Research Article

Try It, You'll Like It

The Influence of Expectation, Consumption, and Revelation on Preferences for Beer

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ABSTRACT—*Patrons of a pub evaluated regular beer and "MIT brew" (regular beer plus a few drops of balsamic vinegar) in one of three conditions. One group tasted the samples blind (the secret ingredient was never disclosed). A second group was informed of the contents before tasting. A third group learned of the secret ingredient immediately after tasting, but prior to indicating their preference. Not surprisingly, preference for the MIT brew was higher in the blind condition than in either of the two disclosure conditions. However, the timing of the information mattered substantially. Disclosure of the secret ingredient significantly reduced preference only when the disclosure preceded tasting, suggesting that disclosure affected preferences by influencing the experience itself, rather than by acting as an independent negative input or by modifying retrospective interpretation of the experience.*

The quality of an experience is jointly determined by bottom-up processes, which reflect characteristics of the stimulus impinging on the perceiver's sensory organs, and top-down processes, which reflect the perceiver's beliefs, desires, and expectations. The role of each kind of process can be illustrated by the perception of ambiguous figures, such as Jastrow's famous rabbit-duck illusion. Visual experience surely depends on what is in the image, but may also be affected by what one expects to see. Although Jastrow's figure is never interpreted as a giraffe or a scorpion, it might look like either a rabbit or a duck depending on which concept has been primed.

The influence of top-down and bottom-up processes has been a central theme across many domains of psychology. Visual perception is affected by prior conceptual structures, as well as by characteristics of the visual stimulus itself (Biederman, 1972; Palmer, 1975); assessments of a person's ability are influenced by expectations of his or her ability, as well as by objective performance measures (Darley & Gross, 1983; Jones, Rock, Shaver, Goethals, & Ward, 1968); judgments of extended events are driven by the quality of one's experiences and the interpretation one imposes on them (Brief, Butcher, George, & Link 1993; David, Green, Martin, & Suls, 1997); the enjoyment of a film is influenced by expectations of its quality, as well as by its true quality and the conditions under which it is viewed (Klaaren, Hodges, & Wilson, 1994); and even memories can be colored by one's theories of what should have occurred, rather than what did occur (Cohen, 1981; Stangor & McMillan, 1992).

The domain of food and drinks provides a particularly fertile testing ground for researching the influence of conceptual information on subjective experiences: Coke is rated higher when consumed from a cup bearing the brand logo rather than from an unmarked cup (McClure et al., 2004); a slice of turkey is rated higher if thought to come from a popular brand rather than an unpopular one (Makens, 1965); Perrier is preferred to Old Fashioned Seltzer when the beverages are consumed with the labels showing, but not otherwise (Nevid, 1981); preference for one's favorite beer vanishes if the labels on the beers being compared are removed (Allison & Uhl, 1964); describing the protein of nutrition bars as "soy protein" causes them to be rated as more grainy and less flavorful than when the word "soy" is not included (Wansink, Park, Sonka, & Morganosky, 2000); bitter coffee seems less so if consumers are repeatedly misinformed that it is not bitter (Olson & Dover, 1978); strawberry yogurt and cheese spreads are liked more if labeled "full-fat" than if labeled "low-fat" (Wardle & Solomons, 1994); and, intriguingly, people eat more vanilla ice cream if it is accurately labeled "high fat" than if it is labeled "low fat" (Bowen, Tomoyasu, Anderson, Carney, & Kristal, 1992).

Besides documenting the separate influences of top-down and bottom-up processes, some researchers have examined how they interact by manipulating when conceptual information is presented relative to the experience. For example, Hoch and Ha (1986) showed respondents ads exaggerating the qualities of a J.C. Penney shirt either before or after the respondents examined it and found that they spent more time examining the fabric

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and evaluated the shirt more favorably if the information was provided before the examination (see also Levin & Gaeth, 1988). This suggests that prior knowledge can affect the allocation of attention or use of information (such as the time spent examining the stitching). However, it remains unclear whether knowledge can also change the experience itself (e.g., the tactile quality of the material), just as it remains unclear in most taste-test studies whether brand identity is just another input to respondents' overall evaluation (a valued attribute in its own right, like temperature or sweetness) or whether it modifies the actual gustatory experience (by affecting the tongue's chemoreceptors or the part of the brain that interprets the gustatory signal).

In the current research, we examined whether information affects perception by comparing people's preference for unadulterated beer versus beer mixed with a small amount of balsamic vinegar—an additive that most people find conceptually offensive.[1] We compared preferences across three conditions: a blind condition, in which the additive was not mentioned, and two disclosure conditions, in which the identity of the secret ingredient was revealed either before tasting or after tasting. The latter (after) condition allowed us to diagnose whether conceptual information affects only preferences or whether it changes one's experience of the stimulus. To understand how the after condition could shed light on the interaction of top-down and bottom-up processes, suppose Allison and Uhl (1964) had included a third condition in which participants received brand information after they sampled the five beers. If this group had rated the beers similarly to the before group (the ordinary, or control, condition in which participants knew which brand they were consuming), this would suggest that brand information is a distinct, separate input to evaluations—an expression of support for one's preferred brand. If, however, the ratings of the after group had resembled the ratings of the blind group, this would suggest that brand information affects the taste experience itself, but that once the taste is established, brand information has no further influence and does not alter the way in which people characterize their consumption experience.

A similar design could be used in studies investigating the role of affective expectations. For example, in a study by Wilson, Lisle, Kraft, and Wetzel (1989), all participants saw three truly funny cartoons, followed by three not-so-funny ones. Half of the participants were told nothing about the contents of the cartoons, whereas the other half were led to expect that all the cartoons would be funny. The misinformed group rated the less funny cartoons to be just as funny as the truly funny ones. A videotape of their facial expressions suggested that positive expectations improved their cartoon-viewing experience, that the ratings were not just an experimental demand effect reflecting respondents' reluctance to admit that they did not "get" the cartoons that were allegedly found funny by other people. Nevertheless, it would have been instructive to know how respondents would have rated the cartoons if they had received the bogus information about other people's ratings *after* seeing the cartoons. Would their prior "unbiased" experience govern their ultimate evaluation, or would they also be affected by this delayed (mis)information?

[1]To verify our assumption that people would be averse to the idea of balsamic vinegar in beer, we asked 121 patrons of The Muddy Charles, a local pub, to rate how beer would taste if balsamic vinegar were added, using a scale ranging from −10 (*much worse*) to +10 (*much better*). Eighty percent of the respondents expected that balsamic vinegar would make the beer taste worse. The mean rating was −4.03, which was significantly below 0, $F(1, 119) = 22.45$, $p < .01$.

EXPERIMENTAL APPROACH

In the first three experiments of the present study, respondents consumed two beer samples: one unadulterated sample and one sample of "MIT brew," which contained several drops of balsamic vinegar—a beer flavoring that most participants find conceptually offensive, but that does not, at this concentration, degrade the beer's flavor (in fact, it slightly improves it). Respondents were randomly assigned to one of three conditions. In the *blind* condition, they tasted the two samples without any information about the contents. In the *before* condition, they were told which beer contained balsamic vinegar, prior to tasting either. In the *after* condition, they first tasted the beers and were then told which beer contained balsamic vinegar (see Fig. 1).

If top-down processes play no role in taste preferences, preferences in the three conditions should not differ (blind $\approx$ before $\approx$ after). However, if knowledge does influence preferences, as our intuition and prior research suggest, preference for the MIT brew should be lower in both disclosure conditions than in the blind condition. Of greatest interest were the results of the after condition. If the presence of a conceptually aversive additive is an independent input to evaluations, the timing of the information should not matter, and preferences for the MIT brew should be reduced equally in the two disclosure conditions (blind $>$ before $\approx$ after). However, if expectations influence the consumption experience itself, preference for the MIT brew should be markedly lower in the before condition than in the after condition (blind $\geq$ after $>$ before).

EXPERIMENTS 1–3: PREFERENCES

Our first three experiments were conducted at two local pubs: The Muddy Charles and The Thirsty Ear. Patrons were approached and asked to participate in a short study involving free beer. Those who agreed (nearly everyone) tasted two 2-oz. samples of beer: "regular" beer (Budweiser or Samuel Adams) and the MIT brew, which included several drops of balsamic vinegar.[2]

There were 388 participants in total (90 in Experiment 1, 139 in Experiment 2, and 159 in Experiment 3). In each experiment,

[2]When the control beer was Samuel Adams, we added six drops. When it was the lighter Budweiser, we added four drops. Budweiser was used in the first two experiments, and Sam Adams in the third. We switched after discovering that Budweiser is not a very popular beer among our participants, many of whom even disputed whether it deserves to be called a "beer."

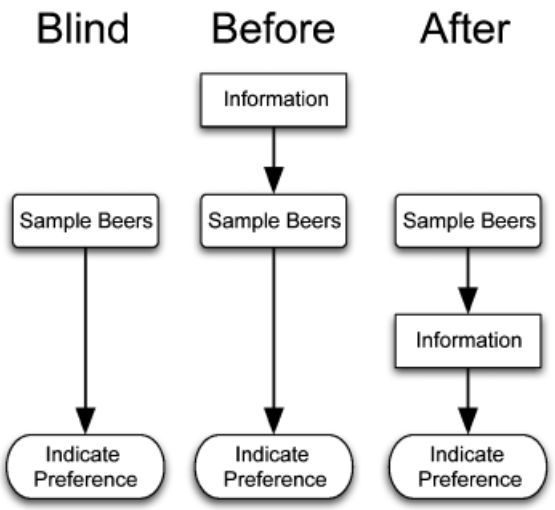

Fig. 1. Illustration of the three experimental conditions, in which we manipulated whether information about the presence of balsamic vinegar in one of the samples was disclosed and if so, when it was disclosed relative to tasting and evaluation.

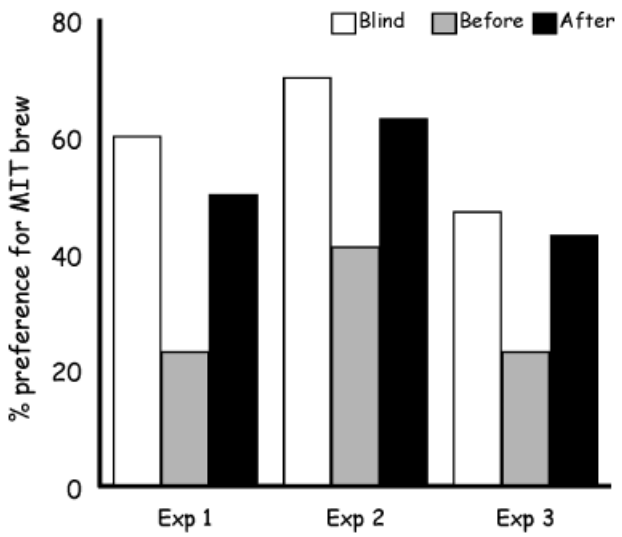

Fig. 2. Percentage of respondents preferring the MIT brew across the three conditions in Experiments 1 through 3.

participants were randomly assigned to one of the three experimental conditions (blind, before, and after). After tasting the two samples, respondents indicated their preference between them. In Experiment 1, participants simply indicated which of the two samples they liked more. In Experiment 2, they also received a full (10-oz.) serving of the sample they preferred. In Experiment 3, the blind condition was the same as in Experiment 2, but in the before and after conditions, participants received a full (10-oz.) glass of regular beer, some balsamic vinegar, a dropper, and the "secret recipe" ("add three drops of balsamic vinegar per ounce and stir"). We monitored how much balsamic vinegar participants actually added to their beer, and used this information to code their degree of preference for one beer over the other. It turned out that all participants added either the exact amount of balsamic vinegar specified by the recipe or none at all, creating a binary dependent measure.

As can be seen in Figure 2, preference for the MIT brew was higher in the blind condition (59%) than in the before condition (30%). This difference was significant overall, $F(1, 385) = 23.15$, $p_{rep} > .99$, $\eta^2 = .057$, and for each of the three experiments individually (all p_{rep}s $> .95$). More important, the preference for the MIT brew was significantly lower in the before condition than in the after condition, both overall (30% vs. 52%), $F(1, 385) = 13.86$, $p_{rep} > .99$, $\eta^2 = .035$, and for each of the experiments individually (all p_{rep}s $> .90$). By contrast, the after condition did not differ significantly from the blind condition, either overall (52% vs. 59%), $F(1, 385) = 1.17$, $p_{rep} = .66$, $\eta^2 = .003$, or for any of the individual experiments (all p_{rep}s $< .56$).

Together, the results show that preference for the MIT brew was affected by disclosure of its contents, but only if disclosure preceded tasting, which suggests that preferences are influenced primarily through the effect of expectations on the taste experience itself. Respondents in the after condition appeared content to let their experience dictate their preferences, and apparently did not reinterpret their experience to align with the mildly unsettling news about what they had just consumed. These results are compatible with those of Levin and Gaeth (1988), who found that hamburger falsely labeled as "25% fat" received slightly lower taste ratings if that fat content was reported before tasting than if it was reported after tasting, although the difference in their study was not significant (perhaps because people do not regard beef fat as tasting bad, even if they have health concerns about eating it).

EXPERIMENT 4: ARE THESE RESULTS OBVIOUS?

Our mothers often used creative labeling to trick us into eating something they knew we would otherwise oppose (e.g., by calling crab cakes "sea hamburgers"). They knew such deception was required to gain our consent, but that they need not maintain the lie *after* we had consumed the foods, and would often debrief us afterward, with smug satisfaction ("By the way, son, in case you were wondering, "sea" means "crab."). They suspected (correctly in most cases) that we could not "handle the truth" before eating, but could handle it after our senses had signaled that this was good stuff.

Were our mothers using an obvious strategy, or were they especially clever? To test whether the results we obtained are obvious, we presented Experiment 2 to 68 MIT students. After describing the procedure, we told them, truthfully, that the MIT brew had been chosen over regular beer by 70% of participants in the blind condition and by 41% in the before condition, and asked them to predict the percentage who chose it in the after condition, offering $50 for the most accurate prediction.

As can be seen from Figure 3, respondents could not generally predict the results. Predictions were uniformly spread between 41% and 70% (with some even falling outside this interval). They were not clustered near the upper range of this interval, as

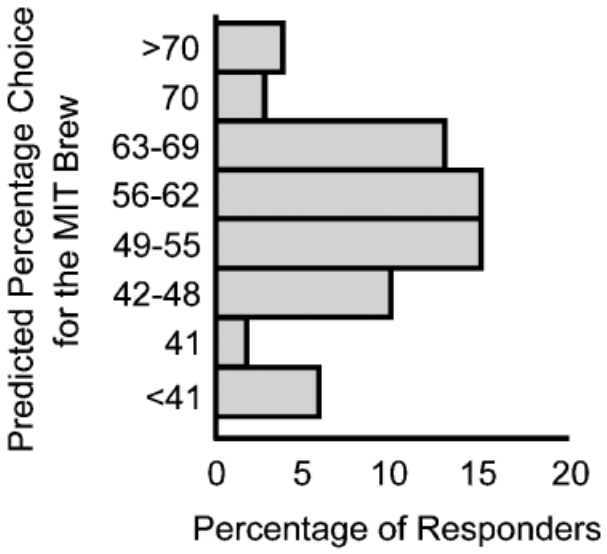

Fig. 3. Results from Experiment 4: distribution of respondents' predictions of the percentage of Experiment 2 participants in the after condition who preferred the MIT brew. The instructions gave the real preferences in the blind and before conditions: 70% and 41%, respectively.

would be predicted if our results could be foreseen. Thus, our results are not obvious—at least not to MIT students.

GENERAL DISCUSSION

Our study focused on the relative importance of, and interaction between, two different bases for preferences: knowledge (top down) and experience (bottom up). The results across three experiments suggest that information (about the presence of a conceptually offensive ingredient) influences preferences more when received before consumption than when received after consumption. The MIT brew was liked much less when disclosure preceded sampling than when respondents learned about the balsamic vinegar after they had tasted both samples. Indeed, disclosure of the secret ingredient after consumption did not significantly reduce preferences for our MIT brew (there were no significant differences between the blind and after conditions). Together, these results suggest that expectations affected real-time experience itself, not just people's post hoc characterization of the experience.

Our results raise several additional questions. First, how important are the temporal intervals between sensory experience, the receipt of other information, and the evaluative judgment? In our experiments, negative information received after consumption did not markedly reduce evaluations of the MIT brew. By contrast, Braun (1999) found that respondents who consumed diluted orange juice tainted with vinegar evaluated the juice markedly more favorably if they were later told that it was "sweet, pulpy, and pure." Her results may differ from ours because that misleading information was presented 30 min after respondents drank the orange juice, and during this time they may have partially forgotten the experience, which would have diminished its weight relative to the misinformation.

A second question raised by these experiments concerns the speed with which conceptual attitudes align with experiences. If people are coerced or tricked into discovering that they actually enjoy some unusual food (sea urchin roe), food additive (balsamic vinegar), or sexual practice (fill in the blank), do they eagerly consume it at the next opportunity, or do their prior expectations linger, despite the disconfirmation? In our experiments, preferences converged with experiences after only a single trial (recall that only 20% of participants thought balsamic vinegar would improve a beer's flavor, yet 52% in the after condition preferred the MIT brew). However, it remains unclear whether those respondents in the after condition who preferred the MIT brew would continue to prefer it on subsequent visits to the pub. Sometimes a single positive taste experience may extinguish preconceptions, but in other cases, the original negative conception may linger and gradually regain ascendance over fading taste memories. Tuorila, Cardello, and Lesher (1994) found that expectations quickly return, even after being disconfirmed. In their study, respondents tasted normal and fat-free versions of saltine crackers and pound cake. Although a blind taste test disconfirmed respondents' expectations that fat-free products would taste worse, when the respondents came back to the lab a month later, they retained their original negative impressions of those products. A study by Klaaren et al. (1994) suggests that positive expectations may also linger. In that study, students who were told they would enjoy *The Immigrant* (a silent film starring Charlie Chaplin) not only reported greater enjoyment of the film than those who were not told this, but were also more likely to participate in a subsequent study involving a different Chaplin film. Moreover, their willingness to participate correlated only with their original affective expectation, and not with manipulations of their real-time experience (the comfort of the chair and the angle at which they were forced to view the film). These results suggest that hedonic theories (expectations) may sometimes outweigh hedonic experience as determinants of remembered and predicted utility.

A third question concerns how specific perceptual, attentional, and cognitive mechanisms mediate the effect of expectations on experience (or reported experience). One interpretation of our results is that people (reasonably) anticipated disliking the MIT brew, and this negative anticipatory emotion lingered to degrade their subsequent consumption experience (see Wilson & Klaaren, 1992). Another possibility, advanced by Hoch and Ha (1986), is that expectations bias informational search. They found that evaluations of J.C. Penney polo shirts were more favorable if participants were first told that the shirts were made with "great craftsmanship, styling and meticulous quality control" than if those claims were presented after participants had examined the shirts (and shirts of competing brands). Hoch and Ha proposed that the brand-specific claims induced respondents to devote more time to inspecting

the J.C. Penney shirts, searching for information that confirmed the claims. It seems unlikely that participants in our before condition spent extra time consuming the MIT brew, searching for negative aspects of the experience. However, prior knowledge of the additive may have changed the way they interpreted their ambiguous beer experience (some combination of wet, bitter, sweet, sour, carbonated, and malty). When the secret ingredient was disclosed before consumption, they may have focused on the negative aspects of that multidimensional experience, and falsely attributed those negative elements to the vinegar rather than the beer. However, when the information was disclosed following the experience, they did not appear to attribute negative aspects of their ambiguous consumption experience to the presence of the balsamic vinegar. Thus, the malleability of one's tastes is likely influenced by the timing of attitude-discrepant information.

In a review of the influence of sensory expectation on sensory perception, Deliza and MacFie (1996) concluded that "it is an immensely complex topic which has had very little research attention" (p. 122). We agree. As emphasized by our discussion, the relative influence of perceptual and conceptual inputs on overall evaluations likely depends on the timing of the information, the timing of the judgment, the particular domain, and the range of sensory and cognitive processes engaged by the particular task instructions. We are therefore not confident that we could train pub goers to be willing to pay extra for the MIT brew. However, we are confident that our experimental approach will prove intellectually profitable to researchers interested in the relations among conceptual knowledge, experience, and the construction of preference.

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