



Research report

Eww she sneezed! Contamination context affects children's food preferences and consumption [☆]



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ARTICLE INFO

Article history:

Received 29 September 2014

Received in revised form 6 December 2014

Accepted 23 December 2014

Available online 31 December 2014

Keywords:

Social cognition

Eating

Food selection

Contamination

Disgust

ABSTRACT

Does contextual information about disgust influence children's food consumption and subjective experience of taste? Three- to eight-year-old children ($N = 60$) were presented with two identical foods, yet children were led to believe that one food had been contaminated by sneezing and licking, while the other was clean. When given the opportunity to eat the foods, 5- to 8-year-old children consumed more clean food and rated the clean food's taste more positively; younger children did not distinguish between the foods. The relation between contamination and subjective taste held even among children who ate both foods and had direct evidence that they were identical. These data indicate that children's consumption behavior and food preferences are influenced by information external to foods themselves.

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Introduction

Food preferences vary widely across cultures. Substances that are viewed as staples or delicacies in some cultures are sometimes considered disgusting and unacceptable to eat in others. For example, insects are part of the daily diet in some cultures, but other cultures treat the consumption of insects as revolting (Van Huis et al., 2013). Moreover, religious prohibitions of particular foods (e.g., pork, shellfish) are often justified on the basis of cleanliness: Observant members of some religious groups abstain from eating the flesh of animals that are considered to be unclean in order to avoid contamination, whereas people from different religious or cultural backgrounds regularly eat those same foods and do not find them offensive (Rozin, Haidt, & McCauley, 2000). Given that people from different cultures are presumably not born with radically different gustatory systems, adapting one's own taste preferences and food choices to match those endorsed by one's culture is an important problem of development.

The present research explores the impact of context – any information external to a food itself and not related to the food's actual

ingredients or composition – on children's evaluation and consumption of foods. In this case, children learned that one food had been ostensibly contaminated. Critically, the foods presented to children showed no visible signs of contamination, thus allowing us to test the impact of a disgust context on children's consideration of otherwise identical foods.

Previous research provides ample evidence that children are sensitive to the sensory properties of foods. Beginning as newborns, children like foods that are sweet and salty and dislike foods that are sour and bitter (Birch, 1990, 1999; Desor, Maller, & Turner, 1973; Mennella, Lukasewycz, Griffith, & Beauchamp, 2011; Ventura & Mennella, 2011). The same innate taste biases are observed across cultures and may have evolved to encourage consumption of high-calorie foods that are beneficial for early physical growth (Birch, 1999; Coldwell, Oswald, & Reed, 2009; Ventura & Mennella, 2011). In addition to innate taste biases, infants' and children's preferences are guided by a bias for familiar flavors (Aldridge, Dovey, & Halford, 2009; Hausner, Nicklaus, Issanchou, Mølgaard, & Møller, 2010; Mennella, Jagnow, & Beauchamp, 2001). For example, infants prefer flavors to which they have been exposed prenatally (Mennella et al., 2001; see also Hausner et al., 2010), and children are more likely to eat a food whose flavor matches one they have experienced before (Birch & Marlin, 1982; Liem & de Graaf, 2004; Liem & Mennella, 2002).

Nonetheless, sensory properties alone do not always provide sufficient information to decide if something is good to eat. For example, edible plants and mushrooms can look similar to poisonous ones, especially to naïve foragers. Ingesting various items in order to discover which substances are safe and which are dangerous could therefore expose the body to unpleasant or even lethal consequences (see Wertz

[☆] Acknowledgments. This research was supported by NICHD grant R01 HD070890 to KDK and KS and an NSF Graduate Research Fellowship (DGE-1144082) to JMD. We thank Jennifer Galamba and Emily Gerdin for help with subject recruitment and data collection and Alex Shaw, members of the Development of Social Cognition Lab, and two anonymous reviewers for helpful comments on a previous version of the manuscript.

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& Wynn, 2014a, 2014b). Furthermore, foods that are prohibited by particular cultural or religious norms might share many overlapping sensory properties with foods that are considered appropriate to eat (e.g., beef vs. pork for Muslims vs. Hindus), so missing key pieces of cultural knowledge could leave individuals open to errors and penalties from their cultural group. In these situations, contextual information is necessary to discern what is safe or acceptable to eat from what is dangerous or unacceptable to eat. As such, attending to the environment in which a food is presented, the reaction of a person after eating a food, or the group membership of the person eating a food might all be useful strategies when learning what to eat.

For adults, it is clear that contextual information (including social, political, and religious knowledge) influences food selection and taste preferences; this influence is observed in adults' behavior and neural response to foods (e.g., Bohannon, Goldstein, & Herschkowitsch, 2010; De Araujo, Rolls, Velazco, Margot, & Cayeux, 2005; Herman, Roth, & Polivy, 2003; Lee, Frederick, & Ariely, 2006; McClure et al., 2004; McFerran, Dahl, Fitzsimons, & Morales, 2010; Morrot, Brochet, & Dubourdiou, 2001; Rozin et al., 2000). Yet, prior research with children suggests that learning what foods to avoid might occur over a protracted period of development. As illustration, children younger than two years of age are more likely than any other age group to accidentally ingest toxic substances (Cashdan, 1994). Research by Rozin and colleagues suggests that reasoning about contaminated, disgusting, or dangerous foods requires children to understand the presence and operation of invisible entities – a notion that might be particularly difficult for young children to comprehend (e.g., Rozin & Fallon, 1987). For instance, when presented with vignettes describing events that could contaminate a glass of juice (e.g., introducing a bug, hair, or poison), 3- to 5-year-old children were willing to endorse the juice as acceptable to drink if the contaminating item was simply removed. Older children and adults were less likely to endorse the juice as safe to drink and many maintained this belief even after the glass had been washed (Fallon, Rozin, & Pliner, 1984). In a related series of demonstrations, children under five years of age were sometimes willing to eat disgusting substances or contaminated items (e.g., imitation feces made from limburger cheese and peanut butter or juice containing a human hair; Rozin, Fallon, & Augustoni-Ziskind, 1985; Rozin, Hammer, Oster, Horowitz, & Marmora, 1986).

While studies on the development of disgust find that young children fail to use important contextual cues to guide their eating behavior and evaluation of foods, research in domains outside of the disgust literature suggests that, in some situations, young children are sensitive to contextual information when approaching foods. Researchers interested in social cognition and marketing have found that context can influence children's eating behavior and evaluations of foods in the preschool and early school years. Specifically, the presence of social partners or the behaviors of social models influences children's food choices. For instance, increasing social interaction while eating (e.g., providing positive attention from caregivers or manipulating the size or composition of a participating peer group) increases infants' and children's food consumption (Lumeng & Hillman, 2007; Lumeng, Patil, & Blass, 2007; Salvy, Vartanian, Coelho, Jarrin, & Pliner, 2008). Additionally, children look to social models for input when deciding whether to eat an unfamiliar or previously disliked food (Adessi, Galloway, Visalberghi, & Birch, 2005; Birch, 1980; Birch, Zimmerman, & Hind, 1980; Greenhalgh et al., 2009; Harper & Sanders, 1975), and they are particularly swayed by models whose social group membership (e.g., gender or age) matches their own (Birch et al., 1980; Duncker, 1938; Frazier, Gelman, Kaciroti, Russell, & Lumeng, 2012; HENDY & Raudenbush, 2000; Shutts, Banaji, & Spelke, 2010). Related research conducted in the field of food marketing suggests that children prefer foods whose packaging features familiar brand labels (e.g., McDonald's) and pictures of popular cartoon characters (e.g.,

characters from *Sesame Street*) to foods that are not accompanied by familiar brands or popular characters (Kotler, Schiffman, & Hanson, 2012; Lapierre, Vaala, & Linebarger, 2011; Levin & Levin, 2010; Roberto, Baik, Harris, & Brownell, 2010; Robinson, Borzekowski, Matheson, & Kraemer, 2007).

The present research investigated 3- to 8-year-old children's food consumption and evaluation of taste for ostensibly clean versus contaminated foods. Past studies examining children's understanding of contamination have typically presented children with single foods in isolation, often in situations where the foods' actual physical properties differ (e.g., Rozin et al., 1985; Rozin et al., 1986; Stevenson, Oaten, Case, Repacholi, & Wagland, 2010) or have elicited hypothetical judgments rather than providing children with real foods to taste (e.g., Au, Sidle, & Rollins, 1993; Fallon et al., 1984). The current method employs insights gained from both the social cognition and food marketing literatures: Here we provide children with an opportunity to compare clean and contaminated foods that have identical physical properties to one another, and then we measure children's evaluation and actual consumption of real foods. Our method may more sensitively assess children's avoidance of contaminated foods and could shed light on how different contexts can alter children's eating behavior and attitudes about foods.

In the present study, we manipulated whether foods appeared to be clean or contaminated: Children watched videos in which two actors each ate and positively endorsed a food; one actor also contaminated her food by sneezing in it. Then, the two actors appeared to hand the foods directly to the child, creating the illusion that participants could actually eat the same foods they saw offered by the actors onscreen. Clean and contaminated foods featured the same substance (applesauce, a generally familiar and appealing food), thus any differences in children's consumption or evaluations could not be driven by intrinsic properties of the foods.

Method

Participants

Participants included 60 children (28 boys, 32 girls; $M = 5.92$ years, range = 3.15–8.61 years) from the Chicago area. There were 20 children in each of three age groups: 3- to 4-year-olds, 5- to 6-year-olds, and 7- to 8-year-olds. Children were excluded if they did not want to complete the full study ($N = 4$) or if their parents interfered with the study (e.g., encouraged or discouraged children from eating; $N = 2$).

Parents of participants were asked to report at what time their child had last eaten, how much their child liked applesauce, and how often their child ate applesauce. All but one parent completed this questionnaire.

Materials and procedure

Upon entering the testing room, the experimenter introduced participants to a video of two female actors whose images were projected onto a large screen (172 cm × 61 cm). Pre-recorded videos showed each actor seated at a table with a bowl and spoon in front of her; one bowl was red and the other was blue. The experimenter introduced the actors and the procedure to the participant, saying, "You are going to see them try some snacks, and then you will get a chance to try the same snacks yourself."

Children then watched familiarization videos in which each actor (in sequential order) ate the food in front of her. Both actors appeared to enjoy the food they ate; they both smiled and said, "Mmm! Maybe you want to try some." One actor put an unused spoon into her bowl after eating, saying, "Here is a new spoon for you." The other actor licked her spoon, sneezed into her bowl, and put her used spoon into her bowl after eating, saying, "I'll leave my spoon

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