CHAPTER 16

Food and Eating

PAUL ROZIN

As its name indicates, with “cultural” modifying “psychology,” cultural psychology is a branch of psychology. Although extending the scope and depth of psychology, it has appropriately accepted the organization that psychology has imposed on its phenomena. That orientation, unlike the orientation in anthropology or zoology, focuses on basic underlying processes, such as perception, attention, cognition, and emotion. Indeed, the document proposing this volume notes that its middle section will be organized “in terms of domains of cultural-psychological empirical research. There will be sections on identities, cognition, emotion and motivation, interaction and social relationships, and socialization.” The process orientation that has dominated psychology for more than a century, documented by P. Rozin (in press), has proved very productive. But, especially with the reemergence of mind as the central concern of psychology in the late 20th century, the process orientation has focused almost entirely on the features of minds, at the cost of ignoring the domains of life, the institutions, cultural environments and practices that constitute most of daily life (P. Rozin, in press). It is these latter aspects that have dominated the fine ethnographies provided by anthropologists over the century, and that formed the empirical basis for the serious consideration of culture within psychology.

The fields of cognitive science and evolutionary psychology, following on changes in orientation to animal learning, have become more involved with domain-specific adaptations. It seems appropriate to at least raise the possibility of a different organization of cultural psychology. This would organize the field around the major domains of life: eating, sex, protection (including housing and clothing), parenting, etc. Unfortunately, it is virtually impossible to accomplish both a process and life domain segmentation of a field at the same time. However, for this volume, at least two exceptions to the process approach have been incorporated: one is a chapter on religion, and the other, this chapter on the domain of food and eating. Although food is clearly central to both culture and human biology, it has been little studied by psychologists in general, or by cultural psychologists specifically. This state of affairs results primarily from the process orientation in the field, as well as long-term (but diminishing) assumptions about the adequacy of domain general principles to account for behavior. This chapter attempts to organize what we know about food and culture, and to argue for a central role for the study of food and eating in cultural psychology.

Because the study of food (except for obesity, eating disorders, and the regulation of intake) is almost absent from psychology, I provide

THE FOOD–EATING DOMAIN

Food has to do with one of the basic domains of survival. It is central in animal life: food search, identification, and ingestion probably accounts for most of the waking time of most animals. Food selection is perhaps the single most important force in animal evolution; if you want to know as much as you can about an unknown animal, the best thing to ask, other than about its phylogenetic classification, is “What does it eat?” This single fact is highly informative about the sense organs, physiology of the digestive system, motor abilities, and learning or cognitive capacities. Animals that eat a very narrow range of foods are highly tuned to detect and appropriate their prey: Examples are anteaters, the carnivorous mammals, and specialized herbivores, such as pandas and koalas. More generalist animals have a broader but less specialized set of skills and structures, and are generally more well developed in what we loosely call intelligence (see Milton’s [1993] article on the relation between brain size and diet in monkeys). A generalist animal faces a great set of challenges: finding combinations of foods that are nutritive, balanced, and minimally toxic. I can imagine no other task that is more intellectually demanding, though, surely, mastering complex social organizations (e.g., Humphrey, 1976) is also deeply complex and challenging (and sometimes related to feeding patterns or strategies). So a first reason to be interested in food in cultural psychology is that it is such an important part of our primate heritage and so closely linked to intelligence.

A second reason that suggests food as an important area of study follows from the recent increase of interest in affect in psychology. Food is one of the major sources of affect. Eating is at the same time satisfying and threatening. It is a necessary and frequent part of remaining alive, because it provides the only source of energy and life-sustaining nutrients. On the other hand, many of the possible edibles in the world are toxic or are vehicles for dangerous microorganisms. Presumably, for this reason, people (and other animals) feel very strongly about what goes in their mouths; they are rarely neutral on this point. The stakes are high. For humans, another dimension amplifies the affective response to foods. It is widely believed in traditional cultures that a person takes on the properties of the foods he or she eats (“You are what you eat”). In this context, eating can have moral import, and can affect a person’s personality and fortunes. “You are what you eat” is an eminently sensible idea; when we mix two things (in this case, a person and the food she eats), it is natural to believe that the product reflects both of the constituents. Although modern biological science makes clear that there are no grounds for believing that properties such as moral status or personality could be transmitted by the molecules that result from the process of digestion, it has been shown that even educated Westerners believe, implicitly, that one takes on the properties of what one eats. Nemeroof and Rozin (1989) asked two groups of American students to read a few paragraphs about a culture, then answer questions about the people in that culture. Both groups read the same description, except that one culture was described as eating boar and hunting, but not eating, marine turtle, and the other as eating marine turtle and hunting, but not eating, boar. The boar-eaters were later rated as having more hair, and as being more aggressive, faster runners, and showing other boar properties (and fewer turtle properties) than the turtle-eaters.
Other arguments for a cultural psychology of food and eating derive directly from human issues, and human culture. Food selection and procurement figure prominently in almost all theories of the evolution of humans, with a shift from a more plant-dominated forest diet to a diet with more animal protein in the savannah environment. Animals are generally harder foods to procure, so that more demands are made on motor capacities and sensory abilities. But a diet relying on animals does relieve a creature of the risks of dietary imbalance. All animals are made of roughly the same molecules, so almost any animal is a good source of nutrition. Not so for plants, which are often incomplete or imbalanced sources of nutrients for animals, and must be eaten in appropriate combinations. For the human omnivore, seeking animal food but still consuming a wide range of plant foods, there are two challenges: procurement of food (most challenging for animal prey) and appropriate food selection (most challenging to the degree of reliance on plant foods).

If there is a prominent advance that set humans on the course to elaborated culture, it is surely the development of agriculture and domestication (Diamond, 1996). These powerful human advances, made primarily some 4,000 to 10,000 years ago, provided humans with a steady and efficient food supply. This allowed for larger aggregations of humans, and for the specialization of labor inside and outside the food domain that prompted all sorts of technological advances (e.g., guns and steel, as Diamond eloquently argues). So, in the evolution of human culture, food provides a critical opportunity for extended development of other domains of life, including all sorts of crafts, aesthetic practices, and high technologies.

In contemporary human life, work and food are usually the two major categories of waking activities. Activity logs from 14 cultures, painstakingly documented by Szalai (1972), reveal that (for three cultures that I have tabulated—Peru, the United States, and France in the early 1970s) at 13.2% of total time (including food-related activities: eating, shopping, preparation, cleanup), food is third behind sleep (36.7%) and work (16%). And, of course, much of work is devoted to earning money or trade that is ultimately spent on food. Indeed, among the traditional cultures of the world, including China and India, themselves about a third of humanity, food is the principal source of expenditures, amounting to about 50% of total expenditures (Samuelson, 1990). In more developed cultures, such as Western Europe and North America, food drops down to 20% or considerably less of total expenditures, but these cultures constitute a minority of the world.

So two more reasons for being interested in food, besides its importance in animal life and evolution and its high affective loading, is its importance in both human evolution (biologically and culturally) and its importance in contemporary daily life.

There are further, discipline-related reasons for the study of food to be of particular interest to psychologists in general, and to cultural psychologists in particular. First, food is a major subject of thought, because the need for it is so compelling, and obtaining it is so challenging. It is likely that many of the features of intelligence so important for humans arose first in solving problems in the domain of food. “What is edible and what is not” is one of the most critical problems facing the young human omnivore. Powerful plastic adaptations to discover the effects of ingested food (e.g., conditioned taste aversions) stand out among learning abilities, and use of food as reinforcement is the central technique of the psychology of learning. Siegal (1956) has argued that in child development, the first domain in which nascent intellectual abilities appear often concerns food and the detection of toxicity.

Second, food and eating are unique among our basic biological systems with respect to human culture. The other systems, including breathing, excretion and sex, maintain much of their nonhuman primate character even in elaborated human cultures. It is the remarkable stability of human mating systems under the impact of powerful cultural change that puts mate selection at the center of evolutionary psychology (Buss, 2004). Food, on the other hand, is the one biological system that has been massively transformed by culture into a range of meanings and practices, cuisines, social events, such that the nutritional function of food is often overshadowed by its social functions. There is nothing quite like dinner, let alone a dinner “party,” for our other biological functions. This unique elaboration of food is the subject of Leon Kass’s (1994) remarkable book, The Hungry Soul, in which he documents the transformation of food from a source of nutrition to a socially meaningful
substance in biblical through European history. As Kass notes: "An activity that is inherently ugly is beautified by graceful deed and tactful speech. An activity that is violent and destructive is tamed by gentle manner that keeps its destructive character mostly out of sight. An activity that deforms and dissolves living forms is given form-ality of its own by the work of the human intellect" (p. 154). Or "We eat as if we don't have to, we exploit an animal necessity, as a ballerina exploits gravity" (p. 158).

Third, a remarkable thing has happened to the world of food in developed cultures toward the end of the 20th century. Technological advances have virtually inverted our food environment, so that our adaptations to our ancestral environment are now often maladaptive. This is discussed in a later section.

THE BIOLOGICAL FOOD SYSTEM: THE HUMAN GENERALIST AND SOME FOOD UNIVERSALS

The food generalist faces a daunting food choice problem. Obtaining adequate nutrition involves satisfying the body's persistent need for some 40 nutrients, including many specific amino acids, some fatty acids, vitamins, minerals and water. In the course of satisfying these nutritional constraints, the generalist must also attain adequate energy from a mixture of proteins, fats, and carbohydrates. This set of nutritional requirements can be met easily if there is a fair amount of animal food in the diet, but also by choosing a broad diet among plant foods. However, the generalist faces a dilemma, because in the course of sampling the potential food environment widely, he is likely to encounter potential foods with toxic components or harmful microorganisms. The former are more likely in plants, the latter in animal foods. The risks of eating broadly are high, as are the benefits resulting from the ability to survive in diverse environments. There are no simple ways to avoid toxins and infective agents reliably on sensory grounds, nor to avoid potential foods that have minimal nutritional value. For the most part, this must be learned.

The food generalist, particularly the mammalian generalist (as exemplified by the relatively well studied domestic rat, Rattus norvegicus, and human beings), faces serious challenges in both the selection of a balanced diet and the avoidance of harmful or useless potential foods. He is equipped with some biological adaptations to aid in what must ultimately be primarily a process of acquisition. One set of genetically produced adaptations establish at a modest level some of the adaptations characteristic of specialist animals for particular foods or nutrients (P. Rozin, 1976; P. Rozin & Schulkin, 1990). In full form, this type of adaptation includes an internal state detector, which indicates a need for a certain nutrient, and a sensory detection system, which identifies the presence of that substance in the environment. For a koala, a "univore" surviving almost entirely on eucalyptus leaves, one simple system of this sort is all that is necessary for a complete food selection system: an internal detector indicating a need for food (e.g., "hunger"), and a sensory ability to recognize appropriate food (in this case, a "eucalyptus detector"). Acquisition of energy guarantees acquisition of necessary nutrients.

There are some genetically prepared biological aids to food selection in the mammalian generalist, what have been termed "specialists" within the generalist (P. Rozin, 1976). Thus, for water, there is a specific system that signals a need for water ("thirst") and a specific recognition of the sensory characteristics of water. There is also a dedicated taste system for sodium ions, a critical mineral requirement, and there is some evidence for a central detector system to indicate a need for sodium (Richter, 1956; Denton, 1982; Schulkin, 1991). It is possible that there are a few other specific mineral identification and detection systems. There is a well-investigated energy state detection system, signaled by an internal state usually described as "hunger." Although there are no very reliable sensory indications of the presence or absence of energy in a potential food, the sweet taste is a reasonable indicator of the presence of sugars, and the detection of fatty textures also indicates the presence of calories in the form of fat. Finally, a bitter detection system allows for rejection of classes of entities that include common toxins.

Overall, in the sensory domain, then, there is strong evidence for an innate preference associated with sweet (sugars), and an innate aversion to bitter, associated with toxins. These innate preferences and aversions have been clearly demonstrated in newborn infants (Steiner, 1979; Rosenstein & Oster, 1988). As well, there are indications of innate preferences for salt at some concentrations (Beauchamp, 1981). A definite preference for fatty textures is
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in what must ultimately be process of acquisition. Induced adaptations essential some of the adaptations specialist animals for instance (P. Rosin, 1976; P. Rosin, 1988). In full form, this is an internal state detected for a certain molecules detection system, which introduces that substance in the case of a "univore" surviving "eucalyptus leaves, one is all that is necessary to this system: an internal need for food (e.g., ability to recognize case, a "eucalyptus leaves" provide energy guarantees nutrients.

However, prepared biologically in the mammalian term "specialists" (P. Rosin, 1976). Thus, a specific system that signals and a specific recognition characteristics of water. A taste system for sodium requirement, and a central detector role for sodium (Richter, 1991). It is possible that specific mineral detection systems. There is a taste detection system, and usually described there are no very reliable the presence or absence potential food, the sweet indicator of the presence of"fatty textures" presence of calories in the other detection system allows detection of entities that introduce a domain, then, there is taste preference association, and an innate aversion to toxins. These innate aversions have been shown in newborn infants (P. Rosin, 1988). As examples of innate preferences detection (Beauchamp, 1988). Sensitivity for fatty textures is probably innate but has not been demonstrated in newborns. The combined sweet and fat preferences result in strong adult preferences for mixtures of the two (Drawnowski & Greenwood, 1983). Two well-documented infant taste aversions are not easy to tie to nutritional adaptations. An innate and present at-birth aversion to sour (acid) tastes (Steiner, 1979; Rosenstiel & Oster, 1988) does not correspond to any obvious threat to health; it could perhaps represent a bias to avoid unripe fruit in favor of more nutritious ripe fruit. Aversions to chemical irritants (such as chili pepper), prominent in young children, are probably present at birth. It is not clear what these are protective of, because most natural irritants are not harmful. In short, a suite of probably innate taste biases help the generalist to solve the food selection problem, but they do not solve the problem. None are effective with respect to microbially contaminated food, and there are safe and nutritive natural entities that trigger the innate avoidance systems.

So far as we know, unlike the hedonically marked and innately biased taste system, and some similar adaptations in the common chemical sense and perception of oral texture, there are no strongly marked innate olfactory biases (Bartoshuk, 1990). The most likely candidate would be an innate avoidance of decay odor, because of its association with potentially harmful microbes. There is no evidence that such a system exists; indeed, young children seem attracted to decayed material, including feces (P. Rosin, Hammer, Oster, Horowitz, & Marmara, 1986). Children of about 2 years of age or less will put virtually anything in their mouths, including what is described as and appears to be feces.

Sensory biases do not exhaust the innate behavioral repertoire of the generalist. It is in the nature of the generalist to be both interested in new potential foods and cautious about them, because they may be toxic or infected, or simply poor sources of nutrition. This combination of risks and benefits manifests (in rats and humans, where it has been studied most) in an interplay between fear of the new (neophobia) and attraction to the new (neophilia). Nowhere is this more apparent than in the behaviorists of wild rats (Barnett, 1956). What is familiar is safe, but it restricts the nutritional horizon in ways that may be maladaptive as the environment changes. A common "solution" to what I have called the "generalist's dilemma" is the cautious sampling of potential new foods.

Finally, an impressive set of adaptations aid the generalist in discovering the nutritional consequences of things ingested. Unlike most forms of learning, in which the consequences of an action or experience are rapid, there is an inherent delay between the action/experience (eating) and its metabolic consequences in the food system. Digestion takes time. It is now well established that a robust learning system connects tastes with their delayed consequences. In its most prominent form, conditioned taste aversions, this system allows for the association between a taste and a negative consequence (e.g., nausea) that may occur even hours later (Garcia, Hankins, & Rusiniak, 1974; P. Rosin & Kalat, 1971). There is a corresponding, usually weaker ability to associate tastes with delayed positive (nutritional) consequences (Garcia, Ervin, Yorke, & Koelling, 1967; Selak, 1999).

The digestive system and other parts of the body (e.g., the fat stores) work along with behavioral adaptations to solve the problem of acquiring adequate nutrients and energy. Thus, the liver constitutes a short-term store of energy (in the form of glycogen), and fat deposits in the body form a long-term store. Together, they allow the animal to endure periods of food shortage, usually measured in hours (e.g., between meals), days, or weeks. Metabolic pathways, often predominantly in the liver, allow for detoxification of low levels of dietary toxins, the conversion of energy forms, such as the synthesis of fat from carbohydrate, and the synthesis of important molecules, such as proteins and some amino acids.

One cannot help but be impressed by the enormous variety of foods and eating patterns across humanity. Indeed, ethnic cuisines would have no appeal if we all ate the same things in the same way. But the metabolic requirements and behavioral biases I have discussed do result in a substantial number of food/culinary universals or near universals in humans. One should also be open to considering near universals, because human ingenuity has allowed the invasion of very inhospitable environments, such as the Arctic, that severely constrain nutritional options.

The frequent need for energy, water, and nutrients guarantees that all humans eat (and drink) rather frequently, normally more than once a day. Given that humans are not adapted
to consume very low calorie density foods, such as leaves, they almost always eat rather energy-rich foods in concentrated periods of time, called meals (Plimer & Rozin, 2000). Although meals are not necessary (as opposed to continuous grazing) nutritionally, our digestive system is adapted to consuming and processing much more food than is immediately needed, and time can be spent more efficiently (from the point of view of attending to other needs, conserving energy, and avoiding predation) if eating activities are clustered in time. The availability of animal foods, and elaborate preparations of foods, encourage organization of eating in terms of meals.

Virtually all human beings consume some combination of plant and animal foods. In most cases, males are more involved in the procurement of animal foods, and females in the procurement of plant foods, with females more involved in the preparation of foods for ingestion. Eating at meals is usually a social occasion. Sharing of food is a form of bonding—throughout the world, one shares food with those with whom one is close, and this sharing ("shared substance") reinforces the closeness. Thus, food is interpersonally important. Although to some degree foods are consumed raw in all cultures, there is some processing of many foods before ingestion. This includes physical changes (removing shells, grinding), mixing of foods, and cooking. Almost all groups of humans can be described as having a cuisine; a set of rules about eating, and a set of “recipes” for the preparation of foods. These are discussed later, but include, among other things, the addition of group-specific characteristic flavors ("flavor principles") to staples (E. Rozin, 1982). Similarly, almost all human groups exploit some staple grain as a cheap source of energy. Finally, food is universally used as a reward for children and adults, and cuisines and food habits constitute part of a group’s identity.

THE TRANSFORMED BIOLOGICAL MOTIVE: PREADAPTATION AND THE FUNCTIONS AND MEANINGS OF FOOD IN CULTURAL CONTEXT

Leon Kass (1994) captures the major transformation in eating by humans with the contrast between the German verbs fressen, eating by animals, and essen, for eating by humans. Unlike almost all other animals, humans bring food to their mouth rather than bringing their mouth to the food. Humans eat using implements, have table "manners," engage in complex social/informational exchanges during eating (at meals), elaborate foods extensively before eating them, and eat foods in specific orders. In short, eating is an expression of human civilization. Food has become much more than nutrition. As noted in the introduction, food is unique among the biological domains in the degree to which it has been transformed culturally. Food is used by humans for much more than nutrition.

Preadaptation, the process that accounts for the expansion of the food domain in the history of human cultures, was appreciated by Darwin and has been expressed in fuller form by some more modern evolutionists, particularly Bock (1959) and Mayr (1960). It involves the use of an already existing (usually evolved) structure for a new purpose. According to Mayr, preadaptation is the main source of evolutionary novelties and the principal process in speciation. It essentially involves a recombination of existing structures and genes rather than creation of new genes by mutation. One of the finest examples of preadaptation has to do with the food system. The mouth, with its elaborations of teeth and tongue, is an aperture designed to take in nutrients (and air). Clearly, the tongue and teeth have evolved to facilitate the processing of food. But in human evolution, the teeth and tongue, and the entire oral cavity and its link to the respiratory system, are utilized by the language system for the expression of speech. It is noteworthy that the teeth and tongue did not evolve to facilitate language, but were rather opportunistically used by the speech system. To take another example relevant to food, a good argument can be made that the species of plants and animals that were domesticated thousands of years ago were selected by humans because they were preadapted, in terms of social organization, mode of reproduction, and so on, to be useful to, and manageable by, humans.

Preadaptation is even more fundamental in cultural evolution than it is in biological evolution (E. Rozin, 1999a). This is because variation in cultural evolution can be directed by purpose, whereas in biological evolution, the occurrence of variations is dependent on random processes. If a cultural tradition, practice, artifact, or institution might be adaptive in a new context, it can just be transplanted.
does not have to wait for the opportunity to arise by generation of random variants (a very unlikely event, if the use in a new context requires a series of adaptations). Thus, one can combine the virtues of the calculator and typewriter to create a computer, or apply a culinary technique discovered in one culture to another. The flowering of food from nutrition to a complex expression of civilization (Kass, 1994) has taken place along a number of lines, presumably to different degrees and in different temporal orders of evolution in different cultures (Figure 16.1). Early in human evolution, food became an entity of social significance. The meal became a center for social interaction. Food became central to important cultural events. Food sharing became explicit and implicit forms of expression of interpersonal intimacy. Food became a marker of the status of the individual (as in the Hindu caste system, or the public consumption of expensive foods), and a form of group identity. Note the description of British sailors as “limeys,” Germans as “krasts,” and French as “fruits.” Food enters the aesthetic domain as cuisine, taking its place next to other human activities with lesser links to our fundamental biology, such as literature, music, and art. Cuisines elaborate the flavors and presentation of food in ways that can hardly be described, in most cases, as motivated by improved nutritional properties. Rather, it is appeal to the palate and the eye.

Food becomes an integral part of the moral/religious domain, such as when it is used in religious ritual (e.g., taking the host in the Catholic church, the Jewish laws of Kashrut). In Hindu India, with more than 800 million people, food can be considered a form of “moral currency” (Appadurai 1981). It describes it as a “biomoral” substance. The caste system, which ranks people according to moral purity, is largely defined and defended in terms of food transactions designed to prevent the food of those less morally pure to become consumed by those higher in the system (Marriott, 1968). In the West, for example, the United States, the moral role of food is muted, though overeating, fast foods, fatty foods, and most clearly cigarettes, take on moral overtones (Stein & Nemeroff, 1995; P. Rozin, 1999b).

Finally, in addition to expanded roles for food as art form, moral, and social vehicle, the vocabulary associated with food is co-opted as a means of describing things that have nothing to do with food; that is, food has a metaphorical function. In fact, food is one of the major sources of metaphor (Lakoff & Johnson, 1980), such as when we say that “Janet is sweet,” or “Let’s get to the meat of the paper.” Metaphor is, of course, a quintessential example of preadaptation: export of a word from its original context to other contexts.

**DISGUST AS AN EXAMPLE OF PREADAPTATION AND THE CULTURAL EVOLUTION OF THE FOOD SYSTEM**

The role of food as a foundation system to be elaborated in various cultural contexts through the principle of preadaptation is well illustrated in the cultural history of the emotion of disgust (see P. Rozin, Haidt, McCauley, & Imada, 1997; P. Rozin, Haidt, & McCauley, 2000, for reviews). Disgust is and has always been regarded as one of five to 10 basic emotions by psychologists. It is featured by Darwin (1872/1965) in *The Expression of Emotions in Man and Animals*, and figures centrally in Izard’s (1977), Tomkins’s (1963), and Ekman’s (1992) general perspectives on emotion. Following Ekman’s conception of basic emotions, disgust is characterized as having a particular hard-wired pattern of expression, psychophysio-

![Figure 16.1. Food preadaptation.](image-url)
gust elicitors. Because contagion is characteristic of all hedonational disgust elicitors and is not characteristic of the more primitive bad taste “disgusts,” we use the terminology disturbances for bad tastes, and reserve disgust for the culturally acquired rejections that show the contagion property. The contagion property appears to be universal among adult humans but absent in animals or in children younger than about 4 years of age. It seems to be a universal cultural acquisition, perhaps supported by its adaptive advantage in discouraging consumption of infected foods. It is notable, as Angyal (1941) pointed out, that almost all food disgust foods are of animal origin. It is these same foods that have the highest risk as vehicles for transmitting infectious agents.

Feces appears to be the universal core disgust substance. It does not qualify as an innate taste, since it is not rejected by infants (or most animals; P. Rozin, Hammer, et al., 1986). It is a universally acquired human disgust, with its own fundamental developmental concomitant, toilet training.

We believe that disgust is co-opted as a cultural tool to establish culturally supported aversions or prohibitions by endowing the relevant objects with disgust properties. If a forbidden entity becomes disgusting, it will be naturally avoided, and no rules or formal punishments need be invoked. Such is clearly the case with the outcome of toilet training. A previously attractive substance becomes powerfully disgusting.

By our account, the range of disgust expands from its initial food base to include three other categories of events or elicitors. First, following on the focus on animal foods, it is extended to a wide range of animal features—features that humans share with animals. It is a frequent theme in cultural narratives, rituals, and beliefs that humans are not animals and are superior to animals. Any reminder of the animal nature of humans then becomes undesirable. One animal feature is particularly aversive to humans: their mortality (Becker, 1973; Pyszczynski, Greenberg, & Solomon, 1997). Disgust seems to be used as a device to distract humans from reminders of their mortality. By helping to distance humans from their own animal nature, and from animals, it seems to assist in a major goal that develops cross-culturally as humans evolve. That mortality is at the base of what we will call “animal nature disgust” is supported by two observations: (1) the quintessential odor of disgust is the odor of decay of animal

### TABLE 16.1. Correspondence between Moral Systems and Moral Emotions: The CAD Triad Hypothesis

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<thead>
<tr>
<th>Rhetoric</th>
<th>Focal Concepts</th>
<th>Emotion</th>
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<tbody>
<tr>
<td>Community</td>
<td>Duty, hierarchy, interdependence</td>
<td>Contempt</td>
</tr>
<tr>
<td>Autonomy</td>
<td>Harm, rights, justice</td>
<td>Anger</td>
</tr>
<tr>
<td>Divinity</td>
<td>Sacred order, natural order, purity</td>
<td>Disgust</td>
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</tbody>
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other person. It describes Western moral systems quite well. The community system identifies immorality as violation of hierarchical structures, such as addressing a respected elder informally. The divinity system considers an immoral act that reduces one's own or another's purity (divinity). The community and divinity systems are robust parts of morality in many traditional cultures, as demonstrated by Shweder et al. for Hindu Indians. The emotions that involve moral condemnation of others are typically anger, contempt, and disgust. We (P. Rozin, Lowery, et al., 1999) have pointed out that there is a satisfying mapping of these three emotions onto Shweder et al.'s (1997) three systems, with anger associated with autonomy, contempt with community, and disgust with divinity (Table 16.1). We have demonstrated a correspondence between moral offenses of each type and both the emotion words and emotion expressions for each of the three emotions, in both the United States and Japan. Clearly, in a culture in which divinity is an important source of moral principles, disgust will be an important moral emotion. This is illustrated in studies by Haider, Koller, and Diaz (1993), in which they inquired of upper middle-class and lower class Americans and Brazilians whether it was immoral to eat roadkill dog. All respondents felt disgust, but only the middle-class Americans allowed that this was not an immoral act, because nobody was hurt (autonomy was not violated). Because they did not accept a divinity moral system, disgust was not considered a sufficient condition to designate something as immoral.

I have just given a sense of the incredible elaboration of the simple "Get this out of my mouth" emotion into a "Get this away from my soul" emotion. A transition from a "body" to a "soul" emotion—a rich description of this broad function of disgust is described and documented by William J. Miller (1997) in his excellent book, The Anatomy of Disgust. This same type of expansion of meanings for food (as opposed to disgust) in European history is described in Leon Kass's The Hungry Soul (1994).

Kass (1994) provides a particularly graphic illustration of food, disgust, and civilization. In a typical meal situation in many cultures, individuals face each other while eating. They place food into their mouths, the interior of which is generally regarded as disgusting by others. Furthermore, the mass of chewed food in the mouth is itself disgusting (both interpersonally and because of its involvement with body secretions, etc.). Remarkably, due to the virtuosity of eating as informed by table manners, this exchange goes on face-to-face without either partner being exposed to any disgust stimuli. More remarkably, the individuals are often conversing while eating, using the same hole to speak that they use to ingest food; still, neither the inside of the mouth nor the ingested food is seen by the partner!

One final interesting feature of disgust in its culturally elaborated form is that it is often funny. Many jokes and cartoons engage disgust, and disgust is typically at the core of humor for young male children. How is it that a negative emotion becomes a source of amusement? Our proposal is that it is one of many manifestations that humans enjoy "constrained" negative events (what we have called "benign masochism"), that is, events that signal threat but are not really threatening (P. Rozin, 1990a). When a well-dressed person other than oneself or partners steps in "doo, it is sort of amusing, but not for the self.

By the same process of predaptation that expands disgust elicitors in culture history, the process of contagion is carried along with the new elicitors. Thus, contact with an immoral person shows contagion properties; people do not wish to wear Hitler's sweater (P. Rozin, Millman, et al., 1986; P. Rozin & Nemeroff, 1990; Nemeroff & Rozin, 2000).

A comparison of the status of disgust in the United States and India is instructive. Disgust is centered in the core and animal nature domain in the United States, with some extension into the interpersonal domain, and minimal moral disgust. In Hindu India, on the other hand, a good part of disgust engages the interpersonal and moral domain, as illustrated by the caste system, and there is relative insensitivity to animal nature disgust; at least, there is less of a response to contact with death.

CULTURE AND BIOLOGY: SOME FOOD CASE HISTORIES

In this section, I briefly consider the history of some human foods to illustrate how biological, cultural, and psychological factors interact in the cultural evolution of foods (see P. Rozin, 1982, for a more systematic discussion of this issue).
Sugar

The cultural history of sugar is a paradigmatic illustration of how a simple biological predisposition, the preference for a sweet taste, is amplified and elaborated by culture. The innate sweet preference encourages the search for this stimulus and learning about where and when it can be found. In conjunction with the development of agriculture, the desire motivates in humans the cultivation of crops, primarily ripe fruits, that provide this desirable taste experience. Much later in human history, the technology to extract the source of sweetness, sugars, from their natural plant sources allows for the experience of an even more desirable sweet experience. As well, this important advance opens a wide door for expansion of the domain of acceptable foods, because sugar can be added to foods that are otherwise much less palatable, such as coffee or chocolate, and to enhance the taste of traditional dishes.

The search for a source of easily extractable sugar (sugar cane) was a main motivation for the colonization of the tropical Americas by Europeans, and the availability of cheap sugar introduced it to the middle and lower classes, and transformed cuisine in many ways. The extensive culinary and social implications of the availability of inexpensive sugar are well documented by Sidney Mintz (1985) in his book, *Sweetness and Power*. Further technological advances allowed for extraction of sugars from sources other than sugar cane, including sugar beets and corn.

Finally, in the food-flooded modern, developed world, where the calories signaled by the sweet taste are often avoided as opposed to sought, there is the development of artificial sweeteners, uncoupling the taste from the calories that usually go with it, allowing for the experience of pleasure of sweetness without the calories. All of these extensive advances, with major implications for cuisine and society, are motivated quite directly by the biological predisposition for sweet tastes.

Chocolate

One of the great culinary creations of culture, chocolate, represents a more elaborate version of the amplification illustrated by sugar. It illustrates the creation of a “superfood,” motivated by twin biological predispositions for sweet tastes and fatty texture, both indicators of caloric value. The great appeal of chocolate, one of the favorite foods in the Western world, has to do with its sweetness, fatty texture, aroma, and melt-in-the-mouth quality. Importantly, none of these features are obvious in the wild chocolate bean. So, unlike the case for sugar, the cultural evolution of chocolate involved discovery and development of a potential in a natural product. This extremely complex technology involves both modifying the natural product to enhance some of its properties and adding other things (particularly sugar, sometimes milk and vanilla) to improve palatability and produce variety. The natural chocolate bean is extremely bitter and has neither the aroma nor the fatty texture of commercial chocolate. It was ground and consumed as a beverage in close to its natural form by the Indians of Mesoamerica, well before the arrival of Cortez (see Coe & Coe, 1996, for the history of chocolate). This was an innately unpalatable beverage, an acquired taste.

Brought to Europe by the early Spanish explorers, chocolate was transformed into a luscious food by Western Europeans, and later Americans, in a complex process that involves many stages and, critically, depends on the availability of cheap sugar. The result is a food, source of calories and nutrients that is among the most popular in the Western world, and is presently the most craved substance in North America (Weinberger & Elston, 1991; P. Rozin, Levine, & Stoess, 1991).

The story of chocolate, like that of sugar but more so, is the story of the amplification and elaboration of biological predispositions. The difference is that the aspects of chocolate that satisfy these predispositions are not apparent in the natural product. It is of particular cultural and psychological interest that although chocolate is raised in tropical areas, particularly Africa, South America, and parts of Asia, the great desire for it and consumption of it is in the very countries that cannot grow it: Europe, the United States, and Canada. This may be explained, in part, on economic grounds: Chocolate is expensive, and the tropical countries in which it grows are not wealthy.

Chili Pepper

Chili pepper is probably the most widely consumed spice in the world, other than garlic (if one chooses to consider garlic a spice). It is eaten on a daily basis, usually as part of a sea-
soning sauce used with almost all savory foods by more than 2 billion people every day. It is an essential part of the basic flavoring ("flavor principle"; see the section on cuisine) of most tropical and semitropical cuisines in the world. The contrast with chocolate and sugar is striking, because unlike these two popular foods, chili pepper is intrinsically aversive on account of its oral irritant properties. So chili pepper illustrates the reversal of an innate aversion, a case where culture overwhelms and reverses a biological predisposition (see P. Rozin, 1990a, for a detailed consideration of psychological and cultural aspects of chili use).

All chili peppers come from the Americas and were introduced to Europe by the early explorers of the Americas. They spread later to Africa and Asia. The intrinsically aversive irritation of the peppers, caused by a family of chemicals called capsaicins, were bred out of the imported peppers. This probably happened first in Hungary, and the result was what we now call sweet peppers, which became a mainstay of Mediterranean cuisines. But, in spite of the availability of such mild peppers, it was the "hot" peppers that spread to tropical and semitropical Africa and Asia. It is a remarkable feature of history, and particularly culinary history, that such a "bad tasting" product achieved so much success, particularly when other foods from the Americas, including tomatoes and potatoes, experienced substantial resistance before adoption in Europe and other countries.

The story of the chili pepper and the widespread adoption of other intrinsically unpalatable substances, such as black pepper, ginger, tobacco, and coffee, raise two very important questions for cultural psychology. First, what are the cultural or biological adaptive values of this widespread practice, and second, how does culture manage to accomplish the hedonic reversal? As to adaptive value, there are possible accounts but no certain solutions (reviewed in Rozin, 1990a). Billing and Sherman (1998) have made a good case for the antimicrobial value of spices in general, including chili pepper. Other accounts, each with minimal evidence, suggest nutritional values, thermoregulatory (cooling) effects, and coverage of the taste of spoilage.

From the perspective of cultural psychology, the particular interest of chili pepper and other intrinsically aversive substances and activities is how they are socialized. And most critically, it is extremely clear that people consume chili pepper because they like its taste; that is, cultural processes lead to a hedonic reversal in which an intrinsically aversive sensation becomes a pleasant sensation! People do not consume chili pepper like a medicine, because they think it is good for them. They consume it because they like it.

We do not have an adequate account of how this happens (reviewed in Rozin, 1990a), but given the generality of cultural adoption of initially aversive substances and activities, I briefly discuss the causes of hedonic reversal for the chili pepper as a model system. A whole family of accounts link chili pepper ingestion to positive effects it produces, including sweating and lowered body temperature, and induced parasympathetic activity (including salivation, gastric secretion, and lowered heart rate) and endogenous opiate release in the brain. All of these effects do occur; the question is their role in the acquisition of liking. To learn from these effects (and somehow, via this learning, transform the hedonic response), repeated exposure is necessary. Normally, when an aversive event or substance is encountered, it is subsequently avoided. So one important effect of culture is to produce an environment, social and physical, in which there is repeated consumption of food with chili pepper in it. Is this a sufficient condition (e.g., Zajonc's [1968] well-documented "process" of "mere exposure")?

The answer is clearly "no"; fieldwork and preference tests in the field (P. Rozin & Schiller, 1980) indicate that whereas all Mexican children raised in a village over the age of 6 or so years like the burn of chili pepper, not a single animal in the same village does so. This in spite of the fact that the dogs, pigs, and chickens consume the daily garbage, which regularly includes staple foods and dishes, and excess salsa (the chili pepper-based sauce that is placed on most savory foods; P. Rozin & Kennel, 1983). The reversal of the innate aversion for chili pepper, and almost certainly other entities, seems to be an almost uniquely human accomplishment, and to involve culture as an essential ingredient.

Field measurements (Rozin & Schiller, 1980) indicate that very young Mexican children do not like chili pepper, and that a liking for the hot taste occurs somewhere around 4–6 years of age. There are two reasonable, not conflicting, accounts. One is social: In the meal setting, the entire family consumes food with chili pep-
per in it, or with an accompanying sauce to be added to the foods. There is no overt pressure at the table to consume hot pepper. But the young child observes that older siblings and all adults consume it with gusto, and this experience may in some way produce the hedonic reversal.

A second account, which we call "benign masochism" (Rozin & Schiller, 1980; Rozin, 1990a), puts chili-liking together with a whole set of uniquely human activities, in which pleasure is produced by the elicitation of negative experiences and/or emotions: riding roller coasters, recreational parachute jumping, going to sad movies, smoking cigarettes, drinking black coffee. The idea is that humans, and only humans, seem to get pleasure out of the fact that their body is signifying danger/rejection to them, but they know they are really safe. This body--mind disparity seems to induce pleasure. The case is particularly clear for roller-coaster riding. We have some evidence that this might be the case for the chili pepper, because we have shown that any individual's most preferred level of "burn" for the chili pepper is the level just slightly below the level of aversive pain (just as the best roller coaster is the scariest, within constraints; Rozin & Schiller, 1980). It is worth noting that disgust humor, discussed earlier, is another possible example of benign masochism.

The important lesson from chili pepper as an example of a learned reversal of innate aversions is that, at a minimum, it invokes cultural mechanisms at three levels: (1) the availability of the substance or experience, (2) the continued exposure to it in spite of its initial negative effects, and (3) in some yet to be fully understood way, the accomplishment of the hedonic reversal.

Ironically, yet another account for hedonic reversal involves endogenous opiate secretion that invokes an opponent process model. According to this view (Rozin, 1990a), the adaptive opponent system, which is generally employed to adapt to certain types of events that disturb equilibrium, is over-activated and produces a reversal. Such an account has been used to account for addiction (Solomon, 1980).

Milk

Milk is necessarily the first food of mammals. Until the development of animal domestication and then dairying by humans, milk was a unique food available only to baby mammals. In the contemporary human world, milk and derivative dairy products form an important part of the diet in many cultures. It is notably absent from most East Asian cuisines but present in some form in most others as a food for children and adults. Milk illustrates a very important point about the relation of biology to culture. The culture history of dairy products shows both how biological constraints affect cultural evolution and institutions, and, importantly, how culture affects our biology. This dual-direction effect is the focus of this short section on milk.

Because milk is unavailable as a food past nursing in the predomestication environment, it would be problematic to have adult mammals seeking their first food. A number of mechanisms have evolved to accomplish not only the weaning from milk but also some decline in its preference (reviewed in Rozin and Pelchat, 1988). The most relevant mechanism is genetically programmed lactose intolerance (see Simoons, 1969, 1970). The only carbohydrate in mammalian milk (with a few minor exceptions) is lactose, a sugar that is the combination of two simpler sugars, glucose and galactose. Lactose is found only in milk. Lactose, which cannot be absorbed directly, is broken into its two utilizable subcomponents by the gut enzyme, lactase. This enzyme, present in the gut of virtually all mammals, is in programmed such that it gradually disappears at about the time of weaning of the species in question. Undigested lactose ferments in the hind gut, producing gas pains and diarrhea, and interfering with absorption of some of the nutrients in milk. These unpleasant symptoms very likely contribute to the weaning process. Preagricultural humans were therefore like all other mammals and unable to utilize milk effectively after weaning.

Domestication made milk available as an adult food. There is convincing evidence, largely from the work of Frederick Simoons (1969, 1970), that two very different types of adaptations occurred since the origin of domestication to encourage the availability of milk and its products in the postweaning human diet. First, cultural innovations adapted to a biologically limited (adult lactose intolerance) by digesting milk outside of the body, breaking down the lactose into its utilizable components before ingestion. This was done with microorganisms and results in products such as cheese.
and yogurt. These appropriately termed “cultured” products make the carbohydrate in milk utilisable and bypass the negative symptoms.

A second set of biological adaptations occurred subsequent to the rise of dairying. In a group of cultures primarily from Northern Europe, but also including some pastoral groups in Africa, the availability of dairy food set up a situation in which the ability to digest milk was adaptive. There is a single gene mutation that, when it occurs, blocks the downregulation of lactase production at weaning. In these cultures, the occurrence of this mutation improved survivability, and gradually the gene frequency rose. The result is that most people of Northern European origin (and a few African groups) retain their lactase and can drink raw milk throughout their lives. They are lactose tolerant adults. Hence, a cultural advance changed the adaptive landscape for humans and induced a genetic change in some groups of humans.

The main point is the dual direction of culture—biology change so well illustrated by milk. Many issues related to dairy products may engage cultural psychology, but these are not dealt with here. Of particular interest is why Chinese cuisine, one of the world’s major cuisines, includes no dairy products. This may have a cultural-historical explanation: The Chinese were ruled by despised Mongols for a long period and the Mongols are heavy dairy consumers.

**Meat**

Meat should be a subject of special interest to psychologists, because it is a quintessential example of the interesting and important state of ambivalence. It is at the same time the most tabooed and the most favored food across the human race. Meat is a charged entity, imbued with multiple meanings. Because it is the food whose composition is most similar to that of humans, it is the most complete of foods. But this same similarity makes meat most likely to be the host to microorganisms that also find a happy home in humans. Meat is most nutritious and most infective. Obtaining meat involves hunting and killing animals, an act that requires great skill and is at the same time morally questionable. The anthropologist Stanley Tambiah (1969) elaborated some of these points in a well-known paper entitled “Animals Are Good to Think and Good to Pro-

hibit.” He might as well have replaced the word think with eat.

Meat, represented in terms of the most favored parts of animals, is in traditional societies often restricted for the consumption of males, or the more important males. At the same time, in some cultures, some religions, and among some individuals within meat-eating cultures, prohibition of all meat is practiced. Vegetarianism has a long history and a wide geographical presence. Meat is the only general category of foods that is widely prohibited. Almost all objects of food disgust cross-culturally are animals or animal products (Angyal, 1941; P. Rozin & Fallon, 1987). This can, perhaps, be related to the role of disgust in denying our animal nature, as well as in the “You are what you eat” principle (eat an animal and become animal-like; Nemeroff & Rozin, 1989). Of course, cannibalism, often the most negatively regarded human food practice, is a special example of meat eating.

The place of meat in human life has been treated by a number of authors, including Marvin Harris (1985), from an evolutionary perspective; Frederick Simoons (1961/1994) from the cultural-geographic perspective, with a focus on meat taboos; Julia Twigg (1983) from the vegetarian perspective, and other authors in more general treatments (e.g., Beardsworth & Keil, 1997; Fiddes, 1991; P. Rozin, 2004).

**CUISINE**

Eating involves incorporating substance; humans typically do something to the things they find in the world before consuming them. Some of this amounts to physical preparation such as peeling or cutting, but much involves more elaborate transformations, including mixing, grinding, cooking, and flavoring. These behaviors conveniently often leave substantial records that can be examined by archeologists (unlike sex, for example); it is not as good as writing, but it is a meaningful record. Of course, when combined with writing, the food domain results in recipes and cookbooks.

We can use the word cuisine to represent the body of shared rules, beliefs, and practices relating to food within any culture. Regularities are sufficiently great within cultures that we can usually identify the culture by examining what is eaten.
At the level of the “dish,” Elisabeth Rozin (1982) points out that there are three components: staple foods, processing techniques, and flavorings. She notes that most cuisines add a particular set of flavoring ingredients to most savory dishes, and calls these “flavor principles.” Thus, Southern Italian cuisine is characterized by tomato, sweet pepper, olive oil, and oregano as flavorings. Chinese cuisine typically flavors with soy sauce, ginger root, and rice wine, and Mexican cuisine characteristically uses chili pepper with either lime or tomato. Flavor principles provide a distinctiveness/identity to the foods of a particular group, and offer a sense of comfort and familiarity. They may also serve as a means to introduce a new staple food into a cuisine by making it taste familiar with the traditional flavor principle (E. Rozin & Rozin, 1981).

The meal is another component of cuisine. Meals have an internal structure, varying from a single dish of combined ingredients to sequences of foods, as in the appetizer—entree-dessert sequence common in many Western cuisines (see Douglas & Nicod, 1974, for an analysis of the British meal). In many traditional cultures, the various meals are similar in content and structure, with breakfast as warmed over dinner. In many Western cultures, a separate first meal, breakfast, has its own foods and flavors. Howard Schutz (1989) has pointed out that cultures’ “appropriateness” rules have to do with what foods can be mixed or eaten together, proper sequences of foods, and foods for particular times or occasions.

The social eating situation is a third aspect of cuisine. There are issues of who eats, with whom, order of eating (e.g., children first), and rules for leaving the table and for what is supposed to be discussed during the meal. These very elaborate traditions are treated in the next section.

**CIVILIZED EATING**

One of the most striking things about the food world that varies a great deal across cultures is the etiquette of eating, or table manners. As Kass (1994) and Elias (1939/1978) point out, the meal is one of the special areas in which humans display and celebrate the fact that they are civilized. Most modern humans do not eat like animals. They sit at tables, use utensils, respect and do not touch the food on the plates of others, refrain from calling attention to their bodily functions while eating, and observe complex rules of social interaction. Civilized eating is highly complex and requires great skill. Both Kass and Elias indicate that in civilized eating, the biological aspects of eating are suppressed (see the earlier discussion of suppression of disgust during eating). The learning of table manners by children is surely one of the most difficult aspects of growing up.

All of these civilizations of the daily meal are yet more elaborated in the special food occasions, such as attending restaurants, feasts, dinner parties, or weddings (Kass, 1994). And the etiquette and subtle meanings of eating are particularly elaborated in Hindu-Indian culture (Khare, 1976).

**FOOD SOCIALIZATION: WEANING AND TOILET TRAINING**

With breast-feeding and careful monitoring of the infant by its mother, little can go wrong with its food world in the first year. Evidence suggests that for the first year or two of life, children will put anything they find into their mouth (P. Rozin, Hammer, et al., 1986). This potentially dangerous tendency is neutralized by maternal vigilance. It seems that the most important thing a child has to learn in the early years is what not to eat. Of course, in addition to familiar vigilance, the environment can be secured so that the child does not encounter dangerous things.

Freud correctly noted two of the major events of early childhood: weaning and toilet training. One is about food, and the other is a consequence of eating. Weaning is a necessary event, and toilet training, though not literally necessary, is universal. Both involve denying a child a pleasure, and both can be problematic. Both are problems solved in very diverse ways in different cultures, at different ages, with different degrees of attention and harshness. Because Freud saw these two events as central in the formation of personality, they received great attention in a cross-cultural context for at least a generation of field anthropology. As with many other features of a highly overdetermined developmental trajectory, normal children can and do typically become trained following a wide range of weaning and toilet training procedures. These are things that have to be done, but how they are done is not
highly constrained in terms of much higher benefits or costs for one technique as opposed to another. Indeed, a related issue, bottle- or breast-feeding, has occupied an enormous amount of research attention in psychological and medical research in the developed world.

The most important aspects of both toilet training and weaning is that they demand attention, are usually taken seriously by adults, and are accomplished in accordance with a rather complex set of belief structures and practices. They are about food and are major milestones in early life. Ironically, no doubt in part due to the attention they received by Freud, developmental psychology in the last part of the 20th century paid scant attention to these two fundamental processes (P. Rozin, in press).

The acquisition of table manners and food traditions is another important aspect of food socialization that has been little studied by psychologists. Birch, Billman, and Richards (1984) reported that the category of special foods eaten at breakfast in the United States becomes distinctive and separate for children in the later preschool years. P. Rozin, Fallon, and Augustoni-Ziskind (1986) reported that until the later preschool years, children in the United States do not understand or incorporate a variety of food-mixing prohibitions; thus, the young preschool child who likes food A (e.g., steak) and food B (e.g., ice cream) will like A + B. Cuisinie is not that simple (Schutz, 1989).

PREFERENCES: FORMATION AND TRANSMISSION

Food is one of the domains in which preferences are salient. Most foods are either liked or disliked; relatively few produce a neutral response. It is quite remarkable that although preferences for food, music, and a wide range of activities are a very important part of life (and economics), they are studied little by psychologists, cultural or otherwise (P. Rozin, in press). The question for all preferences (leaving aside love and preferences for other people) is, how do they get formed? What makes us like some things and dislike others? The food domain is a natural place to study this, because there are so many food preferences, they are public, and they are usually open for discussion (e.g., unlike sexual preferences). Surely, one of the major distinctive features of a culture is its cuisine and associated food preferences. If we know someone is particularly fond of rice and soy sauce, we can make a good guess that they are from East or Southeast Asia.

Whereas there are surely large cross-cultural differences in food preferences, there is also wide variation within cultures. There is no point in trying to quantify and compare these differences; it all depends on which foods are being studied. Variance in preference for tofu is going to be largely intercultural between Chinese and Americans. But, for the same two cultures, variance in preferences for broccoli might well be primarily explained intraculturally.

Given the generalist background of humans, it is unlikely that most preferences are accounted for in terms of genetic endowment. Two other natural reasons might be critical early experiences and the early environment, as controlled and instantiated largely by the parents. Of course, the human mammal would be poorly served by a tendency to develop strong and permanent preferences for early foods. This would have led to a focus on milk, a food unavailable in the ancestral environment after weaning. That adult food preferences are largely formed in the first 6 years of life is a common Western view, perhaps a derivative of Freud’s focus on what he designated the critical first 6 years. So far as I know, there is no evidence that the first 6 years are any more important than the next, or the next 6 years after that.

Both genetic and early experience accounts predict substantial parent-child correlations in food preferences. Remarkably, they are in fact very low. Results from Americans suggest values averaging around .15 for preferences for specific foods, comparing the preferences of parents (or the midpoint of mother and father) and the preference of their adult child (Pliner, 1983; P. Rozin, 1991). Similar results appear for music preference, whereas correlations for values such as attitudes to abortion are notably higher (P. Rozin, 1991). Cavalli-Sforza, Feldman, Chen, and Dornbusch (1982) identified three routes for transmission of preferences: vertical (parent-child), horizontal (peer influence), and oblique (e.g., teacher-student, media-child). The low parent-child correlations suggest substantial roles for peers, teachers, heroes, and culturewide forces.

It is not surprising that parents, peers, and other cultural forces produce certain in-culture commonalities in preferences. Not all
clear is what produces within-culture differences. We do not have a set of well-documented mechanisms, although mere exposure (Zajonc, 1968; Pliner, 1982), some types of evaluative conditioning (Martin & Levey, 1978; deHouwer, Thomas, & Baejens, 2001), and “social influence” (whatever that means; e.g., Birch (1980); Birch, Zimmerman, & Hind, 1980; Baejens et al., 1996; Duncker, 1938) are surely involved (for reviews, see Birch, Fisher, & Grimm-Thomas, 1996; P. Rozin, 1988, 1990b).

Peer influences are obviously important in the development of food preferences in some cultures, perhaps especially in adolescence. There is some surprising evidence of its absence in food and music preferences in some American contexts (Rozin, Riklis, & Margolis, 2003).

Of course there is more to transmission than preference. Attitudes toward food and eating, including their importance in comparison to other activities, and the balance of worries and pleasures about eating vary considerably not only between cultures (e.g., between France and the United States; P. Rozin, Fischer, Imada, Sarubin, & Wrzesniewski, 1999) but also within cultures. Recent ethnographic data suggest that some of the major differences in food attitudes between Americans and Southern Europeans can be traced to differences in the types of interactions that occur around the dinner table (Ochs, Pontecorvo, & Fasulo, 1996). The Italian family eating environment is much more oriented toward the shared pleasure of eating, and less toward concerns about food, health, and coaxing children or making bargains to promote healthier eating. This work is a promising beginning for systematic studies of food socialization in a cultural context.

THE INVERSION OF THE ANCESTRAL FOOD WORLD AND THE OBESITY EPIDEMIC

A particular problem of general interest to cultural psychology and cultural studies has to do with the stresses and dislocations that occur in human life as a result of major and rapid cultural advances, especially in technology. For example, the rapid increase in the power and accessibility of the Internet and e-mail have produced much more rapid and widespread links among people around the world, allowing a rumor to spread around the world in hours, as opposed to years. Although most news that individuals received was vetted through a chain of other people or, more recently, newspapers and other media, an individual can now spread “news,” accurate or not, directly to consumers around the world. Modern societies have yet to figure out how to compensate for the potential dangers of instant communication and rapid transmission of diseases because of extensive international travel, or how to control weapons of mass destruction.

We are, both biologically and culturally, adapted more to our ancestral food environment than to our very recent, developed world cultural environment. Enormous challenges to humans have emerged in the food domain as a result of technological advances. The inversions are laid out in Table 16.2. An ancestral environment in which food was in relatively short supply has been replaced by an environment in which cheap food is abundant and always available. An ancestral environment that offered a modest variety of potential foods, mixed with many acutely dangerous potential foods, has been replaced by an environment offering an extraordinary range of safe food choices; I venture that the contemporary urban food supermarket has more different types of foods available than were ever available to anyone on earth even 30 years ago! In the ancestral environment, the foods available evolved under complex adaptation pressures and were rarely (except for animal foods) very calorie dense; in the contemporary environment, foods of extraordinary caloric density and extraordinarily appealing sensory properties are available; chocolate is a prime example. There is nothing so palatable or calorie dense in the natural plant world. In the ancestral environment, we had to work to obtain food; in the contemporary environment, minimal calorie expenditure is necessary. In the ancestral environment, there was a rather close temporal link (measured usually in hours) between ingestion of a food and appreciation of its consequences (nutritional virtues or toxicity).

In the contemporary environment, acute risks of imbalance or toxicity are minimized by cultural means, such as sanitation systems and preservatives. The generally remote food risks in contemporary developed cultures are described as consequences for life expectancy that result from particular patterns of food choice; these are measured in decades, not in hours. The epidemiological revolution is largely re-
### TABLE 16.2. Contrast between Human Ancestral Food Environment and Contemporary Developed World Food Environment

<table>
<thead>
<tr>
<th>Feature</th>
<th>Ancestral environment</th>
<th>Contemporary developed world environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability</td>
<td>Modest short supply</td>
<td>Wildly abundant</td>
</tr>
<tr>
<td>Variety</td>
<td>Modest</td>
<td>Extraordinary; almost all edibles and cultural elaborations of them available to everyone</td>
</tr>
<tr>
<td>Super foods</td>
<td>Nonexistent, except for animal foods</td>
<td>Widely available via technological advance (e.g., grain flours, chocolate)</td>
</tr>
<tr>
<td>Energy expenditure necessary to obtain food</td>
<td>Substantial</td>
<td>Minimal</td>
</tr>
<tr>
<td>Cost</td>
<td>Substantial in terms of time and energy expenditure</td>
<td>Minimal</td>
</tr>
<tr>
<td>Consequences of foods:</td>
<td>Apparent within hours of ingestion</td>
<td>Not apparent at all, culturally informed re: effects decades later</td>
</tr>
<tr>
<td>Epidemiological revolution</td>
<td>Adapted to short-term consequence evaluation</td>
<td>Inability to process and understand complex long term food risk information</td>
</tr>
<tr>
<td>Suitability for evaluating foods</td>
<td></td>
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</tbody>
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Respnsible for this change. Only in the contemporary environment do we get information in the form of risk or probabilities of the long-term effects of dietary patterns from epidemiological and other cultural resources. But we are not evolved to make this sort of evaluation; we did not originally live that long, and the short-term effects of foods were our predominant concern. Cultures have not yet adapted to this source of information. Individuals are not educated about even the basics of probability or the nature of science, and are unable to evaluate the importance of communicated information about risks. Hence, the cultural transformations that occurred largely in the 20th century have rendered our biological heritage, finely tuned to our ancestral environment, worse than useless. And the technological advances (e.g., in epidemiology) have not been compensated by lay education that would allow us to comprehend them and behave adaptively with respect to them; we do not teach nutrition, probability, and associated risk–benefit analysis, and we do not teach how science works, which would allow individuals to interpret intelligently the findings of specific studies broadcast in the media.

The result of these mismatches has been an “epidemic” of obesity and widespread dieting, and concern about eating a healthy diet. It is our biological heritage—and that of most if not all animals—to expend as little energy as possible to obtain adequate nutrition and protection, because energy expenditure requires more energy intake, which itself consumes energy and increases the probability of being prey for other species (Elner & Hughes, 1978; Krebs & Davies, 1997). Furthermore, in the natural world, there is generally a bias to consume food when it is available, since it is often scarce, and undernutrition is a greater threat than overnutrition. Our biological tendencies to eat when food is available and to expend as little energy as possible have become destructive in the modern developed world, where food is palatable, plentiful, and available with minimal energy expenditure.

One result of all of these forces, particularly in the United States, is a great ambivalence about eating, with concerns about obesity tempering the potential enjoyment of a highly palatable, omnipresent, and inexpensive food world (Rodin, Silberstein, & Striegel-Moore, 1985; P. Rozin, Bauer, & Catanese, 2003).

My French colleague Claude Fischler and I, along with a number of students, have taken on the task of examining how different cultures deal with the mismatch between the ancestral and contemporary, developed world food environment, focusing on France and the United States. We have argued that France has been more successful in creating or maintaining compensatory cultural institutions (P. Rozin, Fischler, et al., 1999; P. Rozin, Kabrick, Fischler, & Shields, 2003; summarized in P. Rozin, 2005), because traditional features of
1. The French food environment discourages overeating by offering smaller portions and discouraging snacking (P. Rozin, Kahnick, et al., 2003).

2. The cultural geography of living styles in France, including especially the availability of food sources (stores) locally and within walking distance of most homes, and the greater inconveniences and expenses associated with the use of automobiles, probably leads to greater energy expenditure in daily life in France.

3. The traditional French attitudes toward food focus more on the experience of eating and less on the (health) consequences of eating, leading to less conflict and worry about eating, and more pleasure.

4. Certain deep differences in cultural values with respect to food tend to reduce the impact of easy availability of inexpensive, varied, and highly palatable foods (Stearns, 1997; P. Rozin, 2005). These cultural values include:
   a. An emphasis on moderation as the reigning principle for eating in France, as opposed to abundance in the United States. The striking contrast is illustrated by the quintessential American eating holiday, Thanksgiving, in which being overfed seems to be a sign of a successful dinner. As well, the “all you can eat” restaurant is common in the United States and rare in France (P. Rozin, Kahnick, et al., 2003).
   b. A related emphasis on food quality in France and food quantity in the United States. In a sense, love and caring are expressed more in terms of quantity of food offered in the United States versus quality of food in France.
   c. Collective food values are more prominent in France, whereas individualized food values are prominent in the United States. This may result from the strong individualism/protestant traditions in the United States. As a result, Americans prefer to be offered a much wider variety of minor variants of the same food (Rozin, Fischler, Shields, & Masson, 2006), and are much more inclined in a restaurant to do their own mixing and matching of main meat dish and vegetable accompaniments, and more individualized seasoning of foods (salt, pepper, ketchup, mustard, etc.).
   d. Americans are more motivated to spend money and arrange their lives to minimize effort and maximize convenience, which has the result of spending less energy. The French are more inclined to spend money on maximizing joy, that is, having memorable and relatively unique experiences. This corresponds to the important distinction between comforts and pleasures made by Scitovsky (1976/1992).

In short, our analysis indicates that the greater success of the French in resisting both the promotion of overeating and inactivity in modern world results from a combination of differences in cultural values and in the arrangement of the environment. Most of the differences described here operate to preserve the pleasures of eating, reduce exaggerated worries about eating, and promote weight control in the French as opposed to Americans. It is not that the French have developed better compensatory mechanisms for the modern food environment, but that food institutions already in place have increased resistance to these changes.

FOOD AND SEX

I have argued that food plays a special role in cultural psychology because of the ways cultures have transformed the food domain. In contrast, sex plays a prominent role in evolutionary psychology, because of the many basic
similarities in the construct and contexts of sexual behavior in the ancestral and modern environments. Yet there are important and fundamental similarities between these two domains. From the point of view of behavior, food is the critical domain for individual survival, and sex, for species survival. Both are incorporative; except for breathing, these are the two domains in which we take into our bodies material substances from outside our bodies. In both domains, there is great sensitivity about what gets in; there is great pleasure when the “right” stuff gets in, and great aversion, fear, and disgust when the “wrong” stuff gets in.

Contamination and purity are important in the thinking within both domains. Both sex and food involve sharing substance with another person. This is obvious for sex (and may include shared saliva). For food, shared substance occurs in three senses: eating a food prepared by another person, and eating together with another person (perhaps from the same plate or taking bites from the same entity) and, in societies that practice cannibalism, eating another person—either as a demeaning act (analogous to rape) or as an intimate, incorporative act of preserving a loved one within oneself. Alan Fiske (personal communication, January 16, 1991) has pointed out that eating is commonly used as a metaphor for sexual relations in many cultures, and that rules concerning food and sex are often either parallel or mutually determinative. For example, South Asians of higher caste abhor sharing food or drink with people of lower caste and women having sexual relations with men of lower caste. For men in some West African cultures, it is taboo to eat, drink, or share tobacco or kola with the husband of any woman with whom they have sex. They believe that to do so would kill the husband. Conversely, a woman must never cook food for a man who eats with another man with whom she has sexual relations. In several West African pastoralist societies, warriors have sexual relations with some women and eat food cooked by others, but they cannot be seen eating by the women with whom they have sex. In Western cultures, dinner dates and patterns of food sharing may be considered part of sexual foreplay.

Meigs’s (1984) analysis of the food taboos of the Hua of Papua New Guinea is an exemplary demonstration of mixed nutritive and sexual meanings of foods. Foods are believed to be vehicles for “vital essence,” deriving from both their origins and the people who have handled them. There is great concern that pubescent males be protected from feminization by foods. Hence, they are not allowed to consume any food raised or prepared by a fertile woman. Furthermore, a whole set of foods that are believed to be “female” and hence feminizing are prohibited during this period. Meigs assembled a list of such foods, and noted that, as a group, they are reddish in color and soft in texture.

Sex and food each have their relevant aperture, though the mouth is, in many cultures, shared in both food and sex functions. Parallels between the vagina and the mouth are obvious, including common terminology (labia and lips). The high sensitivity of women to vaginal intrusion by foreign and potentially contaminating objects parallels the sense of oral intrusion for such objects by both males and females (P. Rozin, Nemeroft, Horowitz, Gordon, & Voel, 1995).

Finally, at least in American English, there are important metaphorical exchanges of food and sex words. Eat has sexual connotations; the word meat is sometimes used to refer to women in a sexual context and is also used to refer to male genitals.

**SOME IMPORTANT GENERAL ISSUES THAT CAN BE WELL-ADRESSED IN THE FOOD DOMAIN**

Many basic issues in psychology are present in both food and other domains. In some cases, the food domain may provide a particularly convenient area for study of such issues; in other cases, insights from the study of food and eating may contribute to general understanding, or greater understanding of another domain of life. A few of these general issues are considered here.

**Food and Environment**

The amount of food consumed, and the choice of food are both influenced by many factors, some of which fall within the domains of physiology, psychology, and culture. Perhaps the single most important determinant, mundane as it may be, is the environment. One can only eat foods that are available in the environment. Generally, if food is accessible and at least mildly palatable, people will eat it. The availability of food is principally a result of eco-
driving from both men and women who have handled the pubescent that pubescent organization by foods. They may not eat any group of foods that are considered feminizing, are soft in texture, or are considered soft in texture, such as their relevant appetites in many cultures, or some functions. Parallels with the way the body structure are obvious, as in the term for the female to vaginal intercourse (lactation and labia and clitoris) is associated with the maintenance of oral function, or conversely, in females and males. Both terms are used to refer to body parts and are also used to describe features of different body parts.

10. FOOD AND EATING ISSUES THAT CAN AFFECT FOOD DOMAINS

Culture and psychology are present in the use of food in domains. In some cultures, food can take on a particularly symbolic role. As an example of such issues, in some food domains, a study of food and the cultural and social understanding of another domain. The study of general issues are

Food, Social Class, and Social Structure

The foods consumed, and attitudes toward food, vary across social classes. This area represents an interface between psychology and sociology. Cultural psychology must address social structure and social class, because these are psychologically important manifestations of culture. The social structure of Hindu India has an enormous influence on food transactions, as mediated by the caste system (Appadurai, 1981; Marriott, 1968). Changes in food habits within any culture usually take place over decades or even centuries, and typically move from one class to another. Thus, for example, in Europe, chocolate moved from upper to lower classes. Economic factors (rarity and high cost) partly account for this, as well as a general tendency for lower classes to imitate the behavior of higher classes. On the other hand, some foods, including chili pepper and, more generally, highly seasoned foods, have often moved from the lower to the upper classes. The popularity of ethnic cuisines among well-off Americans in recent decades represents a movement from lower to higher classes.

Finally, in modern American society, primarily among more educated and wealthy groups (Leichter, 1997), the idea of healthy eating and exercise has taken hold. This often acquires a moral tinge, which has been called "secular" morality by Solomon Katz (1997).

Food as Symbol

Symbolism has always held a fascination in psychology, partly because both metaphors and symbols seem such a central part of human life (e.g., Lakoff & Johnson, 1980). Food, because of its centrality in life, and because it is incorporated into the body, is a major source for symbols and metaphors. For example, rice plays a central role in Japanese life and thought, over and above its nutritional importance (Ohnuki-Tierney, 1993). Food is at the center of many taboos, many of which seem to serve functions outside the domain of nutrition (e.g., Douglas, 1966).

Globalization and Starvation

An important general issue that is well illustrated in the food domain is globalization. Technological advances and globalisation have made calories inexpensive (Drewnowski, 1999), have led to a market that caters precisely to individual tastes (Kahn & McAlister, 1997), and have generally transformed the world of food and nutrition (Sobal, 1999). What used to be local food risks have become well-publicized, international fears, with mad cow disease as a clear example (Fischler, 1993). Modern food technology and the modern food-based environment has fostered a situation in which convenience and choice has become a prime commodity. It is likely that the inherent and biologically predisposed laziness of all animals, including humans, is being catered to more and more effectively. It may soon be possible to accomplish eating, entertainment, and other major activities with a minimal of energy expenditure. It was once good to be lazy, but it may not be any more, in terms of either quality of life or longevity. In the meantime, technological advances have greatly improved the safety and shelf-life of foods, introduced a massive variety of highly palatable foods, cut food prices, and made it easy to deliver any type of food almost anywhere in the world. Food is a major area for the study of globalization. The successful penetration of McDonald's into vastly different
cultures argues for both important food universals, and a certain cultural sensitivity motivated by the profit motive (Watson, 1997).

At the same time that all of this is happening, along with the surplus of cheap and nutritious food in the developed world, there are still major problems with starvation in the less developed world. It is generally agreed that starvation is a complex product of politics, and economics, sometimes exacerbated by specific cultural practices or preferences. But the major problem today seems to be one of distribution of already produced food to the locations where it is most needed, and this has to do with economics, politics, and culture.

CONCLUSIONS

Food is basic, and it is about biology, psychology (individuals experience), and culture. There are many universals and many major culture differences. Cultural evolution is particularly robust in the food domain, and preadaptation of foundational food system features is rampant. The food system presents particular challenges and particular opportunities for cultural psychology. The cross-cultural and historical records are good, especially because food is so central in archaeology and ethnography. The biological constraints and predispositions are well understood. What we need is for more researchers to take up the challenge.

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