I was once asked to explain why I love being a psychologist. First, I don’t think there is a better way to be trained in science. The difficulties of studying behavior have made us sophisticated about experimental design and statistical analysis. The results of our work impact the lives of real people. We have low tolerance for nonsense in science. As far as I am concerned, this is science at its best. We look for the essence of what makes us act and interact from the exotic to the mundane. And so it is with taste.

Pubillius Syrus (1st century BC) wrote, “No pleasure endures unseasoned by variety.” William Cowper (1731-1800) expanded on that a bit with, “Variety’s the very spice of life that gives it all its flavour.” Although it’s useful for philosophizing, “spice” technically refers to aromatic or pungent plant-derived substances used to flavor foods. In addition to the pleasure they add, spices are important chemosensory labels that identify a food as belonging to the group we find familiar and thus safe. The Flavor-Principle Cookbook (an out-of-print cookbook written by Elizabeth Rozin in 1973 and treasured by those of us lucky enough to own a copy) analyzes cuisines by their customary spices explaining in the process how to make a new ingredient seem to belong to a particular cuisine by using that cuisine’s typical spices. The palatability of spices is learned (more about the mechanics of this later). Learning to like new spices is a gateway into a new culture. Thus, spices engage psychologists in a variety of phenomena from pleasure to cultural identity.

Our dietary choices play critical roles in a variety of health issues, and spices are one element in an array of factors that affect our behavior toward food. Perhaps one of the most fascinating and important phenomena associated with good health is the degree to which we know what to do to be healthy, but we do not do it. This discrepancy is the province of psychology. The U.S. Department of Health and Human Services manages “Healthy People 2010,” a consortium of agencies and organizations dedicated to achieve a set of health goals and objectives for the nation (www.healthypeople.gov). The consortium has proposed 10 health indicators to reflect the major health concerns in the United States at the beginning of the 21st century: physical activity, weight and obesity, tobacco use, substance abuse, responsible sexual behavior, mental health, injury and violence, environmental quality, immunization, and access to health care. Note that the majority of these health indicators involve behavior.

As a psychologist working in the chemical senses and a person who never ceases to be tempted by good barbecue, one of the real world problems of primary interest to me is our love affair with food. The allure of food is not surprising since our very survival depends on it. Also not surprising, the food industry is tuned into the power food has over our lives and uses that power to increase profit. The use of fat, sweetness, and salt to sell food is rooted in the basic biology of the way we are wired to survive. Humans are omnivores, we can (and do) eat an amazing variety of foods. The “omnivore’s dilemma”
(first described by Rozin and Rozin in 1981 and later used as the title of a book by Michael Pollan in 2006) encapsulates the biological challenge we face. We must avoid foods that can harm us and we must seek out and consume foods that will sustain us. Nature equipped us with some mechanisms so the newborn can avoid immediate disasters that could prove fatal. She gave us the “four basic tastes”: bitter detects poisons, sweet detects the sugars essential as fuels for the brain, salty detects the macromineral sodium (essential to nerve and muscle function) and sour detects acids with the potential to burn tissue. The aversions to bitter and strong sour are hard-wired. In addition, the pleasure associated with tasting sugar and salt are hard-wired; we know a great deal about the brain circuitry devoted to making these sensations attractive to us. The love of sweet and salty may be wired into the brain, but the magnitude of that love is connected to body need. This insight developed into the classic theory of “wisdom of the body.” But how do we regulate the many other nutrients essential to build our bodies, in particular, fats and proteins?

Once nature has ensured our immediate survival, she provides another mechanism to insure intake of fats and proteins: learning. Our brains recognize certain benefits from food. Much is yet to be discovered, but recent work identifying receptors in the gastrointestinal (GI) tract (e.g., Egan and Margolskee, 2008) shows us how the diversity of foods we have available provides the signals necessary for the brain to make us learn to love those she deems good for us. Fat and protein molecules are too large to stimulate taste or olfaction directly; however, these large molecules are broken into smaller molecules by digestion. Receptors in the GI tract respond to those smaller molecules: fatty acids (pieces of fat molecules) and glutamate (one of the amino acids that make up proteins). The sensations (specifically the flavors) evoked by food in the mouth are linked to the signals from the receptors in the GI tract through learning. Those flavors become conditioned to evoke pleasure. The more different flavors paired with foods containing fats and proteins that we consume, the larger the set of palatable items with which we can be tempted. Variety is not only the “spice of life,” it is one of the engines that drives overconsumption. Spices are highly salient flavor cues that once learned can (and do) manipulate the palatability of the food we consume. The food industry uses these cues, but hardly deserves all the blame for using flavor to enhance food palatability and thus sell more to consumers. We manipulate our own behavior everyday by the way we flavor the dishes we create in our kitchens.

Subsequent columns will celebrate some of the extraordinarily clever experiments and experimenters who have illuminated our food behavior. Given the current focus on body weight, much of this work will contribute to our understanding of how food regulation mechanisms can lead to what we define as a dysregulation: the “obesity epidemic.” Books, magazines and even scientific journals are filled with explanations of obesity and quick fixes; however, nothing attests quite so dramatically to the failure of these efforts than the continuing series of them.

One conclusion we can embrace from the outset: obesity is complex. There is no single cause and no single solution. I heard a wonderful talk some years ago at one of the annual meetings of the Society for the Study of Ingestive Behavior (affectionately known as SSIB to its members). David Levitsky, a psychologist at Cornell who combines expertise in nutrition with the behavioral sophistication he gained from his psychologist mentor, APS Fellow and Charter Member George Collier, reminded those in his audience that the normal distribution is the mathematical consequence of the summation of a large number of independent events. Thus, weight, like so many human characteristics that are normally distributed, results from the summation many influences. Incidentally, although it is reasonable to use cutoffs to define groups of interest (e.g., the classic sorting into underweight, normal, overweight, and
obese), looking at changes over time of the whole distribution can provide a more accurate assessment of where we should focus our research and interventions. We know that weight is going up, but how is that increase distributed? Katherine Flegal, a nutritionist/epidemiologist at the Centers for Disease Control and Prevention, has shown that increased weight is not evenly distributed across body-mass index (BMI). She summarizes changes in the weight distributions for groups differing by age and sex noting that, “Taken together, these observations suggest that for adults some factors causing increases in BMI are affecting the entire distribution of BMI, although the changes in the distribution of BMI are most marked at the upper end of the distributions.” (Flegal and Troiano, 2000). Jeffrey Friedman (the scientist at Rockefeller University who discovered leptin) used Flegal’s data to argue for interactions of our genes with the environment suggesting the possibility that “there is a subgroup that is genetically susceptible to obesity and a different subgroup that is relatively resistant” (Friedman, 2003).

The contributions of psychologists to a study of food behavior illustrate the same strategies used in many problem areas in psychology: the use of animal models to illuminate human behavior, psychophysics to study the relevant stimuli, controlled laboratory studies to test specific hypotheses with volunteers, epidemiological studies to quantify our observations of populations, etc. In addition, psychologists collaborate with those in other scientific disciplines to extend what we learn in our domain; thus, we collaborate with economists, sociologists, neuroscientists, etc. We also put what we learn to work to study and solve clinical problems. Finally, we use what we learn to make the world we live in a better place.

Next month, I’ll be discussing one of my favorite food topics: Do artificial sweeteners promote weight loss or weight gain? Saccharin, cyclamate (cyclamate was ultimately banned in 1969 because of cancer concerns) and aspartame seemed to usher in a new era: sweet taste with no calories; the sales of these artificial sweeteners testifies to our love of sweet. Although a simple substitution of an artificial sweetener for sugar would obviously lead to weight loss, the reality turned out to be anything but simple. The debate has flourished over the years; however, most recently, two psychologists at Purdue have developed an animal model that not only supports the conclusion that artificial sweeteners lead to weight gain but also shows us how it happens. Stay tuned.