

Short communication

Reluctant trying of an unfamiliar food induces negative affection for the food

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ABSTRACT

Six unfamiliar foods were introduced to children (8–11 years old, $n = 72$) who responded (yes/no) to questions as to whether they (1) had earlier seen, (2) had earlier tasted, (3) were willing to try, and (4) actually tried each food when given the opportunity. Pleasantness (if not tasted, expected pleasantness) of the foods was also rated. Children who wanted to try a food and tasted it, rated it pleasant. Children who were unwilling to try a food, but in spite of that tasted it, rated the pleasantness negatively and largely similarly to those who rated their expected pleasantness, without tasting. Food neophobia, evaluated by parents, was correlated with mean willingness to try ($r = -0.39$). The data provide evidence that reluctance to try a food determines subsequent hedonic experience and may act as a barrier to further familiarization with the food.

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Introduction

During the first years of life, young individuals born into a certain environment need to accept at least part of the food supply of this environment. The younger the children are, the more dependent they are on the food served by their caregivers, usually parents. Parental efforts to support the acceptance of the available food range from attention paid to food availability and quality, and to cognitive, emotional and behavioral strategies (Russell, 2006). Repeated tasting is considered a key mechanism in learning to like a new food (Birch, 1999; Rozin, 2006), and parents commonly encourage or urge their children to repeated tasting (Russell, 2006). However, in a retrospective study young adults reported that childhood experience of pressure to consume foods led to continued dislike for those foods (Batsell, Brown, Ansfield, & Paschall, 2002). Even a slight pressure, requests to finish a food, exerted on 3–5 years old children, resulted in negative comments on the food (Galloway, Fiorito, Francis, & Birch, 2006).

The first tasting of a new food has a major role in breaking or revising the expectations based on earlier information (including visual impression), and in creating future hedonic expectations that incorporate taste (Cardello, 2007; Tuorila, Meiselman, Bell, Cardello, & Johnson, 1994). Furthermore, it is the first step in the extinction of neophobia (Birch, McPhee, Shoba, Pirok, & Steinberg, 1987). For a picky eater, it may also be the last tasting that proves

that the food is not acceptable for this individual (Dovey, Staples, Gibson, & Halford, 2008).

Some people more readily integrate new foods into their diets than others, and the widely used 10-item verbal instrument food neophobia scale (FNS) quantifies such individual variation (Pliner & Hobden, 1992). In many studies, food neophobia score has moderately or strongly predicted unwillingness to try new foods (Dovey et al., 2008; Pliner & Salvy, 2006).

No reports exist on hedonic ratings of unfamiliar foods tried by children who are in different states of preparedness to taste. The present study examined the reluctance vs. willingness to try a new food as a predictor of pleasantness ratings of this food. Age and food neophobia as underlying determinants of responses to unfamiliar foods were also considered.

Methods

Subjects

A total of 72 children participated in the study. They were either 8-year old ($n = 36$, 12 boys and 24 girls) or 11-year old ($n = 36$, 20 boys and 16 girls). Children were recruited as entire classes (the 2nd or the 5th grade) in a suburban elementary school in Helsinki. After the principal of the school had approved the project, each class teacher distributed the background questionnaires and the informed consent forms to children, to be completed at home by parents and to be returned to each teacher in envelopes. The researchers picked up the forms from the school. Children whose parents did not consent to the study, took part in the visits to experimental sessions and were assigned drawing tasks and the like during the sessions.

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The children served as control subjects of a sensory education intervention study (Mustonen, Rantanen, & Tuorila, 2009; Mustonen & Tuorila, 2010). They participated in sensory testing and surveys, but did not receive any sensory education. Socio-economically, the children represented the middle level of families in Helsinki area.

Data collection

The study protocol followed the ethical principles of sensory testing in the authors' laboratory, approved by the ethical committee of the Faculty of Agriculture and Forestry, University of Helsinki. Additional solicitation was obtained as the subjects were minors (less than 18-year old). In addition to the parents' informed consent, the subjects themselves gave a verbal assent to participate. They were told that all actions were voluntary and a task could be skipped if they felt uncomfortable performing it.

The questionnaires completed by parents prior to testing included the 10-item food neophobia scale (Pliner & Hobden, 1992), modified for parental use (e.g., from the original "I don't trust new foods" to "My child does not trust new foods") (Pliner, 1994). Questions on family background, dining practices, and the person responsible for the completion of the questionnaire were also presented. Mothers completed the questionnaire alone or with father in 93% of cases. The remaining questionnaires were filled out by fathers or other relatives.

For experimental sessions, the students and their teachers were supplied with bus tickets to visit the sensory laboratory of the University of Helsinki. The visits took place during the school hours, one class (20–28 students) at a time.

Responses to experimental foods were collected in three sessions, in the time span of 12 months. The samples were presented as the final part of chemosensory tests conducted during each visit (Mustonen et al., 2009). Children gave their responses in sensory booths with partitioning walls, or at a round table with movable screens between them.

In the first session, mussel and bamboo shoot (2 pieces each) were served, in balanced orders of presentation, in white plastic cups (80 ml) covered with a transparent lid. On the questionnaire, the name of each food was written in upper-case letters and subjects rated (yes/no): (1) have you ever seen this food? (2) Have you ever tasted it? (3) Would you like to try it now? Regardless of their reply to the question 3, the children had freedom to choose whether to taste or not, and they confirmed their action by answering yes/no to the question. (4) Did you try this food? Children rated how good or bad they thought the food was (1 = bad, 7 = good, numeric scale anchored by these words and by corresponding smiley faces at each end) either based on tasting or, if not tasted, assumption. The use of the 7-point hedonic scale with 8-year old and older children is supported by the literature (Guinard, 2001; Popper & Kroll, 2007). At 7 months, the procedure was repeated with samples of *Stilton* blue cheese (10 g) and papaya (1–2 cubes), and at 12 months, with samples of wild boar meat (10 g) and sundried tomato (1 piece). Each food was evaluated by 60–66 children.

Hedonic ratings of unfamiliar foods were compared in three sub-populations: those who (1) tried the foods after stating their willingness to try, (2) tried the foods after stating their unwillingness to try ("reluctant trying"), and (3) rated samples based on expected ("non-tasted") pleasantness.

Data analysis

Individual food neophobia scores were computed as a sum of responses to statements, as described by Pliner and Hobden (1992). The Cronbach's alpha of the scale was 0.91.

Hedonic ratings of each food in the three sub-populations (not willing to try nor tried; not willing to try, but tried; willing to try

and tried) were compared using one-way analysis of covariance. Only very few cases were observed in the category "willing to try, but did not try" for each food, hence these subgroups were omitted from the analyses. Furthermore, these analyses were confined to children who had no earlier tasting experience of a sample; these children had replied "no" to the question "Have you ever tasted this food?". The three groups had different grand mean food neophobia scores: across all six foods, mean values were 40.3 (not willing to try nor tried), 40.4 (not willing to try, but tried; thus, tried reluctantly), and 34.4 (willing to try and tried). To rule out the impact of this disposition, food neophobia scores were used as the covariate in these analyses.

One-way analysis of variance was used to analyze hedonic ratings of those who had earlier tried vs. had not tried a food.

Four composite measures were constructed, quantifying the extent to which the subject (1) had seen earlier, (2) had tasted earlier, (3) was willing to try now, and (4) in fact tried the six foods. Computed as a mean of responses, each score ranged from 0 (all six responses were "no") to 1 (all six responses were "yes"). If a child was absent from a session, the score was the mean of the available evaluations. The scores (1)–(4) were subjected to 2×3 analysis of variance, with age group (8- vs. 11-year old) and food neophobia group (3 levels: low = 10–31, $n = 25$, middle = 32–43, $n = 26$, high = 44–63, $n = 21$; cut-offs based on tertiles; uneven number of cases is due to ties) as factors.

Results

The unfamiliar foods were rated positively by those who indicated willingness to try these foods (Fig. 1a). The children who tried foods against their willingness to try ("tried reluctantly")

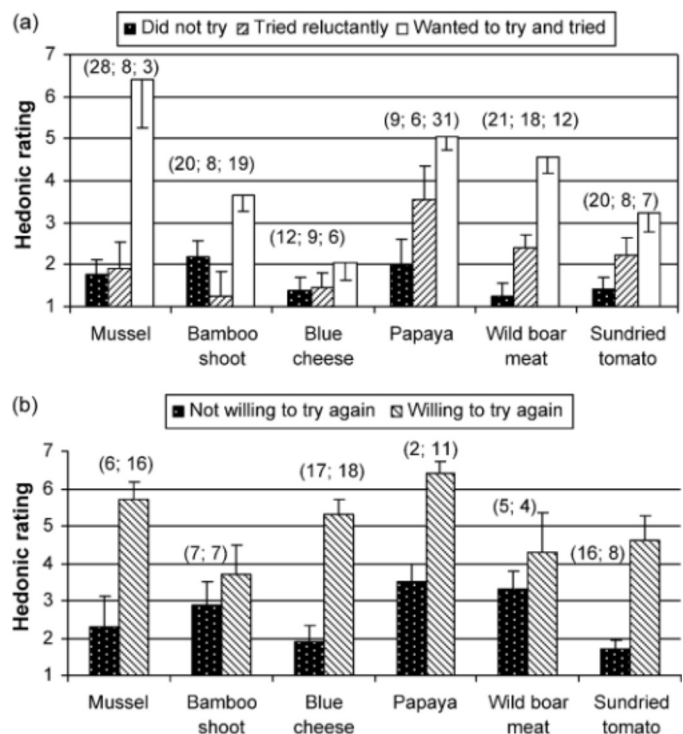


Fig. 1. Mean hedonic ratings (+SEM) of foods. (a) In three sub-populations: those who did not try (ratings based on expected pleasantness); those who tried, although were not willing to do so (ratings based on pleasantness after tasting); and those who were willing to try and also tried a food (ratings based on pleasantness after tasting). (b) Among children who had earlier tried a food and were unwilling vs. willing to try again. The values above bars refer to the number of responses on which a bar is based. Ratings from 1 = "bad" to 7 = "good".

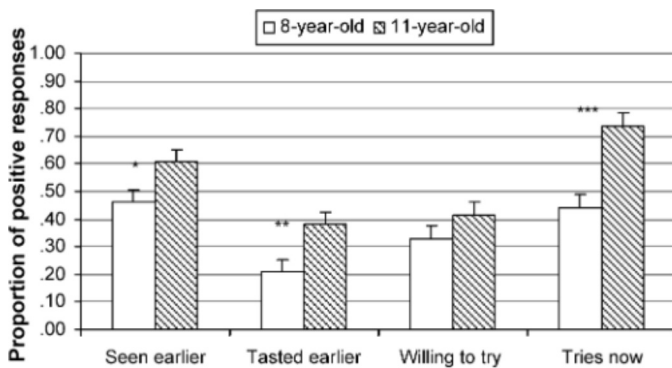


Fig. 2. Mean proportions of positive responses to questions on unfamiliar foods in two age groups. Individual values vary from 0 to 1; for example, having seen earlier all stimuli = 1.00, while having seen none of them = 0. Each mean bar is based on 30–36 individual responses.

gave ratings more similar to those who skipped tasting and rated the foods based on their expectation only. The analyses of covariance confirmed the significant differences among subgroups in five out of six cases (mussel, $F[3,35] = 7.4$, $p = 0.001$; bamboo, $F[3,43] = 5.0$, $p = 0.004$; blue cheese $F[3,23] = 0.6$, $p = 0.597$; papaya, $F[3,42] = 9.0$, $p < 0.001$; wild boar, $F[3,47] = 14.4$, $p < 0.001$; sundried tomato, $F[3,31] = 5.4$, $p < 0.004$). Thus, blue cheese did not receive significantly different ratings from the three subject groups.

To examine the effect of earlier tasting experience, pleasantness ratings were analyzed so that only those who had earlier tasted a food were included. The “experienced” children were divided into those who were either unwilling or willing to try the food in the experimental session. Children who were willing to try a food rated it more pleasant than those who were unwilling to try it (Fig. 1b). The trend was similar for all foods, although the analysis of variance confirmed the significant difference only in four out of six comparisons (mussel, $F[1,20] = 13.1$, $p = 0.002$; bamboo, $F[1,12] = 0.7$, $p = 0.410$; blue cheese $F[1,30] = 30.9$, $p < 0.001$; papaya, $F[1,10] = 15.7$, $p = 0.003$; wild boar, $F[1,6] = 0.8$, $p = 0.413$; sundried tomato, $F[1,21] = 25.8$, $p < 0.001$). Pleasantness ratings of bamboo shoot and wild boar meat did not significantly differ among those who were willing vs. unwilling to taste these foods again.

The food neophobia scores of all subjects ranged from 10 to 63 (mean 36.8, $SD = 13.7$; theoretical range 10–70). The mean score of younger children was 37.9 ($SD = 15.5$) and that of older children 35.7 (12.1). The mean score of boys was 35.0 (13.9) and that of girls 38.2 (13.6). The FNS scores were correlated with the composite measures of willingness to try ($r = -0.39$, $p = 0.001$), having tried earlier ($r = -0.35$, $p = 0.003$), and actual trying ($r = -0.26$, $p = 0.028$), whereas having seen earlier was not significantly correlated with FNS ($r = -0.13$, n.s.).

The older children were more likely to have seen and tasted the unfamiliar foods than the younger ones (main effect of age group, seen: $F[1,66] = 5.4$, $p = 0.024$, tasted: $F[1,66] = 7.5$, $p = 0.008$) (Fig. 2). Furthermore, the older children were more likely to try the foods in the experimental session ($F[1,66] = 18.4$, $p < 0.001$). The age group did not significantly predict willingness to try, but instead, low food neophobia predicted willingness ($F[2,66] = 3.5$, $p = 0.035$). No other effects of food neophobia were observed, nor were there significant interactions of age groups and FNS group. Thus, both the age group and food neophobia regulated responses to unfamiliar foods, but their relative weights varied according to the type of response.

Discussion

The data suggest that willingness to taste a food is a powerful predictor of the subsequent hedonic experience of an unfamiliar

food. Hedonic responses to foods are known to predict choice and repeated consumption (Birch, 1999; Rozin, 2006; Tuorila, 2007). The result is in line with earlier studies that demonstrate the negative effect of pressure to consume on subsequent responses to food. The outcome measures of earlier studies were verbal comments of preschool children (Galloway et al., 2006) and retrospective ratings of foods from adult respondents (Batsell et al., 2002). Based on the evidence from the present study and the one by Batsell et al. (2002), children’s reluctance to try unfamiliar foods should be treated sensitively, as the negative experience can lead to dislike and act as a barrier to further familiarization with the food.

Further, using the present data but confining the analysis to those children who had earlier experience of a food, it was demonstrated that willingness and reluctance were closely associated with positive or negative hedonic experience. Prior exposures resulted in similar consequences in an earlier study in which categories of foods rather than individual foods were studied (Loewen & Pliner, 1999). The willingness vs. unwillingness to try again two of the foods, bamboo shoots and wild boar meat, was not significantly driven by pleasantness. The small difference between the ratings of those unwilling and willing to taste appears to be more due to moderate hedonic ratings of those who tasted the samples again, than to low ratings of those unwilling to do so. Overall, the two sets of means are based on a small number of ratings and the results point to the same direction as those of the remaining four foods. Thus, the outcome may simply be due to the specific sensory or other properties of the products.

Older children had seen and tasted the stimulus foods more often than the younger children, and they also tasted them more likely when given an opportunity to do so. Loewen and Pliner (1999) comparing age groups similar to the present ones, also found that older children were more willing to try unfamiliar foods than younger children. Interestingly, in the present study the stated willingness to try unfamiliar foods was guided by food neophobia rather than by age. Food neophobia of the subject population was similar to other child populations (Dovey et al., 2008; Koivisto & Sjöden, 1996; Pliner & Salvy, 2006). Food neophobia is known to be strongly or moderately inherited (Cooke, Haworth, & Wardle, 2007; Knaapila et al., 2007), and as a persistent trait, its effect may well exceed that of the relatively narrow age range.

Tasting was voluntary, and it is not clear why so many children tried unfamiliar foods against their will. Perhaps the children felt that, once they were in the laboratory, they needed to perform the tasks they had come for. They may also have wanted to share the experience with their classmates, this being easier if the advantage was taken of the situation. Birch (1980) has shown that in preschoolers, social influence by peers may encourage children to taste new, unfamiliar foods. With both explanations, a subtle pressure to taste promoted tasting and thus, the situation somewhat resembled those of earlier studies in which negative reactions to foods were expressed as negative comments (Galloway et al., 2006) or retrospective reports of dislike (Batsell et al., 2002). However, in the present study the pressure, if existed, was a construction of the child him/herself and not external.

Responses to six samples of foods were somewhat specific to foods, as discussed above in the case of pleasantness ratings of bamboo shoot and wild boar meat. Furthermore, the group willing to try blue cheese did not rate its pleasantness significantly higher than the groups unwilling to taste it. Flavor of *Stilton* blue cheese is strong compared to the milder, most common Finnish blue cheese *Aura*. Perhaps it was simply too strong to be considered pleasant. Also, a relatively large number of children were experienced of blue cheese, and it was the culturally the most familiar among the

six samples. These features might underlie the deviating responses.

The present analysis is based on a small group of children whose responses to a small group of unfamiliar foods were examined. The test foods, albeit exotic, were real foods of which some children had experience. Despite these limitations, the data warn from urging a child to try an unfamiliar food when he or she is not positively prepared to get the experience. Rather than helping to extinguish negative responses to an unfamiliar food, such experience may constitute a barrier to further familiarization with this food.

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