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Research Report

Specific social influences on the acceptance of novel foods in 2–5-year-old children

Elsa Addessi[a,1,*], Amy T. Galloway[b], Elisabetta Visalberghi[c], Leann L. Birch[a]

[a]*Department of Human Development and Family Studies, The Pennsylvania State University, S-110 Henderson Building, University Park, PA 16802, USA*
[b]*Department of Psychology, Appalachian State University, Boone, NC 28608, USA*
[c]*CNR, Institute of Cognitive Sciences and Technologies, Unit of Cognitive Primatology and Primate Center, Via Ulisse Aldrovandi, 16/b, 00197 Rome, Italy*

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Abstract

Social influences have been shown to be very important to overcome food neophobia in young children. However, there is no experimental evidence about whether social influences on food acceptance are specific, that is if models eating the same food as the child are more effective in promoting food acceptance than models eating a different food. We assessed children's behavior towards novel foods when an adult model (a) was not eating (*Presence* condition), (b) was eating a food of a Different color (*Different color* condition), and (c) was eating a food of the Same color (*Same color* condition). We tested 27 children (ages 2- to 5-years-old) recruited from The Pennsylvania State University day-care facilities. Results show that children accepted and ate their novel food more in the *Same color* condition than in the *Different color* and in the *Presence* conditions. Therefore, in young children food acceptance is promoted by specific social influences. These data indicate that children are more likely to eat new food if others are eating the same type of food than when others are merely present or eating another kind of food.

Keywords: Children; Social influences; Neophobia; Social learning; Novel food; Novelty; Primates

Introduction

Food neophobia, defined as the hesitancy to eat novel foods (Barnett, 1963), can be considered an efficient behavioral strategy to cope with the 'omnivore's dilemma' (Rozin, 1977): omnivores should explore, sample, and eventually include novel foods in the diet, but they should also be very cautious toward them, in order to avoid the risk of ingesting poisonous substances (see also Freeland & Janzen, 1974; Glander, 1982; Milton, 1993). Food neophobia is widespread among omnivorous species, including humans (e.g. warblers, *Dendroica castanea* and *D. pensylvanica*: Greenberg, 1990; rats, *Rattus norvegicus*, Barnett, 1958; Galef, 1970; ruminants: Provenza, 1995; capuchin monkeys, *Cebus apella*, Visalberghi & Fragaszy, 1995; Visalberghi, Janson, & Agostini, 2003; rhesus macaques, *Macaca mulatta*: Johnson, 2000, 1997; Weiskrantz & Cowey, 1963; chimpanzees, Visalberghi et al., 2002; humans, Rozin, 1976).

In children, although the available studies on food neophobia have utilized rather different approaches, there is evidence that neophobia is minimal in infancy, rises rapidly at around the age of two, and gradually decreases thereafter. Children aged 2–5 years old are more neophobic than infants (4–7 months old). It has been argued that neophobia is not a functional response during infancy, when food is provided by parents, whereas it becomes more important by early childhood, when children have begun to explore the environment and eat by themselves (Birch, Gunder, & Grimm-Thomas, 1998; Cashdan, 1994; see also Cooke, Wardle, & Gibson, 2003). Moreover, in 2–6-year-old children higher levels of neophobia are associated with

* Corresponding author. Address: CNR, Institute of Cognitive Sciences and Technologies, Unit of Cognitive Primatology and Primate Center, Via Ulisse Aldrovandi, 16/b, 00197 Rome, Italy. Tel.: +39 06 3221252; fax: +39 06 3217090.

E-mail addresses: elsa.addessi@istc.cnr.it (E. Addessi), gallowayat@appstate.edu (A.T. Galloway), elisabetta.visalberghi@istc.cnr.it (E. Visalberghi), llb15@psu.edu (L.L. Birch).

[1] Present address: CNR, Institute of Cognitive Sciences and Technologies, Unit of Cognitive Primatology and Primate Center, Via Ulisse Aldrovandi, 16/b, 00197 Rome, Italy.

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lower consumption of vegetables, fruit, and meat, which are the most potentially dangerous foods given the possible presence of plant toxins and food poisoning bacteria (Cooke et al., 2003, see also Cashdan, 1998). These findings are consistent with the hypothesis that children's food preferences are shaped by evolutionary adaptations that are no longer appropriate in the current Western food environment (Cooke et al., 2003; Rozin, 1990).

However, although children's neophobic response towards novel foods is a common cause of parental concern and frustration, neophobia is not a permanent dislike for a particular novel food (Birch, 1983). In fact, neophobia attenuates over time possibly because dietary variety is important for survival in omnivorous species (Raynor & Epstein, 2001). The two more important factors promoting the acceptance of a novel food are the social context in which the food is encountered and the repeated experiences with that food and the consequences of its ingestion.

In adult humans and in other omnivorous species (gerbils, *Meriones unguiculatus*, Forkman, 1991; rats, Galef, 1993; marmosets, *Callithrix jacchus*, Vitale & Queyras, 1997; chacma baboons, *Papio ursinus*, Cambefort, 1981; tufted capuchin monkeys, Visalberghi & Addessi, 2003; adult humans, de Castro & Brewer, 1992; de Castro, 1990), the social context affects food consumption; in particular, when an individual eats in the presence of others eating, his/her eating behavior is socially facilitated (*sensu* Clayton, 1978), i.e. he/she eats more than alone. According to Clayton (1978), social facilitation is an increase in the frequency of a familiar behaviour pattern in the presence of others displaying the same behaviour pattern at the same time. When an individual is faced with a novel food, social facilitation of eating leads to a faster acceptance of the novel food (Visalberghi & Addessi, 2000).

Children show a consistent tendency to sample an unfamiliar food more readily when an adult is eating it than when the food is merely offered (Harper & Sanders, 1975) and an enthusiastic teacher modeling acceptance of a novel food is effective to encourage novel food acceptance in preschool children (Hendy & Raudenbush, 2000; see also Highberger & Carothers, 1977). Moreover, watching peer models who have different preferences modifies food preferences in preschoolers: exposing target children to peer models who are selecting and eating the target children's non-preferred food increases the number of choices for the initially non-preferred food by the target children, even in the presence of an initially highly preferred food (Birch, 1980; Duncker, 1938, for similar findings see also Hendy, 2002).

There is some evidence for age differences in the extent to which children's preferences are affected by the behavior of a model. In Birch (1980) study, food preferences of younger children (3-year-olds) are more affected by peer modeling than those of older children (4-year-olds). In contrast, Harper and Sanders (1975) do not find any differences between toddlers (14 to 20-month-olds) and older children (42 to 48-month-olds) in their response to adult models of novel food acceptance. An inconsistency in the results is also evident for gender differences: whereas some studies show girls to be more influenced than boys by peer models of novel food acceptance (Hendy & Raudenbush, 2000), other studies do not find any gender differences in the responsiveness to adult or peer models (Birch, 1980; Harper & Sanders, 1975).

Children's food preferences are also shaped by the frequency of encounters with a novel food (Birch & Marlin, 1982; Sullivan & Birch, 1994) and children learn about the negative and positive physiological consequences of ingesting it. In fact, if an initially rejected food is repeatedly presented simply requiring that the child takes a very small bite, 2- to 5-year-old children will eventually accept the food after several encounters (experimenter-led exposure in the laboratory: Birch & Marlin, 1982; Sullivan & Birch, 1990; parent-led exposure at home: Wardle et al., 2003). In contrast, if a child merely smells or looks at the food, the child's food acceptance will not be as positive (Birch, McPhee, Shoba, Pirok, & Steinberg, 1987). It is possible that either repeated experiences with a food determine an increase in liking for its taste, or that the absence of post-ingestive nausea and gastrointestinal discomfort gradually lead to the acceptance of a novel food ('learned safety' hypothesis, Kalat & Rozin, 1973). On the contrary, if the ingestion of a novel food is followed by the above negative internal consequences, an individual will associate them with its consumption and that food will not be eaten anymore (food aversion learning, Garcia, Kimeldorf, & Koelling, 1955; Garcia & Koelling, 1966).

Furthermore, it has been shown that early experiences with the flavor of a food have a powerful influence on their subsequent acceptance of that food. Children who are breastfed are exposed to a variety of flavors, and there is evidence that babies prefer flavors they have previously experienced prenatally through the amniotic fluid and postnatally through breast milk (Mennella, Jagnow, & Beauchamp, 2001). There is also evidence that breastfed children are more likely to accept pureed vegetables when first introduced to solids than formula fed babies (Sullivan & Birch, 1994) and the positive influence of breastfeeding on the reduction of picky eating is evident in children as old as 7 years of age (Galloway, Lee, & Birch, 2003).

The aim of the present study was to examine to what extent social influences affect the acceptance and consumption of novel foods in children (ages 2:5–5:2 years). In particular, we aimed to assess whether observing a familiar adult eating a novel food differentially influenced children's behavior towards that food when (a) the adult model was present and eating a different food (*Different color* condition), (b) the adult model was present and eating the same food (*Same color* condition), or when (c) the adult model was present, but not eating (*Presence* condition). We lack experimental evidence on the extent to which in