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## Scientific paper

## Innovation influences liking for chocolates among neophilic consumers

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## ABSTRACT

The fear of trying new foods is a major barrier for entry for innovative ingredients, foods, flavors, or cuisines into the market place. We explored the relationship between perceived innovation and liking for chocolates and degree of neophobia. Line scales were used to measure: innovation, liking, and perceived dollar value for three chocolate confections. One was a traditional confection (palette d'or), and two others were designed to be more innovative (white miso with dark chocolate and white chocolate with candied black olive). An analysis of variance found that panelists ( $n=44$ ) perceived significant ( $p < 0.01$ ) differences among the chocolates in innovation, and liking, but not dollar value or estimated caloric content. The chocolate rated as the most innovative was also rated as the least liked. This finding is significant since the mean neophobia score of our subjects was quite low and very few of them would have been classified as neophobic. This current work suggests that acceptance of innovative new foods is dependent, in part, upon factors that transcend neophobic mindsets. Chefs and product developers should be aware of the fact that even among neophilic consumers who are quite willing to consume novel foods, there is a possibility that a food might be too innovative, resulting in a negative impact on liking.

## Introduction

The livelihood of chefs and product developers depends upon the successful introduction of new foods to the market place. However, menu items and commercially packaged goods that are new and innovative have a poor success rate (Moskowitz et al., 2006). On the one hand consumers desire new, innovative food products but often reject them in favor of the more familiar product. This approach-avoidance response to new foods has been explained as reflecting the omnivore's dilemma (Rozin, 1976).

As omnivores we are attracted to new foods which will increase our dietary variety, in turn increasing the probability of eating a diet which is adequate in nutrients (Foote et al., 2004). Eating a varied diet also protects us from starvation in times of food scarcity. On the other hand, any new, unfamiliar item we ingest might be toxic rather than nutritious, and therefore not be a food at all. Because of this danger humans show neophobia to new foods (Rozin, 1976).

Humans therefore have a conflict (the omnivore's dilemma) between our desire to try new foods (neophilia) and a rejection of them (neophobia). So people might desire to go to a new restaurant but hesitate to go to one if it serves an unfamiliar cuisine. If they go to a

new restaurant they might order a dish with a name they recognize or ingredients with which they are familiar rather than try the innovative and unfamiliar. Chefs often work toward obtaining a "balance" between the novel and the familiar.

The degree to which a new food is novel will affect its acceptance. Entirely new products are much more difficult for people to accept than are those that are only slight "improvements" (Robertson and Gatignon, 1991). The latter are more familiar than are the entirely new items because they are part of a familiar category. Line extensions are less risky product development endeavors than developing a food for a new product category. New foods might be more accepted if they are seen as improvements and not as entirely novel.

This is particularly true among consumers who exhibit more neophobia than neophilia. People vary in the degree to which they exhibit these two traits. Those who are high in neophobia present a challenge to chefs who want to produce creative, innovative dishes that are still liked and accepted by consumers. Chefs want to produce innovative dishes but consumers, particularly those high on the trait of neophobia, might reject foods that are too innovative.

Neophobia reduces the willingness to try new foods and also results in a low level of liking for the taste of new foods (Arvola et al., 1999).

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Liking for new foods increases with exposure to those foods as they become more familiar (i.e., the mere exposure effect, Birch and Marlin, 1982; Pliner, 1982; Zajonc, 1968). However, because novel foods are usually not well-liked on first exposure, they might never be eaten again, preventing the increase in liking with exposure.

Pliner and Hobden (1992) developed the FNS (Food Neophobia Scale) to measure the degree to which people have the trait of neophobia. It contains 10 questions such as “I am constantly sampling new and different foods” and “I am afraid to eat things I have never had before”. People who are more neophobic will be less likely to sample new foods and therefore not come to like them.

This study investigates how the degree of innovation affects the degree of liking for chocolate confections among consumers with varying levels of neophobia. *Chocolate confections* is a category of foods that is familiar and well-liked by most people. Therefore some degree of flavor and design innovation in this common food category should be accepted by consumers and innovative confections should be well-liked. This is particularly true if the consumers are not neophobic. Neophobic consumers might like a chocolate confection with a more traditional taste profile but not like confections with more innovative flavor profiles. Neophilic consumers might like chocolates which are more innovative, but they too might find chocolates that are too innovative less liked than only moderately innovative ones.

The three chocolate confections used in the present study were designed and prepared by a world renowned pastry chef. The chocolate designed to be the least innovative was a “Paleta d’or” which had a traditional flavor profile and was decorated with a piece of gold leaf. The other two had flavors that were more innovative (i.e., white miso with dark chocolate and white chocolate with candied black olive). Since the Paleta d’or was designed to be the least innovative and least novel we expected this chocolate to be liked more than the other two by the neophobic participants. However, we thought it possible that non-neophobic subjects would find the more innovative chocolates to be liked as much, if not more than, the less innovative one. In this group the newness of the flavor of a food in a familiar category might increase liking that is not reduced by fear of the new (neophobia). However, a very high degree of innovation might reduce liking in this group as well.

## Materials and methods

### Participants

Forty-four consumers (12 males and 32 females) volunteered to participate in the study as part of a conference presentation given by the Culinary Institute of America (CIA) at a meeting of the Eastern Psychological Association. Ages ranged from 20 to 76 years ( $M=37$ ,  $SD=17$  years). They received no compensation for their participation. The study was approved by the Montclair State University IRB.

### Chocolate confections

The three chocolate confections (Paleta d’or with a traditional flavor profile and piece of gold leaf, white miso with dark chocolate, and white chocolate with candied black olive, (see Fig. 1) were presented in a counterbalanced order on clear plastic serving trays lined with cocoa coated rice puffs (as an “edible base”), and labeled with 3 random three-digit numbers.

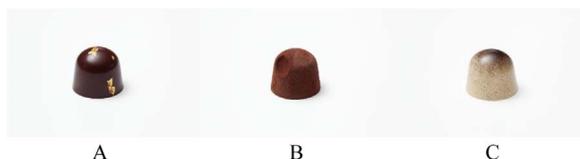


Fig. 1. Chocolate confections: (A) Paleta d’or [traditional], (B) white miso with dark chocolate, (C) white chocolate with candied black olive.

### Procedure

People attending a session about research at the CIA at a psychology conference were asked if they wanted to participate in a study evaluating chocolate confections. They were given a tray of three chocolate confections and a sheet asking them to rate how innovative the chocolates were, how much they liked the flavor of the chocolates, and how expensive they thought each chocolate would be. The ratings were made by bisecting three 135 mm lines whose ends were labeled “not innovative” to “very innovative”; “dislike extremely” to “like extremely”, and “not expensive” to “very expensive”. The sheet also asked them to estimate how many calories each of the confections contained. They were also given the Food Neophobia Scale (FNS; Pliner and Hobden, 1992) to assess their level of neophobia. They tasted the chocolate confections and evaluated them at their seats. When they were finished the trays and data sheets were collected by research assistants.

### Statistical analysis

Repeated measures ANOVA's were used to determine if there were significant effects of chocolate type on perceived innovation, liking, expense, and caloric content for all subjects tested. Post-hoc Bonferroni corrected *t*-tests were used to determine differences between pairs of chocolates for innovation and liking. *T*-tests were then used to assess differences in innovation and liking ratings of the white chocolate with candied black olive (the most innovative chocolate) between participants who were more or less neophobic based on a median split. This last test was conducted only on the ratings of the white chocolate with candied black olive because it was the only one of the three that was found to be innovative. It therefore should have generated the biggest difference between those subjects who were and were not neophobic.

## Results

### Innovation

Chocolates were rated significantly differently on degree of innovation,  $F(2,86)=17.84$ ,  $p < .001$ . Post-hoc Bonferroni corrected *t*-tests found that the white chocolate with candied black olive was perceived as significantly more innovative than both the white miso with dark chocolate and Palet d’Or chocolates (Fig. 2).

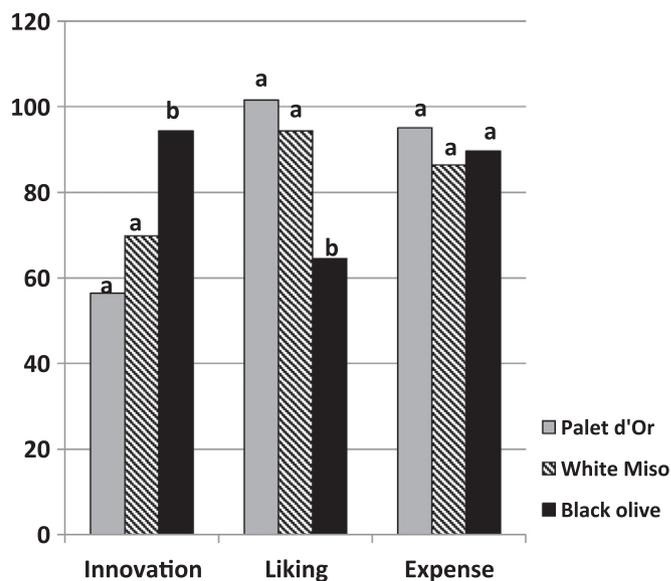


Fig. 2. Mean Innovation, Liking, and Expense ratings for the three chocolates.

### Liking

Chocolates were rated significantly differently on liking  $F(2, 86) = 16.06, p < .001$ . The white miso with dark chocolate and the Palet d'Or chocolates were liked significantly more than the white chocolate with candied black olive (Fig. 2).

### Expense

Chocolate type did not have a significant effect on perceived expense,  $F(2, 86) = 1.65, p = 0.20$  (Fig. 2).

### Caloric estimation

Estimates of caloric content did not differ significantly between chocolates  $F(2, 82) = 1.14, p = 0.32$ .

### Effects of neophobia

Using a median split (FNS=21) no significant differences were detected for innovation [ $t(42) = 0.60, p = 0.55$ ] or liking [ $t(42) = 0.015, p = 0.99$ ] ratings for the white chocolate with candied black olive between subjects who were more or less neophobic. Although median splits are frequently used to compare people who are more or less neophobic on the FNS (e.g., Capiola and Raudenbush, 2012; Pliner and Hobden, 1992; Raudenbush and Capiola, 2012), Pliner and Hobden (1992) report that the mean FNS score in their groups of subjects was 34.5 (the range of possible scores being 10–70). They suggest that scores  $> 35$  indicate high neophobia. Only seven of our participants had scores over 35. The median score of 21 (mean 24.5) indicates that most of our participants were rather low on the trait of neophobia.

## Discussion

The chocolate that was perceived as the most innovative was also the least liked. The only chocolate rated as more than moderately innovative was the white chocolate with candied black olive. That chocolate was the only one whose mean liking ratings was below the half-way point between “not like at all” and “like extremely”. The other two chocolates which were rated as only moderately innovative were liked quite a bit.

The low level of liking for the innovative chocolate was seen even with our population, the majority of whom were not neophobic. Among this group of subjects a moderate amount of innovation seems to have a positive effect on liking but more than that seems to result in a food, even one from a familiar highly-liked category such as chocolate confections, being at best only moderately liked. Even in this highly-liked category of food, too much innovation seems to be negatively related to liking.

The findings are consistent with Mandler's Schema Incongruity Model (Mandler, 1981). This model predicts that products that are exactly what is expected (congruent and therefore not innovative) are usually somewhat liked. A moderate amount of incongruity between the product and what is expected by a typical product of that sort (something which would be considered moderately innovative) causes more liking of the product. However, too much incongruity (something that would be considered very innovative) results in less liking than does a moderate amount. That is, there is an inverted “U” shaped relationship between degree of incongruity between a stimulus and the stimulus typical of that category and liking. This idea is similar to that of Berlyne (1971) who also suggested that a moderate amount of novelty would be most pleasant.

In the current case, the white chocolate with candied black olive might have been just too different from what the subjects expected of a “typical” chocolate (also see Meyers-Levy and Tybout, 1989). Thus it was judged as most “innovative”. However, probably because it was so

atypical it was also judged as not as good tasting as the less innovative chocolates. So it appears from the present data that chocolates seen as moderately innovative (novel) are liked more than more innovative ones (e.g., white chocolate with candied black olive) even among non-neophobics.

Our subjects rated the Palet d'or with the traditional flavor profile and the white miso with dark chocolate as moderately innovative. Although we thought that the white miso with dark chocolate might be rated as fairly innovative, we expected the Palet d'or, with the more traditional flavor profile, might be rated as less innovative. However, the addition of gold leaf might have added a degree of perceived innovation to this chocolate. The white miso with dark chocolate might have been judged as only moderately innovative rather than more highly innovative because it looked like a traditional chocolate and it was not labeled. Had it been labeled as “white miso with dark chocolate” people might have perceived it as more innovative because of the unique ingredient of miso. This idea is supported by the results of a previous study in which we found that labeling confections with their component ingredients, compared to three-digit codes, did alter perceived innovation. A traditional confection was perceived as less innovative when components were described, and a non-traditional confection was perceived as more innovative when components were described than when a three digit code was used (Loss and Migoya, 2014).

That leaves the question as to what would be a familiar chocolate with a low degree of innovation. It is possible that a more commercially available higher-end chocolate confection such as a Godiva product might have been rated as less innovative. However, if subjects are categorizing all chocolate confections together, a less innovative chocolate might be something like a Hershey's chocolate bar which is much more commonly eaten in the United States and therefore less novel. It would be interesting to see if a chocolate rated as low in innovation is rated lower in liking than the moderately innovative chocolates.

The majority of our subjects had very low neophobia scores. That might have been due, at least in part, to the fact that they were mostly well-educated and many had higher than average incomes. People from that demographic tend to have low neophobia scores probably because they have increased exposure to a variety of foods (Meiselman et al., 2010). The fact that most of them were low in neophobia should also not have been surprising since neophobics would most likely not volunteer to participate in such a study. We should have thought about the fact that at a conference with competing sessions only those people who were interested in food, particularly creative food, would be interested in a session by the CIA.

If we had truly neophobic subjects would they have judged the chocolates differently on perceived innovation? Would what they judged as moderately innovative also be rated as the best liked or would they have innovation judgments similar to the non-neophobics but not like chocolates that are perceived as even moderately innovative? It could be that while neophobics like some but not too much innovation, neophobics might like none.

More work is needed on the impact of innovation on liking of foods from highly liked food product categories, particularly among those who are neophobic. This study suggests that among people low in neophobia, moderate innovation improves liking for chocolate confections but too much reduces it. It should also be noted that more chocolates varying in degree of innovation should be tested. It is possible that the white chocolate with candied black olive might not have tasted as good as the other two chocolates. Maybe people do not like the taste of white chocolate as much as dark chocolate or they don't like candied olive. Maybe our results are influenced by those factors rather than degree of innovation.

While this study investigates the relationship between innovation and liking of a highly-liked food category (chocolate confections) using ingredients that are acceptable by most people, it suggests that

innovation which involves novel and/or sometimes disgusting ingredients might face even more severe challenges for chefs. As chefs try to address nutritional and environmental issues relating to the food system, even more challenges in producing products that people will like will have to be addressed. If highly innovative chocolates, with acceptable ingredients, are less liked than moderately innovative ones, even by people who are neophilic and willing to try novel foods, imagine how difficult it would be to produce a product whose ingredient list included insects (Ceurstemont, 2013; Farina, 2017) or food scraps that would normally be sent to landfills (such as “charred pineapple core” and “candied mango skin” served by Dan Barber, Chef of Bluehill at Stone Barns) (Goldfield, 2015).

## Conclusion

Even among neophilic consumers, a high degree of innovation in chocolate confections can decrease how much those chocolates are liked. These consumers like chocolates that they find moderately innovative. These findings are consistent with the psychological theories of Mandler (1981) and Berlyne (1971). A better understanding of liking for, and eventual acceptance of innovative, novel foods requires a collective focus of chefs, food scientists, and psychologists (among other disciplines).

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