the stimuli were derived from prototypes of two geometric shapes – squares and diamonds. This manipulation allows us to test whether fluency underlies the attractiveness of prototypes of more meaningful and namable stimuli, for which participants could rely on other sources of information, such as assessments of functionality or previous preferences (Schwarz & Clore, 1996). Second, because there were no effects of attractiveness instruction condition in Experiment 1, in the interest of clarity, we used the instructions with explicit category referents in Experiment 2. Third, we counterbalanced the order of the attractiveness and classification tasks to further examine whether any effects depend on (i) the salience of categorization fluency, or (ii) the response set, or the possibility that participants use the same strategy on the second task as the first.

Method

Sixty-six students participated in exchange for travel reimbursement. The methods were similar to Experiment 1, with the following exceptions. Stimuli were distortions of either an eight-dot square or a diamond prototype (see Table 1 and Figure 1). In the training phase, participants saw five examples of the categories “Acks” and “Blubs” (the terms “square” and “diamond” were never used). The instructions for the attractiveness judgments always referred to the stimulus category (e.g., How attractive is this Ack, for an Ack?). Finally, the order of attractiveness and classification tasks was counterbalanced.

Results

Preliminary analyses. As in Experiment 1, we analyzed only correct classification responses that occurred at more than 170 ms or less than 3 SDs above the mean response time (2150 ms). The remaining 87% of the trials were collapsed across participants to create mean attractiveness ratings and fluency estimates for each of the 120 patterns. Because preliminary analyses revealed no effect of the specific prototype used to generate the stimuli (square versus diamond), this variable was dropped from subsequent analyses.

Main analyses. Data were again analyzed in two linear contrasts using distortion level as the independent variable. As predicted, relative to distorted patterns, participants categorized more prototypical patterns more quickly, and judged them as more attractive, $Fs(1,116) = 100.75$ (fluency) and 229.58 (attractiveness), p-rep = .99 (Figure 2, bottom panel). Expressing these results as zero-order correlations, closeness to prototype correlated with faster categorization ($r = .66$) and greater attractiveness ($r = -.80$). Faster categorization also correlated with greater attractiveness ($r = -.78$; all $dfs = 120$, p-rep = .99). Critically, again, fluency mediated the relation between distortion and attractiveness (Sobel's $z = 7.78$, p-rep = .99). However, as in Experiment 1, the partial effect of distortion on attractiveness remained significant when fluency was controlled, $r(117) = -.62$, p-rep = .99.

Finally, the relation among attractiveness, distortion, and fluency did not depend on whether participants performed the attractiveness task or the classification task first (all ps-rep < .79). Further, the relation between fluency and attractiveness did not change even when the attractiveness and fluency estimates for the patterns were based only on the first task that participants performed. These findings confirm that the fluency-attractiveness relation is robust and does not depend on the salience of participants' classification performance.

Discussion

The findings from Experiment 2 replicated the relations among fluency, prototypicality, and attractiveness obtained in Experiment 1. Fluency again accounted for a significant proportion (but not all) of the variance in the prototypicality-attractiveness relation. As in Experiment 1, the relation among fluency, prototypicality, and attractiveness did not depend on the salience of categorization. Notably, these findings occurred with meaningful patterns to which participants could apply other knowledge. Yet, if anything, the role of fluency was even more pronounced in Experiment 2.

Experiment 3

Most "beauty-in-averageness" research relies on self-reports – typically in the form of judgments of attractiveness or liking. However, such judgments may not always reflect a genuine affective reaction to the stimulus. For example, in some contexts participants could use the dimension of "attractiveness" as a proxy judgment of distance from a prototype, or as a "cold" judgment of the stimulus quality. Therefore, it is important to examine whether participants show genuine positive reactions to prototypical stimuli, even when dealing with abstract, random patterns. Genuine positive reactions should be reflected in psychophysiological measures, such facial electromyography (EMG). Many studies show that positive affective reactions manifest themselves in incipient smiles, as reflected by higher EMG activity over the cheek region, whereas negative affective responses manifest themselves in incipient frowns, as reflected by higher EMG activity over the brow region (Cacioppo, Petty, Losch, & Kim, 1986). Importantly, facial EMG can detect mild affective reactions to subtle stimuli that do not elicit fully-developed emotional expressions (Cacioppo, Bush, & Tassinary, 1992; Dimberg, Thunberg, & Elmehed, 2000).

Previous research has demonstrated that facial EMG can detect affective reactions to fluency manipulations. For example, Winkielman and Cacioppo (2001) found that enhancing fluency with identity priming and with stimulus duration results in mild positive responses, as reflected in a higher activity over the cheek (but not brow) region. Further, these authors found that the response over the cheek region occurs rapidly upon stimulus viewing, suggesting that the positive affective reaction is spontaneous.

To test the affective reactions to prototypes, we slightly modified the paradigm used in Experiments 1 and 2. Specifically, we first exposed participants to several distortions of random abstract dot patterns converging on a prototype. Then, we assessed participants' affective reactions upon viewing a novel, but "prepared" pattern (i.e., the prototype) versus an "unprepared" control pattern (the prototype of another, unseen category). We based this paradigm on classic studies demonstrating that participants process the novel but prepared prototype more fluently, as reflected in faster categorization times (Posner & Keele, 1968). In addition, this paradigm was recently used in studies demonstrating higher attractiveness judgments for novel but prepared face prototypes (Rhodes, Halberstadt, & Brajkovich, 2001; Rhodes, Halberstadt, Feffrey, & Palermo, 2005). We predicted that, compared with the unprepared prototype, the prepared prototype would elicit greater immediate EMG activity over the cheek (but not brow) region.

Because this design used presentation of different converging distortion patterns as a manipulation of prototype fluency, it coincidentally also allows a test of how a single prior exposure to a pattern influences affective responses. To take advantage of this opportunity, we also compared EMG reactions to previously seen distortion patterns relative to novel control patterns. We expected only a weak effect given that we used only a single presentation, whereas the exposure effects on affective responses typically require multiple repetitions of the same pattern (i.e., the mere-exposure effect; Harmon-Jones & Allen, 2001; Seamon et al. 1998; Zajonc, 1968).

Method

Twenty-one students participated individually for extra credit. Stimuli were nine-dot patterns presented centrally on a 17-inch monitor. Using software by Goldstone (2000), we created 20 random prototypes, within a 300 x 300 pixel matrix, each with 15 distortions (see Figure 1). Distortions were generated by randomly moving each 18 pixel dot by 30 pixels, or by 1.66 dot size (degree of distortion approximately between levels 2 and 3 in Experiments 1 and 2).

The experimental procedure consisted of 10 alternating viewing and testing phases. In each viewing phase, participants saw 15 distortions but no prototype from one of the 10 categories. Participants simply viewed each stimulus, which in this phase appeared for 1 second separated by 400 ms blank. The viewing phase was followed by the testing phase in which participants saw the following patterns in a random order. Two patterns were prototypes. One was the prototype of the category viewed and the other was a control prototype of a category not viewed (order of category presentation was counterbalanced across participants). The two other patterns were distortions. One was a distortion previously viewed, and the other was a control distortion from a category not viewed (counterbalanced). In the testing phase, each trial started with a 4-s fixation cross, followed by a 2-s pattern, and a 4-s fixation star. At the end of each trial, participants rated a pattern on a nine-point liking scale.

EMG recording. The EMG recording and processing conformed to psychophysiological standards (Fridlund & Cacioppo, 1986) and followed the methods of earlier studies on affect and fluency (see Winkielman & Cacioppo, 2001 for more details). Two adjacent Ag/AgCl electrodes, with impedances reduced to less than 10 KOhms, were placed over the region of the left zygomaticus major (cheek) muscle and corrugator supercilii (brow) muscle. Two additional regions, orbicularis oculi (eye corner) and medial frontalis (forehead), controlled for blinking and non-specific facial responses. Because no main effects or interactions were observed for these regions, they are not further discussed. EMG signals were acquired with Neuroscan equipment, filtered with a 10-Hz to 500-Hz bandpass, and sampled at 2048 Hz.

EMG data reduction. Raw EMG signals were submitted to standard data processing steps (Fridlund & Cacioppo, 1986). First, the signals were integrated, rectified and screened for movement artifacts. Second, the data were logarithmically transformed (to reduce the impact of extreme values), and standardized within participants and within individual muscle sites (to reduce individual variability and allow meaningful comparison between muscle sites). Finally, we calculated the mean level of EMG activity during the first 3 seconds after each stimulus presentation and baseline-corrected those scores by subtracting the value of the corresponding 3-second pre-stimulus period (Winkielman & Cacioppo, 2001).

Results

To assess how preparing the prototype influenced smiling and frowning, we conducted a 2 x 2 within-subject MANOVA using Prototype Preparation (prepared vs. unprepared) and Muscle Region (cheek vs. brow). This analysis revealed a significant interaction, $F(20) = 4.52$, p-rep = .92, $\eta_p^2 = .18$ (Figure 3, top left panel). Simple test revealed that cheek activity was greater to prepared than unprepared prototypes, $F(20) = 4.72$, p-rep = .92 , $\eta_p^2 = .19$. There were no differences in brow response. In addition, cheek activity to prepared, as opposed to unprepared, prototypes was greater during the very first second of stimulus viewing (difference of .68 units, $F(20) = 4.11$, p-rep = .91, $\eta_p^2 = .17$). Again, no effects occurred for the brow response. Finally, we analyzed how the preparedness manipulation influenced participants' liking judgments, which were made at the end of the trial, 7 s after the stimulus presentation. Participants liked the prepared prototype more than the unprepared prototype, $F(20) = 4.13$, p-rep

= .91, η_p^2 = .17 (Figure 3, top right panel). In short, the prepared prototype elicited a selective and immediate "smiling" and more favorable judgments, consistent with our hypothesis that prototypicality elicits a genuine positive affective response.

Viewing a previously exposed exemplar did not generate physiological or judgment responses comparable to viewing a novel but prepared prototype (Figure 3, bottom panel). A within-subject MANOVA using Previous Exposure (exposed vs. novel) and Muscle Region (cheek vs. brow) revealed no interactions or main effects on EMG activity during the first 3 s post-stimulus. There were no reliable simple effects for the cheek, or brow, muscle (Figure 3, bottom left panel). The only effect of interest was a marginal increase of cheek activity in the first post-stimulus second (difference of .43 units, $F(20) = 3.15$, p-rep = .88, η_p^2 = .14). However, even this effect was absent in the third post-stimulus second. Likewise, there were no differences in liking judgments between the viewed and novel stimuli (p-rep = .67, bottom right panel). In short, a single presentation of a dot pattern failed to elicit a reliable affective response on physiology and self-reports, consistent with earlier findings that robust exposure effects require multiple repetitions (Harmon-Jones & Allen, 2001; Seamon et al. 1998; see also Rhodes et al., 2005 for discussion of the relation between mere-exposure and beauty-in-averageness effects).

General Discussion

The three experiments presented here suggest that fluency contributes to the preference for prototypical stimuli. Importantly, this preference was observed for both meaningless and meaningful stimuli, and for judgments as well as psychophysiological indicators of affect. Further, the effect of fluency did not depend on whether the attractiveness judgment questions explicitly referred to the stimulus category (Experiment 1), or on whether fluency was made salient by the previous task (Experiment 2). These findings suggest that fluency is used "by default" in attractiveness judgments.

Interestingly, Experiments 1 and 2 revealed that although categorization fluency was a significant mediator, it did not explain the entire prototypicality-attractiveness relation. Several factors might account for the remaining variance. First, for meaningless patterns (Experiment 1), attractiveness may also reflect fluency of earlier perceptual processing stages not captured by the categorization task (P. Reber, et al., 1998; Reber, Wurtz, & Zimmermann, 2004). Second, for meaningful patterns (Experiment 2), attractiveness may be also influenced by symmetry as well as higher-order considerations, such as functionality. For example, a distorted square might be judged unattractive because it is a "poor" square (lacks four equal sides). Finally, there may simply be some biological value attributable to prototypicality per se. If so, however, the current results make it unlikely that this value derives from a narrow mechanism of mate selection.

Experiment 3 demonstrated that presentation of a prototype that was made fluent by presentation of converging exemplars enhances activity over the cheek region -- a psychophysiological response indicative of positive affect. Notably, this response was immediate and sustained, suggesting the affective reaction is spontaneous and robust. Along with converging evidence from self-reports, the physiological data indicate that participants have a genuine, if mild, preference for prototypes, even when stimuli are abstract, random dot patterns.

In sum, our findings suggest that part of the preference for prototypicality arises from a general mechanism linking fluency and positive affect. This mechanism has been shown to contribute to several preference phenomena in psychology (Winkielman et al., 2003) and aesthetics (Reber, Schwarz, & Winkielman, 2004). From our perspective, prototypicality is simply one fluency-enhancing variable, with others including repeated exposure, perceptual and conceptual priming, contrast, clarity, duration, and symmetry. Importantly, this explanation does not rely on considerations of value for mate selection (Halberstadt & Rhodes, 2000, 2003). Thus, it potentially provides a parsimonious account of prototypicality preference across a wide variety of biological and non-biological objects.

Author Notes

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Tables

Table 1. Formula for generating distortions in Experiments 1 and 2.

Level of distortion	Probability of dot movement to a concentric ring					Average distance of dot movement (as fraction of dot size)	
	No movement	1	2	3	4	Experiment 1	Experiment 2
1	0.75	0.15	0.05	0.03	0.02	0.47	0.53
2	0.36	0.48	0.06	0.05	0.05	0.84	0.90
3	0.00	0.40	0.32	0.15	0.13	2.05	1.93
4	0.00	0.24	0.16	0.30	0.30	2.58	2.60

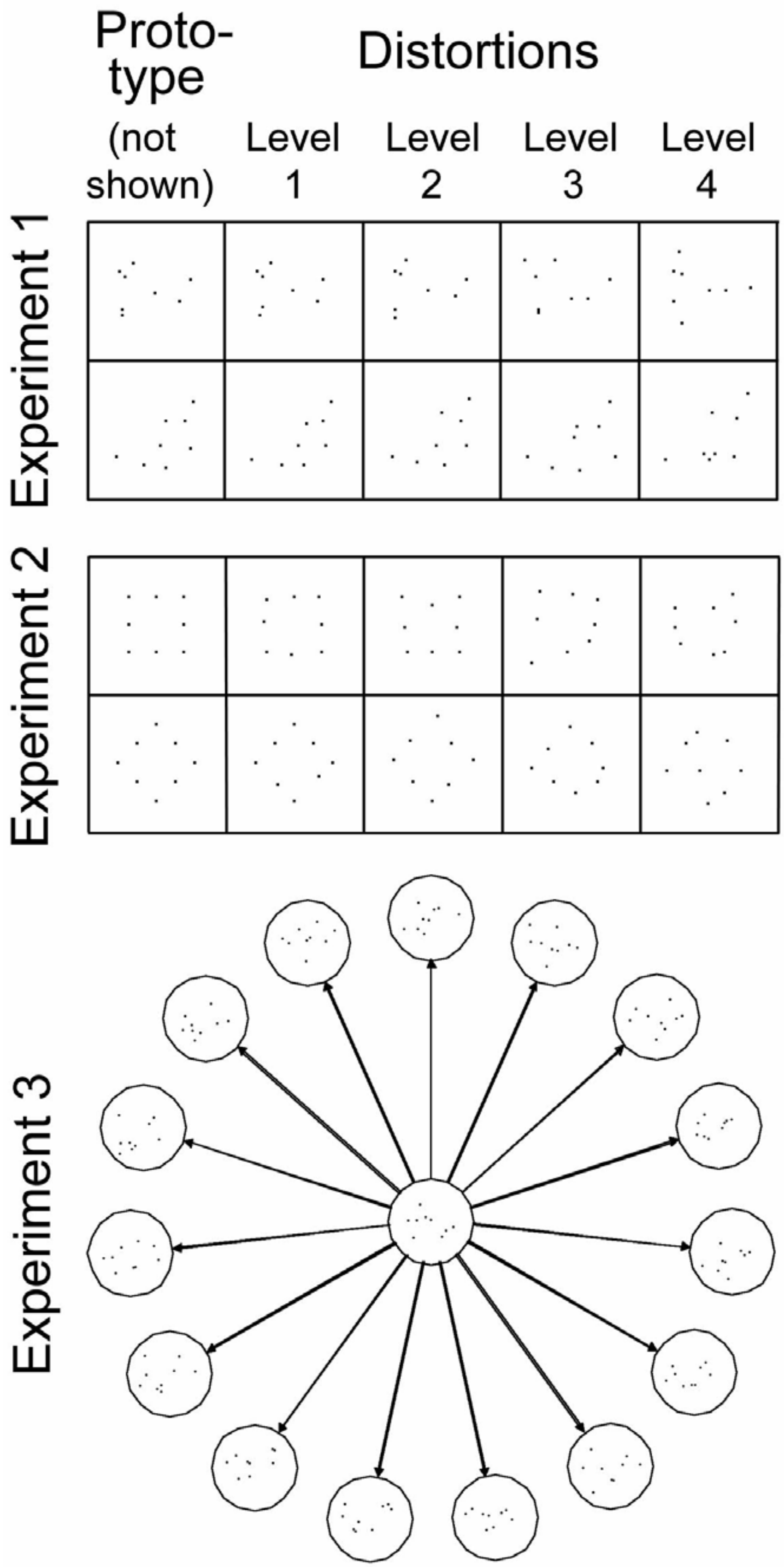
Note: A dot was equally likely to move to any cell in the ring. The current distortion levels 1, 2, 3, 4 correspond to distortion levels 2, 4, 6 and 7.7 in the original formula from Posner et al. (1967).

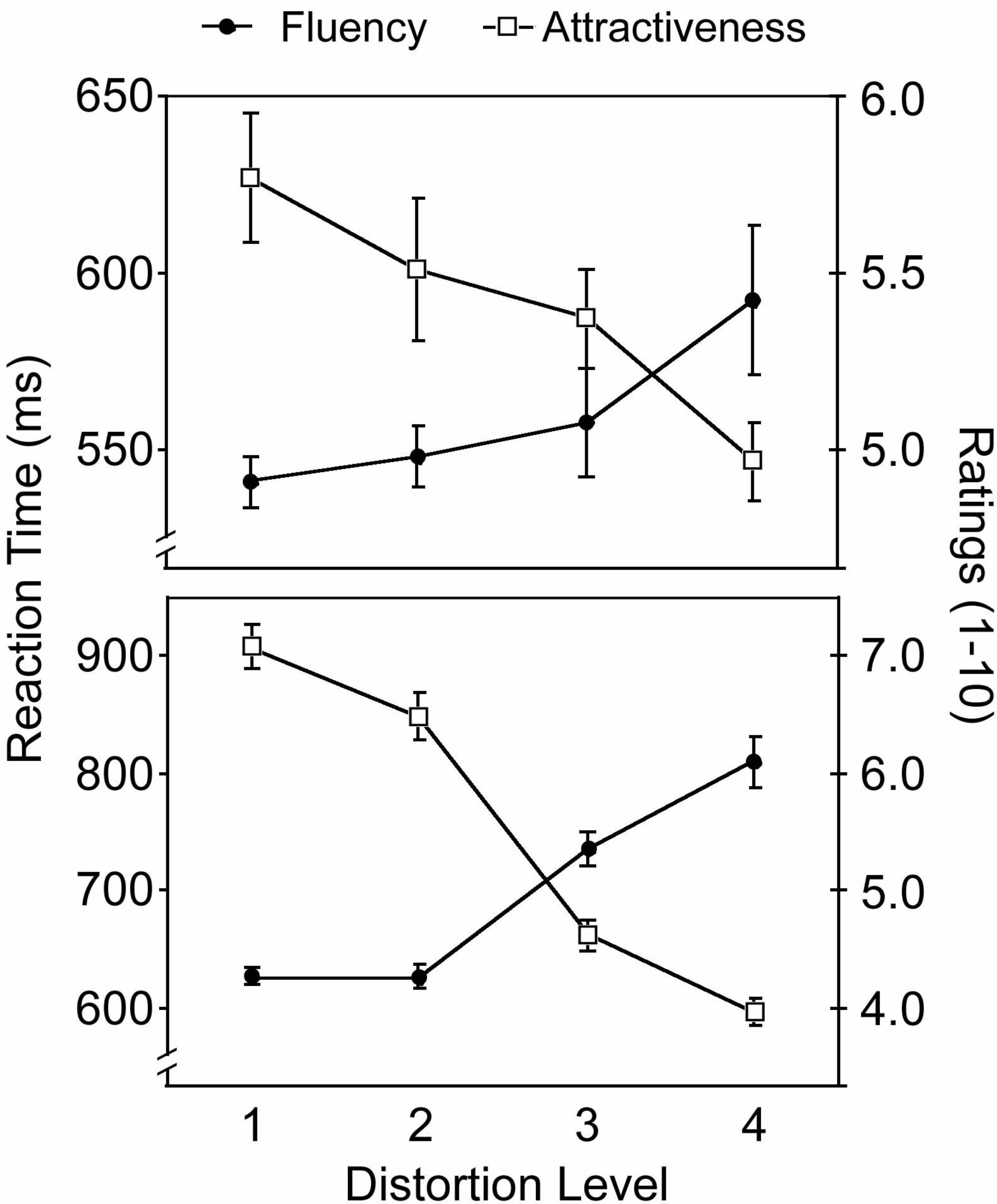
Figure Captions

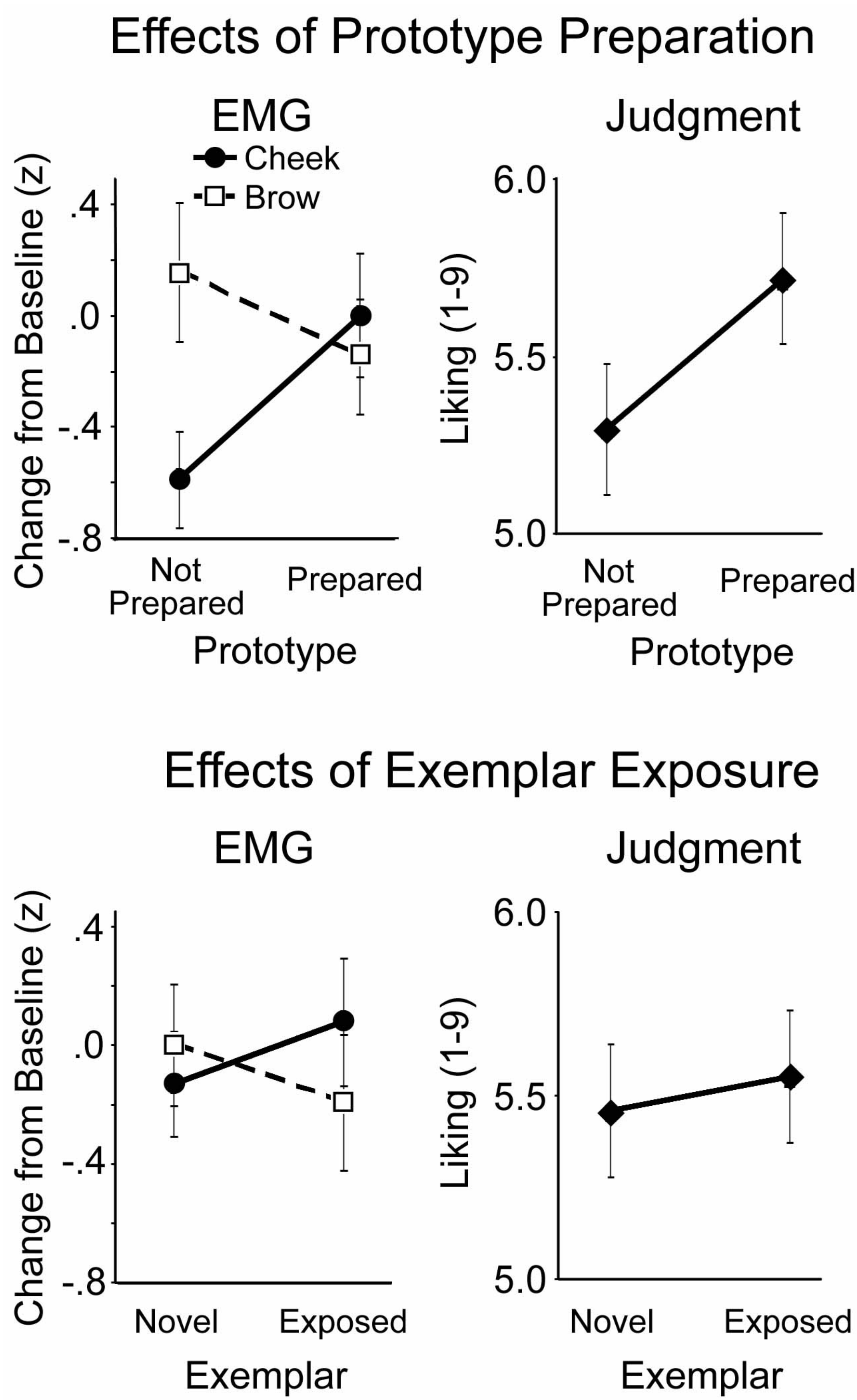
Figure 1. The prototypes and examples of distortions used in Experiment 1 (top panel) and Experiment 2 (middle panel). Example of a category with the prototype (center) and exemplars (surround) used in Experiment 3 (bottom panel).

Figure 2. Means and standard errors of fluency and attractiveness as a function of distortion level. Experiment 1 (top panel) and Experiment 2 (bottom panel).

Figure 3. Mean and standard errors of EMG activity and liking judgment as a function of prototype preparation (top panel) and exposure manipulation (bottom panel).


Proto-
type
(not
shown)
Distortions
Level
1
Level
2
Level
3
Level
4
Experiment 1
Experiment 2
Experiment 3


Fluency
Attractiveness
650
600
550
Reaction Time (ms)
6.0
5.5
5.0
Ratings (1-10)
900
800
700
600
7.0
6.0
5.0
4.0
1
2
3
4
Distortion Level


Effects of Prototype Preparation
EMG
Cheek
Brow
Change from Baseline (z)
.4
.0
-.4
-.8
Not Prepared
Prepared
Prototype
Judgment
Liking (1-9)
6.0
5.5
5.0
Not Prepared
Prepared
Prototype
Effects of Exemplar Exposure
EMG
Change from Baseline (z)
.4
.0
-.4
-.8
Novel
Exposed
Exemplar
Judgment
Liking (1-9)
6.0
5.5
5.0
Novel
Exposed
Exemplar