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You'll spoil your dinner: Attenuating hedonic contrast in meals through cuisine mismatch



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ABSTRACT

Previous research (Lahne & Zellner, 2015) has shown that hedonic contrast occurs in a multi-coursed meal such that good appetizers reduce the hedonic evaluation of an entrée. This paper extends that finding by examining whether hedonic contrast between courses served in a real restaurant meal can be attenuated or eliminated through a categorical mismatch of cuisine (Italian vs Thai). Subjects ($N = 143$) ate a meal in a University teaching restaurant in which the cuisine of the appetizer (soup) was manipulated so that it either matched (Italian *minestrone*) or did not match (Thai *tom kha*) the main course (Italian *pasta aglio e olio*). Subjects reported on their affective response to the meal. When the cuisine matched, hedonic contrast occurred: good *minestrone* caused subjects to like the same pasta – and the entire meal – significantly less. However, when the cuisine did not match there was no evidence of contrast: good *tom kha* did not depress liking ratings for the pasta dish, and in fact the overall meal was rated as *better* with the good appetizer. Thus, hedonic contrast can be attenuated by a mismatch of cuisine category. This research has important implications for restaurants, in that it both provides further evidence that main courses may be negatively affected by appetizers that are “too good”, and that actively varying the cuisine categories of dishes between menu sections may ameliorate this effect.

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1. Introduction

1.1. Meals – food in context

Over the last 75 years, most research into how subjects perceive and evaluate their food has been conducted *in vitro*; while these studies are valuable for their insight into specific mechanisms and the experimental control they can afford, their applicability to the complex, *in vivo* meal context is difficult to predict. In the last 20 years, calls have grown to change the paradigm of food and meal research and to develop research methodologies for accessing consumer perceptions *in context*, rather than in the laboratory (Meiselman, 1992, 2000, 2009).

The context in which a meal is served can influence how much the meal is enjoyed. A number of studies have found that the environment in which a meal is eaten can influence the hedonic ratings of the foods in the meal (e.g., Edwards, Meiselman, Edwards, & Leshner, 2003; Meiselman, Johnson, Reeve, & Crouch, 2000). For example, people rated their liking for Chicken a la King higher

when served in 4-star restaurant than when served in a private boarding school dining hall (Edwards et al., 2003).

The foods presented with another food either on the same plate or in another course served in a meal also provide part of the context of the meal, and can influence the hedonic rating of a food. Recent studies have shown that the hedonic value of a food can be influenced by other foods presented before that food (Lahne & Zellner, 2015; Zellner, Rohm, Bassetti, & Parker, 2003) or at the same time as that food (i.e., on the same plate: Jimenez et al., 2015). In all of these studies hedonic contrast (the movement of ratings of the target food in a direction opposite to the context food) occurs. That is, if a target food is presented either after or at the same time as a very good food, the hedonic value of the target food decreases.

For example, Lahne and Zellner (2015) asked diners to rate how much they liked a main course of pasta *aglio e olio* after eating either a good or mediocre *bruschetta* appetizer. The diners who ate the good *bruschetta* appetizer rated the pasta as less good (in fact, the mean hedonic rating for the pasta in this condition was negative) than the diners who ate the mediocre *bruschetta* appetizer.

However, as Fechner (1898, according to Beebe-Center, 1965 [1932]) pointed out and Zellner et al. (2003) have demonstrated,

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for hedonic contrast to occur the stimuli to be compared must be categorically similar. Zellner et al. (2003) found that hedonic contrast caused by presenting good tasting juices before mediocre ones when both kinds of juices were called “juices”, was reduced if the good-tasting context juices were called “juices” and the mediocre test juices were called “commercial drinks”. It is therefore possible that if two courses in a meal are not thought to be categorically similar in some way, hedonic contrast might be reduced or eliminated between the courses.

1.2. Attenuating hedonic contrast

In Lahne and Zellner (2015), the experimental stimulus (*bruschetta*) was in the same category as the target (a pasta dish). By design, both of the foods were (Americanized) Italian cuisine. In addition, both of these foods were solid, carbohydrate-based dishes (based on wheat). With those two aspects of the appetizer and entrée matching, hedonic contrast did indeed occur between different courses in a meal. But often meals do not consist of conceptually coherent courses or dishes. For example, with the rise of fusion cuisine (so ubiquitous that the name has gone out of fashion) it is not uncommon to find Hawaiian *poke* on the same menu as pasta dishes and steaks. In fact, even more traditional meals have included items that are arguably conceptually distinct: soup, usually quite different by design in form and flavor from the main course to follow has been a feature of Western cuisine from service *a la russe* (Visser, 1991) to the mid-Twentieth Century standard American meal (Carroll, 2013). In Chinese cuisine, although simultaneous service of multiple dishes rather than courses is more standard, these dishes should ideally present strong contrasts in texture, taste, and appearance (Dunlop, 2013; Visser, 1991). One might even argue that the function of between-course refreshers served in Western high-cuisine as developed by the French, like salad or tart sorbets, is explicitly to interrupt comparison of a preceding dish to the following (Labensky & Hause, 2007): in other words, they might prevent hedonic contrast.

Given this common feature of meals, then, it is pertinent to ask whether hedonic contrast still occurs between courses when these courses are qualitatively different. While hedonic contrast occurred in the study by Lahne and Zellner (2015), despite the fact that *bruschetta* and pasta are not categorically the same food (i.e., they are not both pasta dishes), the dishes shared two important qualities: they are both from a generalized (and Americanized) Italian cuisine and they are both solid, carbohydrate-based dishes (based on wheat). It seems reasonable based on the existing knowledge about hedonic contrast in food to question whether this contrast could be attenuated by eliminating these commonalities.

Therefore, the current research investigates whether it is possible to attenuate or eliminate hedonic contrast in a coursed meal by inducing a category mismatch. Using the same target stimulus (main course) as Lahne and Zellner (2015) – a pasta dish with garlic and olive oil – this study manipulates the cuisine of the appetizer (stimulus) and entrée (target) so that the two courses are either from the same or from different cultural cuisines. Specifically, soups from two different cuisines were developed: *minestrone* (tomato, vegetable, and bean soup – an Italian-American cuisine match) and Thai *tom kha* (coconut-lemongrass soup – a cuisine mismatch). Two versions of each soup were developed (good and neutral) in order to determine if cuisine mismatch attenuates or eliminates hedonic contrast. These soups are also quite distinct from the main dish in that they are liquid, not solid, wheat-based carbohydrates.

Thus, the overall hypothesis of this research is that it is possible to attenuate or eliminate hedonic contrast in coursed, restaurant meals by reducing commonalities between the courses. Specifically, it is hypothesized that a mismatch in cuisine between the

appetizer and entrée (in this case, Italian-Italian vs Thai-Italian) will cause a significant attenuation or elimination of hedonic contrast. To test this hypothesis, an *in vivo* meal study was conducted at Drexel University’s Academic Bistro, a training restaurant for Drexel’s Culinary Arts and Science students.

2. Materials and methods

2.1. Participants

A total of 143 subjects (42 males and 101 females) participated in this research. They reported an average age of 32.3 years ($SD = 12.5$ years). On average, subjects reported dining out 1.7 times per week ($SD = 1.3$ times), and nine of the subjects reported experience in the restaurant industry. Samples sizes were slightly different for each treatment group: neutral *minestrone* $N = 35$; good *minestrone* $N = 40$; neutral *tom kha* $N = 37$, good *tom kha* $N = 31$.

Subjects were recruited by word-of-mouth and email advertisements from the Drexel University community. Subjects were a mix of students, faculty, and staff. They were incentivized with the promise of a free lunch; no other compensation was provided. Subjects were disqualified if they had dietary restrictions (aside from vegetarianism, as all recipes to be tested were vegetarian), food allergies, or if they had participated in the previous study (Lahne & Zellner, 2015) or tested pilot appetizers for this study.

The research design and instruments were approved by the Drexel Human Research Protections Program IRB.

2.2. Experimental meal design

In this study, all subjects were served a two-course lunch in naturalistic restaurant conditions. The first course, referred to hereafter as the “appetizer”, the context stimulus, was manipulated. The appetizers varied on two dimensions: cuisine (Italian/Thai) and quality (good/neutral). The dependent variables were the subjects’ affective responses (see Section 2.4) to the meal and its components, particularly the target stimulus, which was the second course pasta dish, hereafter the “main”. In order to incentivize participation, after completing all research questionnaires participants were also given their choice of several fresh-baked cookies prepared by the Academic Bistro kitchen; however, these cookies were not part of the experiment itself.

As discussed above (see Section 1.2), the experimental appetizers for this study were all soups, in order to differentiate them in type (solid vs liquid, no wheat-based carbohydrates) from the main: *minestrone* (an Italian soup) and *tom kha* (a Thai soup). All the soups (as the *bruschetta* appetizer in Lahne & Zellner, 2015) differed in flavor profile from the pasta entrée. The soups were readily identifiable as coming from different cultures and cuisines. *Minestrone* is a common soup in the USA and identified with Italian cuisine. *Tom kha*, while not necessarily identifiable as Thai, is identifiable to our subjects as Asian, and certainly not Italian. Participants were not told the names or cuisine-origin of the dishes. Soups were pilot-tested prior to the main study with a separate group of Drexel students ($N = 24$) to obtain versions of each that were hedonically positive or neutral (see Section 2.4 and Fig. 1, below). Thus, there were four experimental appetizers in total, detailed in Tables 1 and 2. Full recipes are available in Appendix 1.

All subjects received the same main course: *pasta aglio e olio* (pasta with oil and garlic), known to our subjects as an Italian dish, which had been developed to be hedonically neutral by Lahne and Zellner (2015). The ingredients and description for that dish can be found in that paper.

Table 1
Minestrone ingredients.

Mediocre quality	Good quality
Garlic (Minced)	Olive Oil
Onion (Sm Diced)	Garlic (Minced)
Celery (Med. Diced)	Onion (Sm Diced)
Green Peppers (Rough Cut)	Celery (Sm. Diced)
Carrots (Med. Diced)	Green Peppers (Sm. Diced)
Cabbage (Thick Julienne)	Red or Yellow Peppers (Sm. Diced)
Green Beans (Rough Cut)	Carrots (Sm. Diced)
Peas (Shelled)	Cabbage (Julienne)
Zucchini	Green Beans (1 Inch Segments)
Tomato Concasse	Peas (Shelled)
Cooked Cannellini	Zucchini
Water	Tomato Concasse
Oregano (Dry)	Cooked Cannellini
Parsley (Dry)	Vegetable Stock
	Oregano (Dry)
	Basil (Fresh)
	Parsley (Minced)
	Parmesan (Fresh Grated)
	Salt & Pepper

Table 2
Tom kha ingredients.

Mediocre quality	Good quality
Water	Vegetable Stock
Coconut Milk	Coconut Milk
Lemongrass (1/8 in Sliced & Scraped)	Lemongrass (1/8 in Sliced & Scraped)
Tofu	Tofu
Red Peppers (Julienne)	Red & Yellow Peppers (Julienne)
Button Mushroom	Shitake Mushroom
Vegan Soy	Vegan Soy
Red Onion (Fine Julienne)	Red Onion (Fine Julienne)
Fresh Lime Juice	Fresh Lime Juice.
Ginger (Minced)	Ginger (Minced)
Thai Chili	Kaffir Lime Leaves
Fresh Cilantro	Thai Chili
	Fresh Cilantro
	Salt
	Grape Tomatoes
	Thai Basil

2.3. Study design

This study was a 2×2 factorial design, with appetizer cuisine (Italian-American – *minestrone* or Thai – *tom kha*) and appetizer hedonic quality (good or neutral) as the factors. In order to eliminate bias, the study was necessarily between-subjects: each subject was only allowed to enroll in one session. In each session, only one experimental treatment (appetizer) was served, so that subjects were not influenced by observing others being served appetizers that were obviously different than the ones they were served. Therefore, in order to eliminate any possible influence from conducting the study on different days of the week, the study was conducted between 11:30 AM and 1:30 PM over 4 sequential Tuesdays.

All sessions were conducted in the Academic Bistro at Drexel University, a training restaurant for the Culinary Arts program, which is staffed by students who are training to be professional chefs and supervised by professional chefs who serve as teaching faculty. Students and staff prepared all of the dishes for the study according to the recipes in Tables 1 and 2 and Appendix 1 and supervised by the second author to minimize any variation. Researchers and student research-assistants supervised subjects in the dining room, served dishes, and distributed and collected

paper questionnaires. The dining room was set up as a normal restaurant with tables in multiple configurations, seating from 2 to 6 people, all with placemats, silverware, napkins, water cups, and pitchers of filtered water.

When subjects arrived at the Academic Bistro, they were checked in by researchers; subjects enrolled in advance, although walk-ins were allowed when there was availability. Researchers seated subjects, explained the study, and directed subjects to read consent documentation and fill out the pre-meal questionnaire (see Section 2.4). Once these were completed, subjects were served the appetizer assigned to their session; when they were finished with the appetizer it was cleared by researchers and they were served the main. Subjects were informed that, while they did not have to eat all of a course, they did have to taste it so that they could report their opinions. After subjects indicated they were done with the pasta main, this was cleared and the subjects were given the post-meal questionnaire (see Section 2.4). Finally, subjects were given a cookie as a thank-you, and released from the study.

2.4. Questionnaires

The pre-meal questionnaire comprised six items: open-ended items requesting gender, age, occupation, years in the food industry (if applicable), number of meals eaten at restaurants per week, and finally a 10-point scale indicating current hunger level (with 0 indicating “not hungry” and 10 indicating “extremely hungry”).

The post-meal questionnaire asked a number of questions about subjects’ perceptions of the meal. Using a 201-point bipolar scale with –100 labeled as “dislike extremely”, 0 as “neither like nor dislike”, and +100 as “like extremely”, subjects indicated their liking for the first course, second course, and the meal overall. They then rated how attractive they found both the first and second courses using a 201-point bipolar scale with –100 labeled as “extremely unattractive”, 0 as “neither attractive nor unattractive”, and +100 as “extremely attractive”. They then rated how much care they thought the preparer had taken on each of the first and second courses using a 10-point scale (with 0 as “no care”, 5 as “some care”, and 10 as “a lot of care”). They then indicated, in US dollars, how much money they would pay for each course in a restaurant. On a 10-point scale they rated how appropriate the first course was for the second course using a 10-point scale with 0 as “not at all appropriate” and 10 as “very appropriate”. Finally, subjects indicated how hungry they were on a 10-point scale from 0 (“not hungry”) to 10 (“extremely hungry”).

2.5. Data analysis

Data were entered into the R statistical programming environment for analysis (R Core Team, 2015). The study had two independent variables in a 2×2 factorial design: appetizer cuisine and appetizer quality. In order to account for unequal sample sizes, examination of residuals and Q-Q Plots indicated that assumptions of univariate normality were appropriate for these data; therefore, data were analyzed using 2-way ANOVA through the *ez* package (Lawrence, 2015). Results are reported in the original metrics with supporting statistics; when reporting sample statistics “M” is the abbreviation for “mean”, and “SD” for “standard deviation”. Effect sizes are reported as either ω_p^2 (for interaction or main effects) or Cohen’s d_s (for simple effects) (Lakens, 2013). The former can be interpreted roughly as a proportion of variance accounted for by the effect in question; the latter can be interpreted as the difference (in standard deviations) between the means for the groups being compared.

3. Results

3.1. Hunger ratings

Subjects in both *minestrone* groups reported that they were slightly hungrier ($M = 6.67$, $SD = 1.52$) before the meal than those in the *tom kha* groups ($M = 6.04$, $SD = 1.61$; $F_{1,139} = 5.83$, $p = 0.017$, $\omega_p^2 = 0.033$), although there was no difference in hunger levels between appetizer-quality groups and no interaction effect. Because reports of pre-meal hunger were collected in the pre-meal questionnaire, and there was also no difference in reported hunger after the meal for any comparison, this slight variation in hunger levels probably did not affect the liking ratings.

3.2. Appetizer ratings

While the main dependent variable of interest in this study was subjects' reported liking of the main course, it is important to examine some collected data on the appetizers themselves. The experimental design remains the same: appetizer cuisine and quality are the main independent variables.

When the dependent variable was subjects' hedonic ratings for the appetizers, a significant interaction effect was observed between appetizer cuisine and quality on reported liking ($F(1, 139) = 5.97$, $p = 0.016$, $\omega_p^2 = 0.034$). Examining the simple effects of appetizer quality at each level of appetizer type, it is apparent that subjects liked the good *minestrone* ($M = 58.1$, $SD = 36.5$) more than the neutral ($M = 30.9$, $SD = 36.5$; $F(1, 73) = 10.4$, $p = 0.0019$, $d_s = 0.78$); the same pattern was apparent between the good *tom kha* ($M = 35.6$, $SD = 52.3$) and the neutral ($M = -25.0$, $SD = 37.2$; $F(1, 66) = 30.9$, $p = 5.22 \times 10^{-7}$, $d_s = 1.31$). Thus, the interaction appears to be based on the significant difference in degree of the effect, rather than in the direction of the effects. The difference between the good and neutral *tom kha* was larger than the difference between the good and neutral *minestrone* (see Fig. 1).

With appetizer attractiveness as the dependent variable, a significant interaction between appetizer cuisine and quality was observed ($F(1, 139) = 6.11$, $p = 0.015$, $\omega_p^2 = 0.034$). Examination of the simple effect of quality at each appetizer level showed that while good *tom kha* ($M = 58.2$, $SD = 33.6$) was significantly more attractive than neutral ($M = 22.0$, $SD = 44.4$; $F(1, 66) = 13.9$, $p = 4.1 \times 10^{-4}$, $d_s = 0.93$), the *minestrone*'s appearance did not vary across quality ($F(1, 73) = 0.17$, NS). Thus, we conclude that

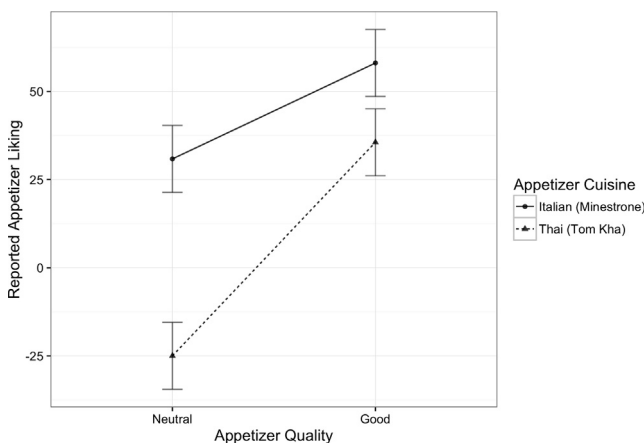


Fig. 1. Appetizer liking by appetizer quality and cuisine. Both “good” appetizers were liked more than their “mediocre” counterparts; however, the difference between the *tom kha* versions is much larger, and in fact the mediocre *tom kha* is hedonically negative.

subjects found the good *tom kha* more attractive than the neutral by almost a full standard deviation, but found no difference in the attractiveness of the *minestrone*.

If we consider the dollars that subjects were willing to pay for the course as the dependent variable, the only significant effect is that of appetizer quality ($F(1, 139) = 20.3$, $p = 1.37 \times 10^{-5}$, $\omega_p^2 = 0.12$): subjects were willing to pay substantially more for the good appetizers ($M = \$6.04$, $SD = \$2.20$) than for the neutral ones ($M = \$4.17$, $SD = \$2.71$). Neither appetizer cuisine nor the two factors' interaction significantly affected the amount subjects were willing to pay.

Finally, subjects did not find any differences among the appetizers in terms of the perceived care the kitchen put into their preparation.

3.3. Main course ratings

The main research question of this study was whether a mismatch between appetizer and main-course cuisine (Italian-American vs Thai) would significantly attenuate the hedonic contrast-effect on consumers' liking for a main course. In fact, hedonic contrast was attenuated by a mismatch in appetizer cuisine with the main, as can be seen by examining the result of the 2-way ANOVA with main-course liking (pasta) as the dependent variable and appetizer cuisine and quality as the main independent variables. There was a significant interaction effect ($F(1, 139) = 6.67$, $p = 0.011$, $\omega_p^2 = 0.038$) between appetizer cuisine and quality, indicating that there were different effects of quality at each level of appetizer cuisine. In examining the simple effects, it is apparent that for the Thai appetizer, *tom kha*, main-course liking was not affected by appetizer quality ($F(1, 66) = 2.22$, NS), but for the Italian-American appetizer, *minestrone*, main-course liking was affected by appetizer quality ($F(1, 73) = 31.5$, $p = 3.35 \times 10^{-5}$, $d_s = 1.32$). The same pasta dish served after good *minestrone* was liked 1.32 standard deviation units less ($M = -14.2$, $SD = 40.6$) than when served after neutral or mediocre *minestrone* ($M = 33.9$, $SD = 32.4$). See Fig. 2.

With main-course attractiveness as the dependent variable, a significant interaction was found between appetizer cuisine and quality ($F(1, 139) = 8.32$, $p = 0.0045$, $\omega_p^2 = 0.049$). There was no simple effect of quality for *tom kha* on the attractiveness of the pasta ($F(1, 66) = 2.08$, NS). However, there was a significant simple effect of quality for *minestrone* ($F(1, 73) = 7.11$, $p = 0.0094$, $d_s = 0.63$): subjects reported that pasta eaten after good *minestrone* was significantly less attractive ($M = 19.2$, $SD = 41.5$)

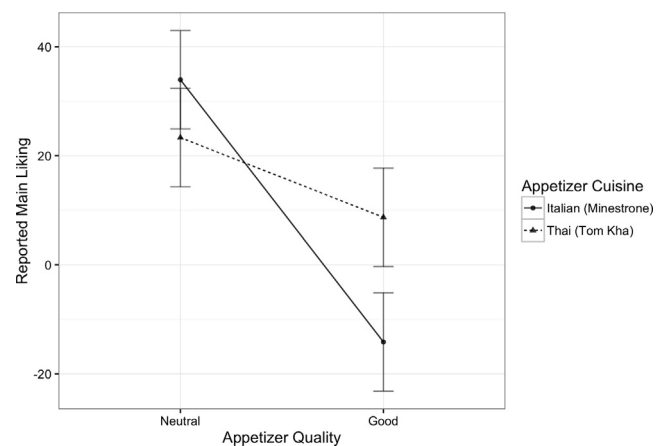


Fig. 2. Main course liking by appetizer quality and cuisine. There is no significant difference in main-course liking for *tom kha* of different qualities, but there is a significant difference for *minestrone* of different qualities.

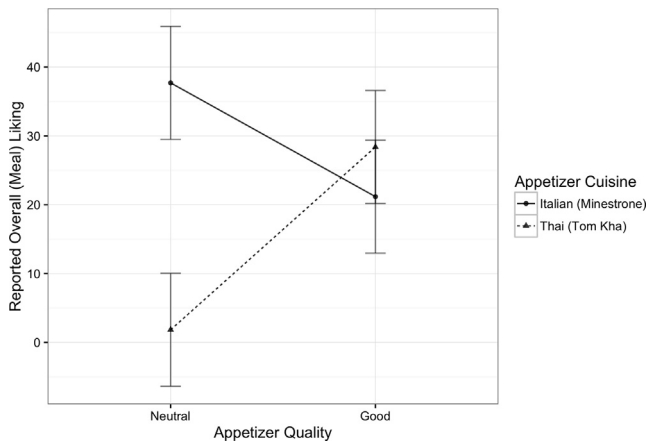


Fig. 3. Overall meal liking by appetizer quality and cuisine. Note that for *tom kha* overall liking appears to be roughly additive from appetizer and main course liking, whereas for *minestrone* there is evidence of (negative) synergy: hedonic contrast.

than the same pasta eaten after neutral or mediocre *minestrone* ($M = 41.3$, $SD = 27.9$).

As with the appetizers themselves, appetizer quality had a significant effect on the price in dollars subjects were willing to pay for the main course ($F(1, 139) = 3.99$, $p = 0.047$, $\omega_p^2 = 0.020$), and neither appetizer cuisine nor the interaction of the factors had a significant effect. This effect is quite small, accounting for about 2% of the total variation in main-course price. It is also in the opposite direction of the appetizer-price effect: subjects were willing to pay slightly less for the pasta following the good appetizers ($M = \$4.87$, $SD = \$3.30$) than for pasta following the mediocre appetizers ($M = \$6.14$, $SD = \$4.00$).

Neither appetizer quality nor cuisine had any significant effect on how subjects perceived the amount of care put into the main course of *pasta aglio e olio*.

3.4. Overall ratings

Subjects were asked to indicate their liking for the meal as a whole. Again, there was a significant interaction effect between appetizer cuisine and quality on this dependent variable ($F(1, 139) = 13.4$, $p = 3.63 \times 10^{-4}$, $\omega_p^2 = 0.080$). In this case, however, simple effects for appetizer quality are significant for both appetizers (see Fig. 3). For *minestrone* ($F(1, 73) = 5.33$, $p = 0.024$, $d_s = 0.53$) the meal with the good appetizer is significantly worse overall ($M = 21.2$, $SD = 29.6$) than the meal with the mediocre appetizer ($M = 37.7$, $SD = 32.3$). For *tom kha* ($F(1, 66) = 7.75$, $p = 0.070$, $d_s = 0.69$) the reverse pattern was seen: meals with the good *tom kha* were more liked overall ($M = 28.4$, $SD = 34.0$) than meals with the neutral or mediocre version ($M = 1.84$, $SD = 43.0$).

Finally, subjects were asked how appropriate the appetizer and main course were for each other. For this dependent variable, there was no significant effect of appetizer quality, nor an interaction effect between appetizer cuisine and quality, but there was a significant effect of appetizer cuisine ($F(1, 139) = 22.9$, $p = 4.31 \times 10^{-6}$, $\omega_p^2 = 0.13$). Subjects agreed that *minestrone* was a significantly more appropriate appetizer for pasta ($M = 5.73$, $SD = 2.54$) than *tom kha* ($M = 3.52$, $SD = 3.02$).

4. Discussion

This study found that when an appetizer differs in *cuisine* from the entrée (Thai vs. Italian-American) hedonic contrast is attenuated. This was the case even though the difference between the

good and neutral *tom kha* was larger than the difference between the good and neutral *minestrone*. Hedonic contrast, a reduction in hedonic rating of the pasta entrée, was only seen with the *minestrone* (Italian-American) appetizer, not the *tom kha* (Thai). This result is even more noteworthy because while the two *minestrone* appetizers were both rated as hedonically positive, only the good *tom kha* was rated as hedonically positive while the neutral one was rated as hedonically negative. Based on this difference in hedonic tone, one might expect a larger difference in hedonic rating of the pasta following the two versions of *tom kha* than following the two (both hedonically positive) versions of *minestrone*. That this did not happen provides strong evidence that the cultural and/or cuisine match between the appetizer and the entrée was important in producing hedonic contrast. If the appetizer and the main course do not cognitively fit into the same cuisine category (e.g., Italian-American) it seems they are not compared and contrast does not occur. Future work that examined both different courses and different appetizers would help to confirm that it is indeed cuisine that is the key category governing the absence or presence of contrast in a meal.

The hedonic contrast caused by an appetizer can also negatively impact a diner's evaluation of the meal as a whole. As seen here, having a good appetizer may have such a negative effect on the entrée that the overall meal is rated as less good than if the appetizer was only neutral. This might have to do with the fact that when evaluating an entire meal the entrée "counts" more in the overall assessment than does the appetizer (Rogozenki & Moskowitz, 1983). Thus, decreasing the perceived quality of the main course by serving a very good appetizer not only negatively impacts the hedonic value of that entrée but of the entire meal.

Further evidence of the importance of cuisine match in inducing hedonic contrast in meals can be found in this overall quality decrease. When the cuisine-mismatched *tom kha* is served, the good-quality appetizer appears to have an additive effect on the quality of the meal as a whole; however, as noted above, when the cuisine-matching *minestrone* is served, a good appetizer has a (negative) synergistic effect on perceived, overall meal-quality. Thus, diners apparently perceive each element of the mismatched meal as discrete, whereas a matched meal is perceived holistically.

This paper replicates and expands on the results of Lahne and Zellner (2015), in which the researchers found that hedonic contrast could occur in a coursed, restaurant meal. This confirms that these contrast effects are not only important in laboratory conditions, but that they are robust effects with probable implications for real-world dining. In real meals it is indeed possible to enjoy a dish less because it is overshadowed by previous ones; in addition, the current research implies that the entire meal may be tainted by this effect.

The results of this study, combined with those from the previous study by Lahne and Zellner (2015) suggest that in hedonic contrast between courses in restaurant meals, some category differences are more important than others (cf. Zellner et al., 2003). While category differences based on cuisine between the appetizer and the entrée eliminated contrast in this study, differences in flavor profile or the material composition of the dishes did not appear sufficient to do so. That is, neither tomato *bruschetta* (Lahne & Zellner, 2015) nor *minestrone* taste at all like *pasta aglio e olio*, and the latter is also composed of very different materials – broth, vegetables, no major carbohydrates; nevertheless, both appetizers caused hedonic contrast with the pasta main course. Furthermore, although soup is historically and gastronomically considered a distinct category of dish (Carroll, 2013; Visser, 1991), it can still cause hedonic contrast. Although further research is necessary to explore the boundaries of this effect, the current study and its predecessor (Lahne & Zellner, 2015) imply that all of these category differences do not attenuate hedonic contrast

as long as the courses are perceived to come from the same coherent cuisine: cuisine causes comparison.

The current research implies that the adverse effect of a good appetizer on an entree will be more of a problem in restaurants which serve food that is more culturally thematic than in restaurants which serve a more ethnically diverse menu. So, for example, good appetizers in an Italian restaurant will all have a negative impact on diners' evaluations of the entrées and the meal as a whole. A restaurant serving equally good appetizers will not see the same negative hedonic impact on their appetizers if the food in the two courses are not ethnically similar (e.g. shrimp summer roll followed by beef bourguignon).

In order to avoid having a good appetizer decrease liking for an entrée and a meal in restaurants that are ethnically thematic, the restaurant might try to cognitively separate the appetizers from the entrees by making diners think of them as less similar. One way to do this might be to point out that the appetizers are somehow different from the entrees. For example, the entrees in an Italian restaurant might be labeled as typical of regions of Italy that are different from those of the appetizers (e.g., Calabria and Tuscany). Such cognitive manipulations have been found to reduce hedonic contrast with other types of stimuli [e.g., birds (Zellner et al., 2003), art (Dolese, Zellner, Vasserman, & Parker, 2005), and faces (Cogan, Parker, & Zellner, 2013)]. Another avenue for future research into these real-world contrast effects is collecting observations on the behavioral correlates of self-reported liking: for example, does the observed hedonic contrast (and subsequent decrease in reported liking) result in actual decreased consumption? While reported consumption and liking are related, they are not homologous, and it is important for both researchers and practitioners (e.g., chefs and caterers) to understand what the implications of these robust contrast effects are. In addition, consumption measurements have the potential to be less intrusive and disruptive to the real-world consumption context, and so, if properly validated, may produce even more ecologically valid results. Further research is needed to investigate the factors that lead to hedonic contrast effects in meals and manipulations to reduce or eliminate them in order to maximize the experience of diners.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.foodqual.2016.10.002>.

References

- Beebe-Center, J. G. (1965). *The psychology of pleasantness and unpleasantness*. New York: Russell & Russell [1932].
- Carroll, A. (2013). *Three squares: The invention of the American meal*. New York: Basic Books.
- Cogan, E., Parker, S., & Zellner, D. A. (2013). Beauty beyond compare: Effects of context extremity and categorization on hedonic contrast. *Journal of Experimental Psychology: Human Perception and Performance*, 39(1), 16–22. <http://dx.doi.org/10.1037/a0031020>.
- Dolese, M., Zellner, D., Vasserman, M., & Parker, S. (2005). Categorization affects hedonic contrast in the visual arts. *Bulletin of Psychology & the Arts*, 5, 21–25.
- Dunlop, F. (2013). *Every grain of rice*. New York: W. W. Norton & Company.
- Edwards, J. S. A., Meiselman, H. L., Edwards, A., & Leshner, L. (2003). The influence of eating location on the acceptability of identically prepared foods. *Food Quality and Preference*, 14(8), 647–652.
- Fechner, G. T. (1898). *Vorschule der aesthetik II* (2nd ed.). Leipzig, Germany: Breitkopf & Härtel.
- Jimenez, M., Rodriguez, D., Greene, N., Zellner, D. A., Cardello, A. V., & Nestrud, M. (2015). Seeing a meal is not eating it: Hedonic context effects differ for visually presented and actually eaten foods. *Food Quality and Preference*, 41, 96–102. <http://dx.doi.org/10.1016/j.foodqual.2014.11.015>.
- Labensky, S. R., & Hause, A. M. (2007). *On cooking*. Saddle River: Pearson.
- Lahne, J., & Zellner, D. A. (2015). The great is the enemy of the good: Hedonic contrast in a coursed meal. *Food Quality and Preference*, 45(2015), 70–74.
- Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: A practical primer for t-tests and ANOVAs. *Frontiers in Psychology*, 4(863), 1–12.
- Lawrence, M. A. (2015). ez: Easy analysis and visualization of factorial experiments (Version 4.3). Retrieved from <<http://cran.r-project.org/package=ez>>.
- Meiselman, H. L. (1992). Methodology and theory in human eating research. *Appetite*, 19(1), 49–55. [http://dx.doi.org/10.1016/0195-6663\(92\)90235-X](http://dx.doi.org/10.1016/0195-6663(92)90235-X).
- Meiselman, H. L. (2000). *Dimensions of the meal: The science, culture, business and art of eating*. Gaithersburg: Aspen Publishers.
- Meiselman, H. L. (2009). *Meals in science and practice: Interdisciplinary research and business applications*. Boca Raton: CRC Press.
- Meiselman, H. L., Johnson, J. L., Reeve, W., & Crouch, J. E. (2000). Demonstrations of the influence of the eating environment on food acceptance. *Appetite*, 35(3), 231–237.
- R Core Team (2015). *R: A language and environment for statistical computing*. Vienna, Austria: R Foundation for Statistical Computing. Retrieved from <<http://www.r-project.org/>>.
- Rogozenski, J. G., & Moskowitz, H. R. (1983). A system for the preference evaluation of cyclic menus. *Foodservice Research International*, 2(3), 139–161.
- Visser, M. (1991). *The rituals of dinner: The origins, evolution, eccentricities, and meaning of table manners*. New York: Penguin.
- Zellner, D. A., Rohm, E. A., Bassetti, T. L., & Parker, S. (2003). Compared to what? Effects of categorization on hedonic contrast. *Psychonomic Bulletin & Review*, 10(2), 468–473. <http://dx.doi.org/10.3758/BF03196508>.