

Cultural Norms in Food Cognition: Development and Cross-Cultural Validation of the Culinary Violation Task

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Abstract

Cultural knowledge shapes how people classify and evaluate everyday practices, but culturally grounded judgements can be difficult to distinguish from general unfamiliarity or dislike. We examined this distinction in food cognition by testing whether reactions to culinary norm violations depend on cultural congruence: whether the violated norm belongs to the participant's own culinary culture or to another culture. Chinese and Italian adults (N = 430; 154 Chinese, 276 Italian) completed the Culinary Violation Task, comprising culturally appropriate and norm-violating food pairings from Chinese and Italian culinary contexts. Participants rated disgust and judged the appropriateness of each pairing. Trial-level mixed-effects models showed that norm-violating items elicited greater disgust and fewer appropriate judgements than culturally appropriate items. Crucially, this violation effect was substantially stronger for own-culture than other-culture items: own-culture violations produced the highest disgust ratings and the lowest appropriateness judgements. Inter-rater agreement was modest overall, reflecting strong consensus for culturally appropriate items but greater variability for proposed norm violations. Internal consistency was acceptable to excellent across stimulus blocks, and task disgust ratings were associated with dispositional disgust sensitivity. The cultural-congruence effect was robust to lived-abroad experience and present in both men and women. These findings show how culturally shared knowledge organises affective and evaluative cognition in an everyday domain, while providing initial reliability and validity evidence for the Culinary Violation Task.

1 Introduction

Cultural knowledge shapes how people classify, evaluate, and respond to everyday experience. Its influence is especially visible when an otherwise harmless act feels not merely unfamiliar or unappealing, but culturally wrong. Would an Italian diner experience seafood pasta served with a cappuccino as simply unusual, or as a violation of an implicit culinary rule? Would a Chinese diner respond similarly to marmalade on rice? Such reactions offer a tractable way to examine how shared cultural expectations become represented in cognition and expressed through affective and evaluative judgements.

Culture does not merely supply explicit beliefs; sustained participation in cultural practices can organise attention, categorisation, interpretation, and judgement (Nisbett et al., 2001). Food is one of the most familiar domains in which these processes operate and one of the most powerful markers of cultural belonging, identity, and social classification (Fischler, 1988; Mintz & Du Bois, 2002). Across societies, people learn not only what is edible, but also what is appropriate, recognisable, authentic, or wrong to eat. These expectations are acquired through family routines, social interaction, regional traditions, and repeated exposure to culturally patterned practices. They often remain implicit until they are violated.

1.1 Culinary norms and cultural consensus

Culinary norms are closely tied to family practices, regional traditions, hospitality, social identity, and collective memory. They shape not only what people like, but also what they perceive as fitting, legitimate, excessive, inappropriate, or transgressive. Cross-cultural research has shown that cultural background influences food preference, sensory evaluation, and acceptability judgements (Jeong & Lee, 2021). However, less is known about how people respond when food norms are violated, and whether these responses depend on whether the violated norm belongs to one's own cultural food system or to another culture.

A central premise of the present study is that a culinary norm violation cannot be defined solely by the researcher. Cultural norms depend on shared knowledge: they are meaningful because members of a cultural group recognise, at least implicitly, what counts as appropriate within a given food system. An unusual food pairing is therefore not necessarily a cultural norm violation; it may simply be unfamiliar, unappealing, creative, or odd. To describe a food item as norm-violating, it is necessary to establish that it departs from expectations that are recognisable within the relevant cultural community. This issue is especially important in cross-cultural research, where a food combination that seems inappropriate to one group may be interpreted differently by another.

1.2 Disgust, meaning, and cultural boundaries

Disgust provides one mechanism through which reactions to culinary violations may operate. Although disgust is often linked to pathogen avoidance and contamination (Tybur et al., 2013), it is not reducible to biological danger. Classic work by Rozin and colleagues has shown that disgust is strongly shaped by symbolic meaning: physically harmless items can elicit aversion if they are associated with contamination, category violation, bodily boundary transgression, or culturally inappropriate practices (Rozin & Fallon, 1987; Rozin et al., 2008). Similarly, culturally offensive but harmless acts can elicit strong affective and moral responses, suggesting that disgust is closely connected to learned expectations about what is acceptable or transgressive (Haidt et al., 1993). Food is therefore a privileged domain for studying how biological, affective, and cultural processes interact.

1.3 Affective and evaluative responses

It is important to distinguish between affective and evaluative responses to culinary norm violations. A person may judge a food pairing as inappropriate because it violates a culturally learned rule, but they may or may not experience the same pairing as disgusting. Conversely, a food pairing may be affectively unpleasant without being interpreted as a violation of a specific cultural norm. Appropriateness judgements and disgust ratings therefore provide complementary measures. Appropriateness judgements capture an explicit evaluation of whether a food pairing fits a perceived culinary norm, whereas disgust ratings capture a more affective response to the same item. Distinguishing these outcomes allows us to ask whether culinary norm violations are experienced primarily as breaches of cultural acceptability, as affectively aversive stimuli, or as both.

1.4 Own-culture and other-culture norms

People may be especially sensitive to violations of the food norms they have internalised through long-term participation in a cultural community. Heritage culinary norms are learned not only as explicit knowledge but also through repeated embodied experience: family meals, everyday routines, celebrations, prohibitions, sensory memories, and shared assumptions about how food should be prepared and consumed. When such norms are violated, responses may therefore be stronger than when the violated norm belongs to another cultural system. By contrast, other-culture food norms may require more explicit cultural knowledge. A participant may find an unfamiliar foreign food combination odd or unappealing, but without sufficient knowledge of that cuisine, may not recognise it as a norm violation in the cultural sense.

1.5 Chinese and Italian culinary contexts

Chinese and Italian food cultures provide a useful context for examining these questions. Both are historically elaborated culinary systems in which food practices are strongly embedded in social life, regional identity, family routines, and shared expectations. Chinese food practices are closely tied to family identity, social occasion, hospitality, regional variation, and beliefs about bodily balance and health (Tian et al., 2018; Yu et al., 2015). Italian food practices are similarly structured by expectations concerning ingredients, combinations, timing, preparation, regional authenticity, and the relationship between food and social identity. In both contexts, some combinations may be perceived not simply as unusual, but as violations of a meaningful culinary order.

1.6 Cultural congruence

The present study uses culturally appropriate and norm-violating food pairings from Chinese and Italian culinary contexts. The design allows us to move beyond the question of whether norm-violating foods are rated more negatively in general. Instead, we ask whether responses depend on cultural congruence: that is, whether the food norm belongs to the participant's own cultural system or to another cultural system. If responses to culinary violations are driven mainly by general oddness, unfamiliarity, or lack of appeal, norm-violating items should elicit similar responses regardless of whether they come from participants' own or another food culture. If, however, culinary norm violations depend on culturally shared knowledge, participants should show stronger affective and evaluative responses to own-culture violations than to other-culture violations.

This approach also helps clarify the role of cultural knowledge. Other-culture violations may be less strongly differentiated from appropriate items not because participants are more tolerant of them, but because they may not fully recognise the relevant norm structure. For example, a food pairing that violates Italian culinary expectations may be highly salient to Italian participants but less meaningful to Chinese participants with limited knowledge of Italian food norms. Similarly, a Chinese culinary violation may be more strongly recognised by Chinese than Italian participants. Such asymmetries are theoretically informative because they suggest that culinary norm violations are not simply properties of stimuli, but emerge from the relationship between a stimulus and the cultural knowledge of the person evaluating it.

1.7 The present study

Building on this cultural-cognitive account, the present study examines whether culturally shared knowledge organises both affective and evaluative responses to everyday norm violations. It introduces and validates the Culinary Violation Task, a picture-based instrument for measuring disgust and appropriateness judgements in response to culturally appropriate and norm-violating food pairings. Chinese and Italian adults evaluated pairings from both Chinese and Italian culinary contexts, allowing the same stimuli to be assessed as own-culture or other-culture items.

We addressed three main research questions. First, do culinary norm violations elicit stronger disgust and lower appropriateness judgements than culturally appropriate food pairings? Second, is this violation effect stronger for own-culture than other-culture food items, consistent with the idea that culinary norm sensitivity depends on culturally shared knowledge? Third, do Chinese and Italian participants show a parallel pattern of heightened sensitivity to violations of their respective heritage food cultures?

Together, these questions provide validity evidence: sensitivity to cultural congruence serves as a known-groups (criterion) validity test of whether the task captures culturally grounded norms rather than mere novelty. In addition, we examined evidence bearing on the task's validity and robustness: the convergent association of task disgust ratings with dispositional disgust sensitivity, and whether the cultural-congruence effect was robust to participants' intercultural experience and gender.

We expected norm-violating food pairings to elicit stronger disgust and lower appropriateness judgements than culturally appropriate pairings. Crucially, we expected this violation effect to be stronger for own-culture than other-culture items. Chinese participants were therefore expected to respond especially strongly to violations of Chinese food norms, whereas Italian participants were expected to respond especially strongly to violations of Italian food norms. Such a pattern would support the view that culinary norm violations are not merely odd or unfamiliar food combinations, but culturally meaningful deviations from shared expectations.

By distinguishing participant culture, food culture, cultural congruence, norm status, disgust, and appropriateness, the study tests a central proposition of cultural cognitive science: that the meaning and evaluation of a stimulus emerge partly from the culturally organised knowledge brought to it by the perceiver.

2 Method

2.1 Participants

Participants were Chinese and Italian adults recruited through convenience and snowball sampling. Recruitment materials were distributed through personal, university, and social-media networks. Eligibility criteria required participants to be aged 18 or above and to identify with either Chinese or

Italian cultural background. Participants completed the study online and provided informed consent before taking part.

After removal of incomplete, invalid, and test responses, the final analytic sample comprised 430 adults: 154 Chinese participants and 276 Italian participants. The Chinese sample had a mean age of 30.31 years (SD = 15.07), and the Italian sample had a mean age of 36.65 years (SD = 11.60). Across the full sample, the mean age was 34.39 years (SD = 13.28). One hundred and eighty participants reported having lived abroad: 100 Chinese participants and 80 Italian participants. Full participant characteristics are reported in Table 1.

Table 1. Participant characteristics by participant culture.

Sample	N	Female	Male	Non-binary	Age M (SD)	Education M (SD)	DS-R M (SD)	Lived abroad
Chinese	154	101 (65.6%)	52 (33.8%)	1 (0.6%)	30.31 (15.07)	4.81 (1.02)	47.94 (6.53)	100 (64.9%)
Italian	276	213 (77.2%)	61 (22.1%)	2 (0.7%)	36.65 (11.60)	4.09 (1.23)	45.65 (6.62)	80 (29.0%)
Total	430	314 (73.0%)	113 (26.3%)	3 (0.7%)	34.39 (13.28)	4.35 (1.21)	46.47 (6.67)	180 (41.9%)

2.2 Design

The study used a quantitative, cross-sectional online design to examine affective and evaluative responses to culturally appropriate and norm-violating food pairings. The design crossed two within-participant factors: norm status and cultural congruence. Norm status compared culturally appropriate food pairings with norm-violating food pairings. Cultural congruence compared food items from the participant's own culinary culture with food items from another culinary culture. For Chinese participants, Chinese food items were coded as own-culture items and Italian food items as other-culture items. For Italian participants, Italian food items were coded as own-culture items and Chinese food items as other-culture items.

The primary dependent variables were disgust ratings and appropriateness judgements. Disgust ratings indexed participants' affective responses to each food pairing, whereas appropriateness judgements indexed their explicit evaluation of whether the pairing was acceptable or appropriate. Participant culture, age, and education were included as covariates in the primary controlled models. Additional analyses examined convergent validity with dispositional disgust sensitivity and tested whether the cultural-congruence effect was robust to lived-abroad experience and gender.

2.3 Materials and measures

2.3.1 Background questionnaire

Participants completed a background questionnaire assessing age, gender, educational background, cultural background, current country of residence and periods abroad, which were used to characterise the sample (Table 1). Additional individual-difference measures were not analysed in the present study, which focuses on validating the task.

2.3.2 Culinary Violation Task

The Culinary Violation Task was developed to assess affective and evaluative responses to culturally appropriate and norm-violating food pairings. The task comprised 40 image-based trials. Twenty trials depicted Chinese food items and twenty depicted Italian food items. Within each food culture, ten trials depicted culturally appropriate pairings and ten depicted norm-violating pairings. This produced four stimulus categories: Chinese appropriate, Chinese violation, Italian appropriate, and Italian violation.

Stimulus development was conducted collaboratively by members of the research team from the two relevant cultural communities. The Chinese co-authors proposed and reviewed the Chinese appropriate and norm-violating items, whereas the Italian co-authors proposed and reviewed the Italian appropriate and norm-violating items. Items were discussed within the relevant cultural teams, drawing on the co-authors' lived cultural experience and knowledge of customary food practices. Appropriate items were defined as foods or combinations recognisable as acceptable within the relevant culinary context. Norm-violating items were defined as physically safe combinations that departed from culturally shared expectations concerning ingredients, accompaniments, preparation, or time of consumption. The aim was to identify violations of recognisable culinary conventions rather than foods that were dangerous, contaminated, or inherently inedible. Proposed items were reviewed within the relevant cultural team, and any disagreements about their classification were discussed until consensus was reached.

Chinese appropriate items consisted of familiar dishes or pairings commonly recognised as acceptable within Chinese culinary contexts, such as congee with pickled vegetables, dim sum with green tea, and pork dumplings with black vinegar. Chinese violation items consisted of physically safe but culturally unusual or inappropriate combinations expected to violate Chinese culinary expectations, such as peanut butter on congee, marmalade on rice, or Cantonese roast duck with coffee. Italian appropriate items consisted of pairings or dishes considered acceptable within Italian culinary contexts, such as Parma ham and melon, polenta with sausage, and cheese and pear. Italian violation items consisted of combinations expected to violate Italian culinary norms, such as seafood pasta with cappuccino, pasta with ketchup, or grated Parmesan cheese on seafood pasta.

Each trial presented a food image and a short written description. Food images were generated using Google Gemini from standardised prompts designed to produce plain, realistic, and visually consistent depictions across items. All images were reviewed by members of the relevant cultural team before inclusion. Stimuli were selected to be physically safe and non-extreme, so that responses would reflect perceived cultural appropriateness and affective aversion rather than obvious physical danger or contamination. The full list of stimulus descriptions and selected examples are provided in Appendix A.

For each item, participants made two judgements. First, they judged whether the food pairing was appropriate. These responses were coded as binary judgements, with 1 indicating appropriate and 0 indicating inappropriate. Second, participants rated their affective response to the food item on a five-point scale, with higher scores indicating stronger disgust. Trial-level responses were retained for all primary analyses so that both participant-level and item-level variability could be modelled.

2.3.3 Disgust sensitivity

Individual differences in disgust sensitivity were assessed using the Disgust Scale-Revised (DS-R; Olatunji et al., 2007). Higher scores indicate greater dispositional disgust sensitivity. Disgust sensitivity was included as an exploratory individual-difference predictor to test whether participants who were generally more prone to disgust showed stronger affective responses to culinary norm violations.

2.4 Procedure

The study was administered online using Gorilla Experiment Builder (Anwyl-Irvine et al., 2020). Participants accessed the study through a survey link or QR code included in the recruitment materials. After reading the participant information sheet, participants provided informed consent electronically. Participation was voluntary and anonymous, and participants were informed that they could withdraw before final submission.

Participants first completed the background questionnaire and individual-difference measures. They then completed the Culinary Violation Task. In each trial, participants viewed a food image with a short description and provided an appropriateness judgement and a disgust rating. Trial order was pseudo-randomised for each participant. At the end of the study, participants received a debriefing statement explaining the purpose of the research. Materials were administered in language versions appropriate to the participant group.

2.5 Ethics approval and consent to participate

The study involved human participants and was conducted in accordance with relevant institutional and ethical guidelines. Full ethical approval was obtained from the UCL IOE Research Ethics Committee for REC2248: The Cultural Brain at the Table: Emotional and Cognitive Responses to Food Norm Violations

Across Cultures. Approval was granted on 2 September 2025. The associated data protection number was Z6364106/2025/08/38. For the Italian sample, approval was obtained by the Bioethics Committee of the University of Bologna (Prot. N. 0410031 del 20/11/2025). All participants provided informed consent electronically before beginning the study, and participation was voluntary and anonymous.

2.6 Data screening and preparation

Data were screened before analysis. Test responses from members of the research team, incomplete responses, duplicate entries, and invalid responses were removed before constructing the final analytic dataset. Participants who gave identical responses across all 40 stimuli (zero within-person variance) were removed as careless responders ($n = 11$). Trial-level Culinary Violation Task data were merged with participant-level background and individual-difference variables using participant identifiers.

Each trial was coded according to food culture, norm status, participant culture, and cultural congruence. Food culture was coded as Chinese or Italian. Norm status was coded as appropriate or violation. Participant culture was coded as Chinese or Italian. Cultural congruence was coded as own-culture when the food culture matched the participant's cultural group and other-culture when it did not. Thus, Chinese food items were own-culture items for Chinese participants and other-culture items for Italian participants, whereas Italian food items were own-culture items for Italian participants and other-culture items for Chinese participants. For each trial, participants' binary appropriateness judgement constituted the raw response, coded 1 when the pairing was judged appropriate and 0 when it was judged inappropriate. From this response, we derived an intended-classification consistency score indicating whether the participant's judgement corresponded to the stimulus classification specified by the research team. For culturally appropriate items, the consistency score was identical to the raw judgement: an "appropriate" response was coded 1 and an "inappropriate" response was coded 0. For intended norm-violating items, the coding was reversed: an "inappropriate" response was coded 1 and an "appropriate" response was coded 0. Formally, the consistency score equalled the raw judgement for culturally appropriate items and **1 – raw judgement** for intended violation items. Thus, a score of 1 indicated correspondence with the intended stimulus classification, irrespective of whether that classification was appropriate or norm-violating.

Disgust ratings were analysed as continuous trial-level responses, with higher values indicating stronger disgust. Appropriateness judgements were analysed as binary trial-level responses, with 1 indicating that the item was judged appropriate and 0 indicating that it was judged inappropriate. For descriptive purposes, mean disgust ratings and proportions of appropriate judgements were calculated separately by participant culture, food culture, norm status, and cultural congruence.

2.7 Statistical analysis

Analyses were conducted in R (R Core Team, 2026) using mixed-effects models. The primary analyses used trial-level models because each participant rated multiple food items and each item was rated by multiple participants. This approach allowed us to account for non-independence in the data by including random intercepts for participants and items. Linear mixed-effects models were fitted using lme4 (Bates et al., 2015) and lmerTest (Kuznetsova et al., 2017), and planned contrasts were conducted using emmeans (Lenth & Piaskowski, 2026).

The primary model for disgust ratings was a linear mixed-effects model. The fixed effects were norm status, cultural congruence, participant culture, age, education, and the interaction between norm status and cultural congruence. Random intercepts were included for participant and item. Age and education were standardised before analysis. The key test was the norm status $\times$ cultural congruence interaction, which examined whether the difference between appropriate and norm-violating items was stronger for own-culture than other-culture food items.

The primary model for appropriateness judgements was a generalised linear mixed-effects model with a binomial link function. The fixed-effects structure matched the disgust model: norm status, cultural congruence, participant culture, age, education, and the norm status $\times$ cultural congruence interaction. Random intercepts were included for participant and item. The key test was again the norm status $\times$ cultural congruence interaction, examining whether the effect of norm violation on the probability of judging an item appropriate differed between own-culture and other-culture items.

Planned contrasts were conducted using estimated marginal means. For each outcome, we compared appropriate and violation items separately within own-culture and other-culture conditions. For disgust ratings, contrasts tested whether norm-violating items elicited higher disgust than appropriate items. For appropriateness judgements, contrasts tested whether appropriate items were more likely than violation items to be judged appropriate.

To quantify agreement in participants' evaluations of stimuli from their own culinary culture, Krippendorff's alpha was calculated for nominal responses. Two coefficients were estimated: one for Chinese participants' binary appropriateness judgements of the 20 Chinese items and one for Italian participants' judgements of the 20 Italian items. Participants were treated as raters, food items as units, and appropriateness judgements as nominal classifications. Krippendorff's alpha was selected because it accommodates multiple raters and missing observations. The coefficients were interpreted alongside item-level proportions because an overall agreement coefficient may obscure variation in consensus across individual stimuli. For each item, we therefore calculated the percentage of participants who judged it appropriate and the percentage whose judgement corresponded to its intended classification. As a complementary index of reliability, we estimated the internal consistency of task scores within each cuisine $\times$ norm-status block and within each cultural sample, using Cronbach's α for the 1–5 disgust ratings and KR-20 for the binary appropriateness judgements. Together, inter-rater agreement, item-level consensus, and internal consistency provided complementary reliability evidence, while the norm status $\times$ cultural congruence effect provided known-groups validity evidence.

Convergent validity of the disgust-rating component was assessed against dispositional disgust sensitivity (DS-R). Finally, as robustness checks, we tested whether the cultural-congruence effect was moderated by lived-abroad experience or gender.

3 Results

3.1 Sample characteristics and descriptive statistics

After data screening, the final analytic sample comprised 430 participants: 154 Chinese adults and 276 Italian adults. Participants completed 40 trials in the Culinary Violation Task, producing 17,200 trial-level observations. Because one Chinese participant had missing age data, the primary mixed-effects models including age and education were fitted to 429 participants, contributing 17,160 trial-level observations. Participant characteristics are reported in Table 1.

Descriptive statistics for the main task outcomes are shown in Table 2. Across participants, own-culture appropriate items elicited the lowest disgust ratings ($M = 1.57$, $SD = 0.56$), whereas own-culture violation items elicited the highest disgust ratings ($M = 3.17$, $SD = 0.80$). Other-culture items showed a smaller difference between appropriate items ($M = 2.17$, $SD = 0.69$) and violation items ($M = 2.77$, $SD = 0.81$). A parallel pattern was observed for appropriateness judgements. Own-culture appropriate items were judged appropriate on 95% of trials ($M = .95$, $SD = .11$), whereas own-culture violation items were judged appropriate on 41% of trials ($M = .41$, $SD = .28$). For other-culture items, appropriate items were judged appropriate on 81% of trials ($M = .81$, $SD = .20$), and violation items on 60% of trials ($M = .60$, $SD = .25$).

The full descriptive pattern by participant culture, food culture, and norm status is reported in Appendix B.

Table 2. Descriptive task outcomes by cultural congruence and norm status. Disgust scores represent mean ratings on a 1–5 scale, with higher scores indicating stronger disgust; appropriateness scores represent the mean proportion of items judged appropriate.

Cultural congruence	Norm status	N	Disgust M (SD)	Proportion appropriate M (SD)
Other-culture	Appropriate	430	2.17 (0.69)	0.81 (0.20)
Other-culture	Violation	430	2.77 (0.81)	0.60 (0.25)
Own-culture	Appropriate	430	1.57 (0.56)	0.95 (0.11)
Own-culture	Violation	430	3.17 (0.80)	0.41 (0.28)

3.2 Agreement and item-level evaluation of stimulus classifications

Agreement among participants evaluating stimuli from their own culinary culture was modest overall. Krippendorff's α was .432 for Chinese participants evaluating Chinese items and .406 for Italian participants evaluating Italian items. Item-level analyses clarified this pattern: all culturally appropriate items showed very high classification consistency, whereas proposed norm violations varied more substantially in the extent to which they were recognised as violations. Chinese appropriate items showed a mean classification consistency of 96.8%, and Italian appropriate items showed a mean classification consistency of 94.5%. In contrast, Chinese violation items showed a mean classification consistency of 54.2%, and Italian violation items showed a mean classification consistency of 62.2%. Using a descriptive threshold of 70% classification consistency, all culturally appropriate items reached this threshold, whereas only 4 of 10 Chinese violation items and 3 of 10 Italian violation items did so. Full item-level results are reported in Appendix C. This indicates that the task robustly identified culturally appropriate pairings, while proposed violation items varied in the extent to which they were recognised as norm violations. Internal consistency was acceptable to excellent across stimulus blocks. For binary appropriateness judgements, KR-20 values ranged from .648 to .852. For disgust ratings, Cronbach's α ranged from .699 to .924. These results indicate that the task showed acceptable internal consistency within stimulus blocks, although overall inter-rater agreement was modest because consensus was very high for culturally appropriate items but more variable for proposed norm violations. Table 3 reports Cronbach's α for the 1–5 disgust ratings and KR-20 for the binary appropriateness judgements.

Table 3. Internal-consistency reliability of the Culinary Violation Task, by stimulus block and cultural sample.

Stimulus block (10 items)	Sample	N	Disgust ratings α	Appropriateness KR-20
Italian cuisine – congruent	Italian	276	.70	.65
	Chinese	154	.80	.67
Italian cuisine – violation	Italian	276	.81	.85
	Chinese	154	.80	.65
Chinese cuisine – congruent	Italian	276	.84	.76
	Chinese	154	.92	.85
Chinese cuisine – violation	Italian	276	.78	.79
	Chinese	154	.80	.67

Note. k = 10 items per block. Reliability was estimated separately within each cuisine $\times$ norm-status block and within each sample because congruent and norm-violating items were not intended to index a single latent dimension. Disgust ratings (1 = very pleasant to 5 = strong disgust) were assessed with Cronbach's α ; binary appropriateness judgements were assessed with KR-20 (Cronbach's α for dichotomous items). Coefficients were acceptable to excellent overall (disgust α = .70–.92; appropriateness KR-20 = .65–.85). The lowest value, appropriateness of Italian congruent pairings in the

Italian sample ($KR-20 = .65$), likely reflects a ceiling effect: these familiar, normatively appropriate pairings were judged appropriate by nearly all participants, restricting score variance.

3.3 Primary analyses: Cultural congruence of norm violations

The primary analyses tested whether responses to norm-violating items differed as a function of cultural congruence. The cultural-congruence effect constitutes the central known-groups (criterion) validity test for the task. The critical prediction was that the effect of norm status would be stronger for own-culture than other-culture items. The key model tests for the norm status $\times$ cultural congruence interaction are summarised in **Table 4**.

Table 4. Primary mixed-effects model tests of the norm status $\times$ cultural congruence interaction for disgust ratings and appropriateness judgements. Disgust ratings were analysed using a linear mixed-effects model; appropriateness judgements were analysed using a binomial generalised linear mixed-effects model.

Outcome	Model	Key test	Statistic	Value	df	p
Disgust	LMM	Norm status $\times$ cultural congruence	F	1093.31	1	< .001
Appropriateness	GLMM (binomial)	Norm status $\times$ cultural congruence	χ^2	1015.90	1	< .001

3.3.1 Disgust ratings

A linear mixed-effects model was fitted to trial-level disgust ratings, with fixed effects of norm status, cultural congruence, participant culture, age, education, and the interaction between norm status and cultural congruence. Random intercepts were included for participants and items. The model showed that norm-violating items elicited higher disgust than culturally appropriate items, $F(1, 40.00) = 110.15$, $p < .001$. There were also significant effects of cultural congruence, $F(1, 16728.90) = 31.56$, $p < .001$, and participant culture, $F(1, 428.30) = 173.76$, $p < .001$. Age was not significant, $F(1, 428.30) = 0.30$, $p = .585$, whereas education showed a small significant association with disgust ratings, $F(1, 428.30) = 5.29$, $p = .022$. Most importantly, the norm status $\times$ cultural congruence interaction was significant, $F(1, 16728.90) = 1093.31$, $p < .001$. Planned contrasts showed that violations elicited higher disgust than appropriate items for other-culture stimuli, estimate = 0.60, SE = 0.11, $z = 5.65$, $p < .001$, but this effect was much larger for own-culture stimuli, estimate = 1.61, SE = 0.11, $z = 15.13$, $p < .001$.

3.3.2 Appropriateness judgements

A parallel generalised linear mixed-effects model was fitted to binary appropriateness judgements, with the same fixed and random effects structure. The model was fitted with a binomial error distribution and logit link. The key norm status $\times$ cultural congruence interaction was significant, $\chi^2(1) = 1015.90, p < .001$. Planned contrasts showed that culturally appropriate items were more likely than norm-violating items to be judged appropriate for both other-culture stimuli, $OR = 4.41, SE = 1.42, z = 4.60, p < .001$, and own-culture stimuli, $OR = 138.82, SE = 46.30, z = 14.80, p < .001$. The contrast was therefore much stronger for own-culture stimuli, supporting the interpretation that participants were especially sensitive to norm violations within their own culinary culture.

Together, the disgust and appropriateness models provide converging evidence for the task's known-groups validity: culturally appropriate and norm-violating items were differentiated most strongly when participants evaluated foods from their own culinary culture.

3.4 Additional validity and robustness checks

We conducted additional checks bearing on the task: a convergent-validity test against dispositional disgust sensitivity, and robustness checks against participants' lived-abroad experience and gender.

3.4.1 Convergent validity: Association with dispositional disgust sensitivity

As convergent-validity evidence for the disgust-rating component of the task, we tested whether task-elicited disgust was associated with dispositional disgust sensitivity, as measured by the DS-R. The primary disgust model was extended by adding standardised DS-R scores and their interactions with norm status and cultural congruence. Dispositional disgust sensitivity was significantly associated with disgust ratings, $F(1, 428.30) = 70.63, p < .001$, indicating that participants with higher DS-R scores gave higher disgust ratings overall. Importantly, the central norm status $\times$ cultural congruence interaction remained significant when DS-R was included, $F(1, 16729.70) = 1077.27, p < .001$. The norm status $\times$ cultural congruence $\times$ DS-R interaction was also significant, $F(1, 16710.20) = 19.35, p < .001$, indicating that the association between DS-R and task disgust varied across conditions. Follow-up slope estimates showed that higher DS-R scores were associated with higher disgust ratings in all conditions: other-culture appropriate items, $b = 0.25, SE = 0.03, 95\% CI [0.19, 0.30]$; other-culture violation items, $b = 0.19, SE = 0.03, 95\% CI [0.14, 0.24]$; own-culture appropriate items, $b = 0.13, SE = 0.03, 95\% CI [0.08, 0.18]$; and own-culture violation items, $b = 0.20, SE = 0.03, 95\% CI [0.15, 0.26]$.

Overall, DS-R scores supported convergent validity for the disgust-rating component of the task: participants with higher dispositional disgust sensitivity gave higher task disgust ratings. At the same time, the cultural-congruence effect remained robust after accounting for general disgust proneness, indicating that the task captures culturally specific norm violations over and above individual differences in disgust sensitivity.

3.4.2 Robustness to intercultural experience

As a robustness check, we tested whether the cultural-congruence effect depended on participants' lived-abroad experience. In the complete-case model sample, 180 participants had lived abroad and 249 had not.

For disgust ratings, lived-abroad status did not significantly moderate the primary norm status $\times$ cultural congruence interaction, $F(1, 16729.50) = 0.37, p = .543$. Lived-abroad status also showed no significant main effect on disgust ratings, $F(1, 428.30) = 0.07, p = .796$, and did not significantly interact with norm status, $F(1, 16692.00) = 0.51, p = .475$, or cultural congruence, $F(1, 16729.50) = 1.78, p = .182$. For appropriateness judgements, the norm status $\times$ cultural congruence $\times$ lived-abroad interaction was also not significant, $\chi^2(1) = 1.53, p = .216$. Thus, the central cultural-congruence effect was robust to whether participants had lived abroad.

3.4.3 Robustness to gender

As a further robustness check, we examined whether the cultural-congruence effect varied by gender. Because only three participants identified as non-binary, this analysis was restricted to male and female participants, resulting in a model sample of 426 participants and 17,040 trial-level observations. For disgust ratings, the central norm status $\times$ cultural congruence interaction remained highly significant, $F(1, 16598.70) = 939.11, p < .001$. The norm status $\times$ cultural congruence $\times$ gender interaction was also significant, $F(1, 16584.90) = 4.97, p = .026$, indicating a small difference in the magnitude of the disgust effect by gender. Follow-up contrasts showed that both men and women displayed the same overall pattern: violations elicited higher disgust than appropriate items, and this difference was larger for own-culture than other-culture stimuli. For men, the increase in disgust from appropriate to violation items was 0.42 for other-culture stimuli and 1.54 for own-culture stimuli. For women, the corresponding increases were 0.66 and 1.63. For appropriateness judgements, the norm status $\times$ cultural congruence $\times$ gender interaction was not significant, $\chi^2(1) = 0.58, p = .448$. Thus, the central cultural-congruence pattern was present in both men and women, although the magnitude of the disgust response showed a small gender-related difference.

4 Discussion

This study examined how Chinese and Italian adults respond to culturally appropriate and norm-violating food pairings from Chinese and Italian culinary contexts. The central finding was a cultural-congruence effect: the difference between appropriate and violating pairings was substantially larger when participants evaluated foods from their own culinary culture. This convergent pattern across disgust and appropriateness judgements provides evidence that responses to culinary violations depend on culturally organised knowledge, rather than on stimulus oddness or unpleasantness alone. The task also showed strong consensus for culturally appropriate items and acceptable internal consistency within stimulus blocks, although agreement concerning proposed norm violations was more variable. These

findings provide initial, concurrent evidence for the reliability and validity of the Culinary Violation Task, while underlining the need for independent norming of future stimulus sets.

From a cultural-cognitive perspective, the critical result is not simply that the two groups differed in their food evaluations. Rather, the same item categories acquired different affective and evaluative force depending on the relation between the stimulus and the perceiver's cultural knowledge. Cultural congruence therefore functioned as a test of culturally situated meaning: participants differentiated appropriate from violating pairings most strongly when they possessed the relevant, repeatedly enacted culinary knowledge. This supports an account in which everyday cultural practices help organise classification and judgement, making implicit norm knowledge observable when an expectation is breached.

The findings contribute to previous work showing that food is closely tied to identity, belonging, and social classification (Fischler, 1988; Mintz & Du Bois, 2002). They also extend cross-cultural research on food perception and acceptability by showing that cultural background shapes not only what people prefer, but also how strongly they respond when implicit culinary rules are broken (Jeong & Lee, 2021). In this sense, the study moves beyond food preference and familiarity to show how food norms become part of culturally organised cognition.

The results also align with theories of disgust that emphasise symbolic and cultural meaning rather than biological threat alone. As previous work has shown, harmless stimuli can elicit disgust when they violate culturally learned categories, expectations, or boundaries (Rozin & Fallon, 1987; Rozin et al., 2008; Haidt et al., 1993). The present findings extend this perspective to everyday culinary practices: own-culture violations elicited the highest disgust ratings and the lowest appropriateness judgements, suggesting that food norms are represented both affectively and evaluatively.

The exploratory individual-difference analyses add nuance to this interpretation. Disgust sensitivity was associated with stronger affective responses overall, but it did not displace the central role of cultural congruence. However, lived-abroad experience did not emerge as a significant predictor. This suggests that intercultural experience may shape responses to food norms, but the strongest finding in the present study is that people are especially sensitive to violations of the culinary systems they know best.

These findings also speak to work on acculturation and intercultural experience. Exposure to another culture does not necessarily weaken or replace heritage cultural norms (Ryder et al., 2000; Torelli et al., 2011), and time abroad may not capture the depth or quality of intercultural engagement (Brown, 2009; Sobkowiak, 2019). In the present study, lived-abroad experience did not significantly moderate the cultural-congruence effect, suggesting that the affective and evaluative force of familiar culinary norms remained evident across participants with and without such experience. Future research should examine richer measures of intercultural engagement, including language use, cultural identity (Phinney & Ong, 2007), and everyday participation in multiple food cultures.

Several limitations should be acknowledged. The study was cross-sectional and therefore cannot establish how culinary norm sensitivity develops over time or whether intercultural experience changes responses to food norms. Chinese and Italian food cultures are also internally diverse, and regional, generational, social-class, and family-level variation may shape what counts as appropriate or inappropriate. In addition, the task relied on online images and short descriptions rather than real eating contexts. The stimuli were generated and reviewed collaboratively by Chinese and Italian members of the research team. The item-level results showed very strong consensus concerning the culturally appropriate items, but agreement was more variable for the proposed norm violations, as also reflected in the modest agreement coefficients. Some combinations may therefore have been perceived as unusual or unconventional without being recognised consistently as violations of culturally shared rules. Moreover, stimulus evaluation and hypothesis testing occurred within the same study, so these findings provide concurrent rather than independent evidence of cultural consensus. Future research should employ separate stimulus-generation and norming samples, establish consensus criteria in advance, and obtain direct ratings of familiarity, oddness, expected taste, visual appeal, and perceived cultural wrongness. Overall, this study positions food as a powerful domain for studying cultural cognition. Cultural knowledge is not only expressed through language, identity statements, or abstract beliefs; it is also carried in embodied, everyday practices. Culinary norm violations make visible the implicit rules through which people classify, feel, and judge cultural behaviour. By showing that Chinese and Italian adults are especially sensitive to violations of their own culinary norms, the study identifies food practices as a psychologically meaningful site where cultural consensus, affect, and evaluation converge. Two directions follow from these findings. First, future work should extend the Culinary Violation Task to additional culinary cultures, to establish its generalizability beyond the Italian and Chinese contexts examined here. Second, having provided initial evidence for the task's reliability and validity, future studies can use it to examine how individual differences, such as intercultural experience, cultural identity, and multilingualism, shape reactions to culinary norm violations.

5 Conclusion

Food pairings can feel culturally wrong not only because they are unusual or unpleasant, but because they disrupt shared expectations about what belongs within a culinary system. Chinese and Italian adults responded most strongly when violations concerned their own culinary culture, showing that the affective and evaluative meaning of a food pairing depends partly on the cultural knowledge of the person judging it. Culinary practices therefore provide an accessible everyday domain in which to examine how shared knowledge organises cognition, becomes affectively charged, and is revealed through responses to norm violations.

Declarations

6.1 Funding

No funding was received for conducting this study.

6.2 Competing interests

The authors have no relevant financial or non-financial interests to disclose.

6.3 Ethics approval

The study was performed in accordance with relevant institutional ethical standards. Approval was granted by the UCL IOE Research Ethics Committee (REC2248; 2 September 2025; data-protection registration Z6364106/2025/08/38) and by the Bioethics Committee of the University of Bologna (Prot. N. 0410031, 20 November 2025).

6.4 Consent to participate

All participants provided informed consent electronically before taking part. Participation was voluntary and anonymous.

6.5 Data availability

Anonymised data and analysis scripts are available from the corresponding author upon reasonable request, subject to ethical and data-protection requirements. Public deposition of the full dataset is not currently possible because participants consented to anonymised research use under institutional ethical and data-protection conditions.

6.6 Use of generative AI and AI-assisted technologies

OpenAI ChatGPT was used under author supervision to support language editing, manuscript organisation, consistency checks, and checks of the reproducibility and reporting of R output. Google Gemini was used during stimulus development to generate the food images presented to participants. All AI-assisted outputs were reviewed and, where necessary, revised by the authors, who take full responsibility for the content of the manuscript and the integrity of the reported research.

6.7 Author contributions

Roberto Filippi: Conceptualization, Methodology, Supervision, Formal analysis, Interpretation of findings, Writing – original draft, Writing – review and editing, Project administration.

Liang Hu: Chinese stimuli development, Data collection, Data preparation, Preliminary analysis, Writing – review and editing.

Olivia Yang: Chinese stimuli development, Data collection, Data preparation, Preliminary analysis, Writing – review and editing.

Lam Yuen Sun: Chinese stimuli development, Data collection, Data preparation, Preliminary analysis, Writing – review and editing.

Yinuo Tian: Chinese stimuli development, Data collection, Data preparation, Preliminary analysis, Writing – review and editing.

Tong Wu: Chinese stimuli development, Data collection, Data preparation, Preliminary analysis, Writing – review and editing.

Elisa Pappalardo: Italian stimuli development, Data collection, Data preparation, Preliminary analysis, Writing – review and editing.

Maria Francesca Sturlese: Italian stimuli development, Data collection, Data preparation, Preliminary analysis, Writing – review and editing.

Camilla Zaccaria: Italian stimuli development, Data collection, Data preparation, Preliminary analysis, Writing – review and editing.

Elisabetta Lombardo: Italian stimuli development, Data collection, Data preparation, Preliminary analysis, Writing – review and editing.

Paola Bonifacci: Conceptualization, Theoretical framing, Italian participant recruitment support, Interpretation of findings, Writing – review and editing.

Li Wei: Conceptualization, Theoretical framing, Interpretation of findings, Writing – review and editing.

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Figures

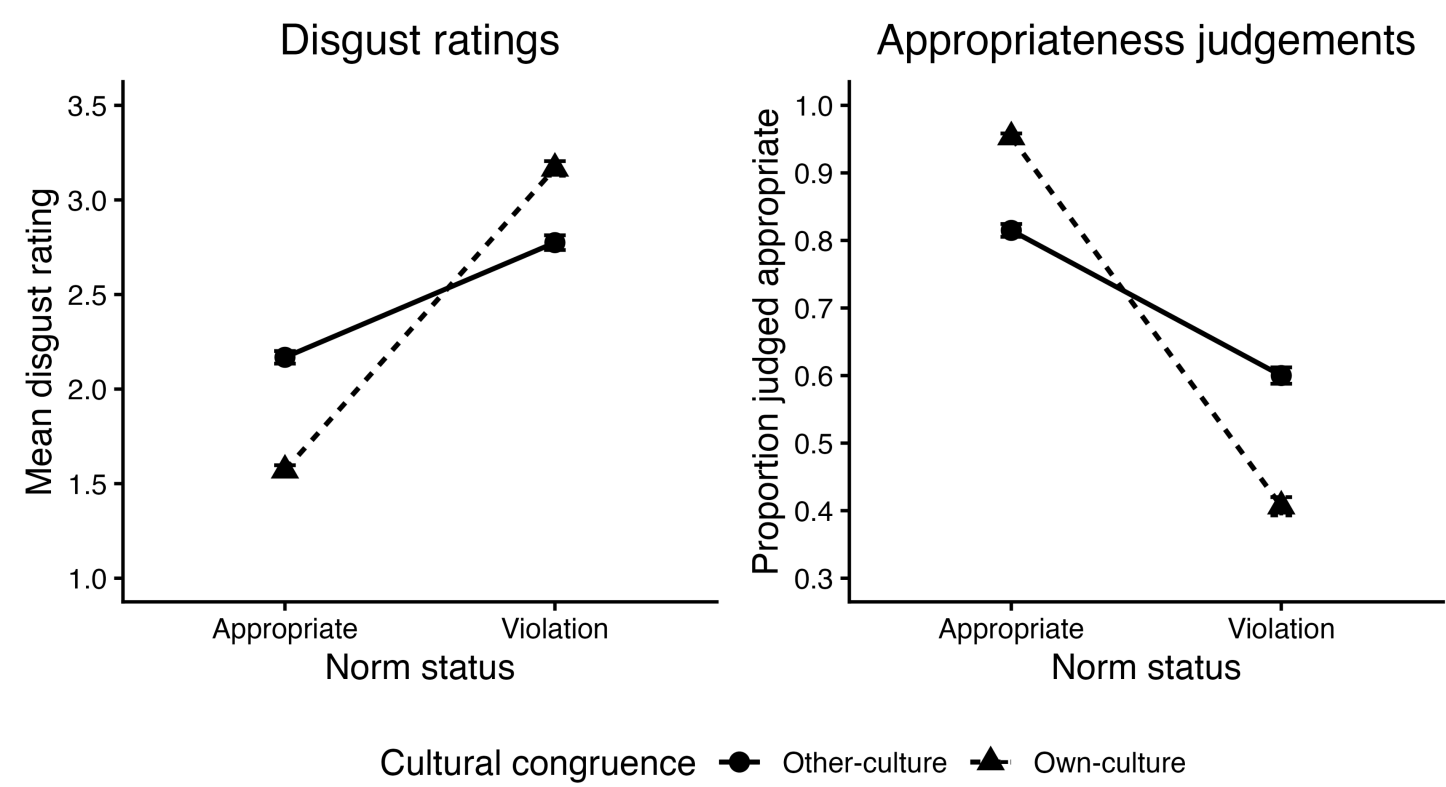


Figure 1

Mean disgust ratings and proportion of items judged appropriate as a function of norm status and cultural congruence. Error bars represent standard errors calculated from participant-level condition means. Participants showed stronger responses to norm violations when the stimuli belonged to their own culinary culture than when they belonged to another culinary culture.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Appendix.docx](#)