

Interrogating Moral and Quantification Discourses in Nutritional Knowledge

Abstract: This conversation is part of a special issue on “Critical Nutrition” in which multiple authors weigh in on various themes related to the origins, character, and consequences of contemporary American nutrition discourses and practices, as well as how nutrition might be known and done differently. In this section authors focus on the hegemony of reductionism and quantification in modern-day nutritional knowledge by discussing the historical foundations and ethical dimensions, as well as the scientific absences, in this knowledge.

Introduction: Julie Guthman

FOR MANY AMERICANS, good nutrition is associated with counting calories, balancing the right amount of carbohydrates, proteins, and fats, and ensuring the intake of essential vitamins and minerals. As several scholars in this issue and elsewhere have discussed, the hegemony of counting and disclosing calories, macronutrients, and micronutrients as a dietary management practice stems from the American Progressive Era’s love affair with rationalization and standardization (Biltekoff 2013; Mudry 2009; Scrinis 2013; Veit 2013). As Nick Cullather (2007) has argued, the calorie, especially, made dietary needs appear commensurable and thus allowed regulation and surveillance of health at the level of the population. In that way quantification is what the philosopher Michel Foucault (2009) would call a technology of security. As Foucault might also have noted, dietary biopolitics is also enacted through institutional disciplinary practices. Here it is worth considering that quantification discourses have well served the nutrition profession, which in its efforts to get individuals to “eat right,” often draws on the ostensible “simplicity” of communicating with numbers (Yates-Doerr 2012). Marion Nestle, for example, has consistently suggested that the way to cope with a mountain of conflicting dietary advice is to keep it simple (e.g., 2007). Yet, as Emily Yates-Doerr (2012) has shown through her field work in Guatemala, simplicity can be tremendously opaque. Simplicity, after all, depends on shared ontologies of what constitutes food and how it can be categorized. Moreover, vitamin and mineral content, as well as calories, are not tangible or

Reviewing various challenges to the energy balance model, they all suggest that the promotion of good nutrition is far from simple. Some authors also discuss why various “invisible” nutrients and measures of good nutrition continue to hold so much sway in nutrition discourse.

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visible to the eye and thus depend on expert knowledge to evaluate their presence. Discourses of simplicity also seem to assume that all bodies respond similarly to particular foods (Hayes-Conroy and Hayes-Conroy 2013).

In this section authors engage with the hegemony of reductionism and quantification in modern-day nutritional knowledge by discussing the historical foundations and ethical dimensions, as well as the scientific absences in this knowledge. They all suggest that the promotion of good nutrition is far from simple, yet they provide somewhat different answers as to why these “invisible” nutrients and measures of good nutrition continue to hold so much sway.

Social and Moral Dimensions of Nutrition Facts: Charlotte Biltekoff

Nutrition is much more than a collection of objective facts about the relationship between the chemical (or even microbial) constituents of food and the physiology of body; it is also a means of expressing social concerns and social values (Mudry 2009; Kimura 2013; Hayes Conroy and Hayes Conroy 2013). Therefore, any efforts to solve pressing problems in food and health should focus not just on getting nutrition knowledge right in the sense that Adele Hite discusses in *Nutrition Troubles*, but also on getting nutrition knowledge right in the sense of understanding the complex of beliefs and values that are expressed through the science of nutrition and its application in the form of dietary advice and other interventions.

Science historian Gyorgy Scrinis (2013) has contributed to an understanding of the extra-scientific aspects of nutrition through his theory of nutritionism, which rethinks nutrition as not simply a collection of facts about the relationship between food and the body, but instead an ideology that has had profound effects on the way individuals understand and assess food. His critique is food-centered in that he focuses on the ways in which the supposedly neutral language of nutrition privileges certain modes of assessing food values and occludes others. And he is primarily concerned with the political economic effects of these ideologies, in the sense that the food industry benefits from nutritionism's focus on nutrients rather than ingredients, additives, and processing techniques, for example. Scrinis also argues that nutrition constructs "nutri-centric" subjects—people who embrace and internalize the particular ways of understanding food and the body that nutritionism produces. However, accounting for the kind of knowledge and power that inheres in nutrition also requires taking into account the effects nutrition knowledge has outside of the realm of food. Nutrition is an ideology that constructs subjects with certain kinds of relationships not just to food and nutrition, but to themselves, other people, and the social order. Looking beyond food, at social effects, and beyond political economy, at the cultural politics of dietary health, reveals ideological effects of nutrition that Scrinis has not theorized.

Scientific research focuses on understanding the physiological and biochemical facts of nutrition. It seeks to order and simplify the vast complexity of biological processes, and as Scrinis (2013) points out, typically does so through a reductive approach to nutrients, food, and the body that tightens its gaze around a set of distinct facts about particular nutrients. But nutrition's utilitarian reductionisms deny more than just the scientific complexity of nutrition facts. It also obscures their social and cultural complexity. While reductionism serves the process of scientific discovery, nutritional knowledge cannot successfully be applied in the absence of understanding the social contexts in which those facts are produced and applied. The job of social science, therefore, is to account for the relationship between nutrition and its context, to ask "what else is going on here?" in the face of knowledge that claims pure objectivity, and, ultimately, to convince our colleagues in the sciences that understanding and working with the social and cultural aspects of nutrition is essential to assuring that scientific research has its intended impact.

John Coveney (2006) provides an important foundation for rethinking nutritional knowledge in *Food, Morals and Meaning: The Pleasure and Anxiety of Eating*. He shows that nutrition facts are fundamentally rooted in moral values; the ethical, or spiritual, dimensions of nutrition date back to

antiquity. Moral and aesthetic criteria prevailed in the determination of a good diet until the advent of the modern science of nutrition in the nineteenth century but, as Coveney argues, the emergence of the science of nutrition changed things dramatically, but not completely. Rather than introducing an entirely new conceptualization of the relationship between food and health, nutrition built on existing moral precepts concerning the management of the appetite. Like other sciences, nutrition ultimately staked its claim to authority on the presumed objectivity of the quantitative frameworks it produced. But the ethical aspects of nutrition were obscured, not vanquished, by the empirical. As Coveney argues, nutrition is always both empirical and ethical; it provides rules about what to eat that also function as a system through which people construct themselves as certain kinds of subjects.

Most contemporary consumers of both food and dietary advice think of nutrition as a purely objective means of measuring and assessing food value, focusing on the quantitative frameworks that explain what makes certain foods and diets good or bad, and better or worse than others. But occasional brushes with the ethical dimensions of nutrition are inevitable. My students report that they try to eat right not only because they want to live long and healthy lives (and look good), but also because they want to show that they are educated, disciplined, mature, or virtuous. The moral satisfaction of bringing kale salad to a potluck, the awkward social dynamics of soccer practice snacks, vicious yet seemingly socially acceptable attacks on the characters of fat people; each of these briefly reveal ethical aspects of nutrition and dietary health that are always there.

It can be very difficult to keep both the empirical and ethical aspects of nutrition in mind. As I explore in *Eating Right in America* (Biltekoff 2013), nutritional frameworks for thinking about good food tend to obscure their inevitable moral and ethical dimensions. The campaign against obesity, for example, is organized around an empirical problem (that of population-level weight increase and its correlations with disease) and is conducted using quantitative strategies such as the BMI and calories in/calories out models. The factual orientation belies moral dimensions that are evident, for example, in the prejudice and discrimination fat people face, including in the arena of health care itself (Puhl and Brownell 2001; Saguy 2013). They are also evident, even explicit, in frequent representations of obesity as a threat to the nation and weight loss as a patriotic duty. A 2004 Harvard Magazine cover, for example, implies that obesity is a question of national character through its representation of a fat, flag-draped lady liberty standing on a penny scale, aghast at the

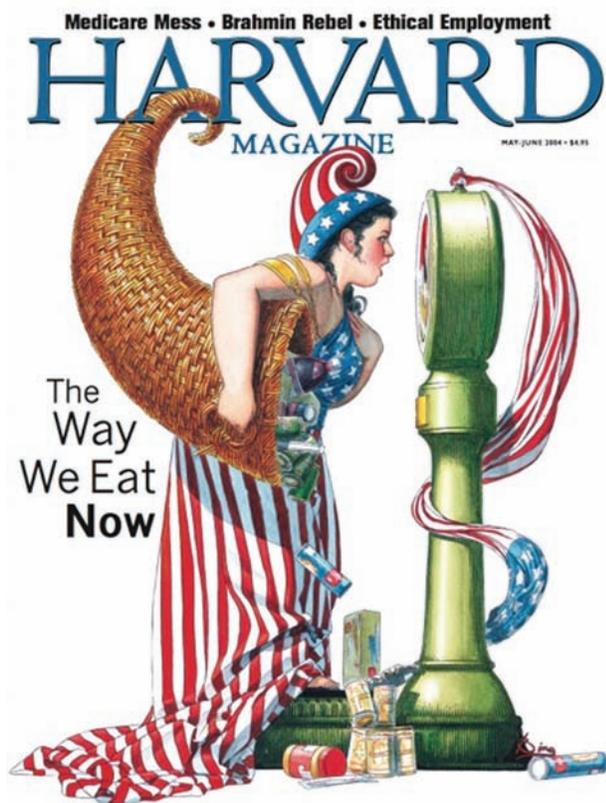


FIGURE 1: *The moral dimensions of dietary discourse made explicit.*
HARVARD MAGAZINE, MAY-JUNE 2004

display as beer cans, soda bottles, peanut butter and chips tumble from her corrupt cornucopia (see Figure 1). At the same time, ethically oriented frameworks typically obscure their inevitably empirical aspects. The alternative food movement, for example, is overtly organized around the moral and ethical dimensions of food choices. Less obvious are the normalizing “rules” that it conveys about what exactly constitutes “good food.”

But the historical arc of dietary reform in the United States reveals a pattern that can bring the dual nature of dietary advice into clearer focus; both dietary and social ideals have changed over the course of the last century, but the relationship between them has remained consistent. Dietary reformers have consistently responded to nutrition crises that were also social crises by providing dietary advice (rules) that also expressed social ideals (ethics). The deeply ethical nature of nutrition facts and dietary advice is particularly evident in the early years of modern nutrition and its application in the form of dietary advice by turn-of-the-twentieth-century social reformers referred to as domestic scientists. Both Wilbur O. Atwater, known as the Father of American Nutrition, and

domestic scientists embraced the dual nature of their work overtly, producing and applying facts and rules in the interest of addressing social problems that industrialization and urbanization were visiting on Northeastern urban centers. Atwater, for example, responded to concerns about the possibility of labor unrest, shared among many of the fledgling middle class at the time, by defining a good diet as one that produced the most energy for work at the least possible cost. Domestic scientists initially applied the nutritional facts that Atwater produced with the stated aim of improving the character and morals of New England’s immigrants and urban poor. Later, they applied nutrition facts toward improving the middle class, giving rise to home economics courses that, while focused on domesticity, provided lessons that were strikingly similar to those offered in the civics courses of their day (Biltekoff 2013).

Robert Crawford (1984: 62) has argued that the concept of health is a way people give expression to cultural notions of well-being or quality of life, and that talking about health is a way to reaffirm the shared values of a culture and express what it means to be a moral person. Likewise, there is no such thing as dietary health apart from social values. Looking back at nutrition and dietary reform at the turn of the twentieth century reminds us that empirical facts and quantitative strategies of nutrition are inevitably informed by and engaged in social processes and that the ideological dimensions of nutrition transcend by far the realm of food and eating.

Quantification and the Calorie: Jessica Mudry

A recent post on the USDA’s blog that reads “Better Nutrition Leads to a Better Life, Thanks to USDA Research” brings Charlotte’s work into conversation with my own (USDA 2014.) The national campaign of nutrition, on a mission to make the lives of Americans better by telling them what and how to eat, points to the impossible task of extricating dietary health and social values, but it also brings to light the processes of generating and defining these values. According to the USDA, “research” is owed a debt of gratitude for bettering our lives through food. What the USDA means by “research” deserves scholarly attention as I think it gets at important epistemological questions about food.

As Charlotte points out, domestic scientists built their social causes on a foundation of nutrition, but underpinning that foundation is a set of practices belonging to science. I am interested in what happens when empirical research and scientific language circumscribes food and dietary health, and what this does to the process of knowledge contestation. The

perceived universality and scientific rigor in nutrition science introduces a distance between food and the people who eat it, as well as a rhetorical strategy for constructing health as a palatable goal. If nutrition is a science, then data become the currency for knowledge because science provides nutritionists an objective distance from both food and eaters (Porter 1995).

At the level of language, it is the scientific voice that becomes the medium of knowledge production. When a package of cookies is 100 calories, or a glass of milk is a source of calcium, these statements are not sullied with human opinion (Montgomery 1996). As well, only specialized communities have access to this knowledge. Nutritionists may dispute the caloric needs among 25-year-old active males but the dispute is about, as Charlotte says, “getting the facts right,” not questioning how they are constructed as facts, or by whom. A nutritionist framework privileges nutritionists, dieticians, or biochemists as the arbiters of the category of “food” because they are the ones who generate and assess quantitative data. Because these quantitative properties strip food of any history, geography, culture, or taste, any food can be “known” in this way, compared to another and assessed, on a qualitative level, whether or not it is part of a “good” diet. Of course, if science determines whether a food is good or not, the rubric of self-assessment, and moral judgment around food, is also mathematical.

This quantitative framework has piqued my interest in the calorie as the measurable “known” of diets, eating, and food. This interest arose because I see the practice of measurement as having rhetorical effects on eaters, nutrition policy, and the field of dietetics, agriculture, and industries of food production (Mudry 2009). Today, it is hard to find any dietary advice that does not refer to the calorie — global health indices, federal food guides, local restaurant menus — and so to understand nutritionism as an ideological force, the naturalized elements of its discourses deserve some attention. The calorie defines our food, our metabolisms, our activities, and our health, and has done so since the development of the technology of the calorimeter in the late 1800s in Germany and America. Charlotte alludes to Wilbur Atwater generating the nutritional profiles of foods so that he could assess the “efficiency” of diets. This was a sage political move by Atwater, but not a surprising one. Progressivist politics, and the scientific management movements in America and Western Europe at the turn of the twentieth century, put efficiency at the center of public life. The scientific management of all public affairs was the way to become more efficient (Haber 1964; Nelson 1980). To be an efficient “prime motor,” as Atwater called the human body, was to make the calorie the central medium of exchange between eating and doing, and to make



FIGURE 2: Encouraging us to think about ourselves as Atwater’s “prime motor.”

PHOTOGRAPH: “TAKE THE STAIRS!” BY LUDOVIC BERTRON, CREATIVE COMMONS 2.0

sure that the calories going into the body equaled what came out in the form of work (Atwater and Benedict 1903: 10).

Wilbur Atwater’s research was pivotal in generating a morality of food through the identification of nutrients. Atwater’s concern was the measurement of “the total income and outgo of energy in the body of animal or a man” to prove the law of conservation of energy (Atwater and Rosa 1899). He and his research associates recruited graduate students to spend days in a tiny, isolated, temperature-controlled calorimeter, and the human subjects read, ate, slept, pedaled a stationary bicycle, and studied inside the chamber. Atwater and Rosa measured everything the student ate, and every task they performed. Everything the student excreted was weighed and measured. The unit for all of this measurement was the calorie. Atwater and Edward Rosa’s laboratory experiments with the respiration calorimeter were instrumental in generating the tripartite relationship among food, calories, and the body. The experiments helped make the body a site for contesting nutritional knowledge, and a place to turn the calorie from an edible noun to a medium of energy transfer.

At its core, much nutrition research still treats the body as a simplified motor. Now it does not seem strange to read that calories are something we “do”; either through our quotidian activities: shoveling snow, having sex, vacuuming, “playing with our kids with vigorous effort” (Harvard Heart Letter n.d.), or through nominated exercise: running at a speed of 5.2 miles per hour, using an elliptical machine, or doing a boot camp aerobics class. So when stars make statements like “I work out so that I can eat what I want,” as Gwyneth Paltrow stated in the UK’s *InStyle* magazine in 2012, she makes an obvious statement — there is a relationship between food and doing, and that relationship is one in which the

body is a site of calorified and moralized negotiation (Chang 2012). Modern mechanized gym equipment like treadmills and stairclimbers provide programs for users to set the number of calories burned as a goal for a workout. This is, as Gwyneth Paltrow pointed out, to zero the effects of what the person ate or, indeed, to work toward caloric debt with the hope of losing weight.

Atwater's respiration calorimeter was an early technology that, in the name of efficiency, aimed to show scientists how to balance, or "zero," the body by quantifying foods, activities, and by-products. This balanced equation is the simplistic predecessor to our idea of metabolism—often spoken about in deterministic terms, and lamented for being too fast among those trying to bulk up and too slow for those trying to lose weight. Modern nutrition scientists, exercise scientists, and food chemists continue signifying the calorie by referring to it in discussions of nutrition policies, eating, exercise, bodies, and food package labeling. The ubiquity of the calorie, and the moral load it carries, has now caused problems for the very researchers who rely on it as a metric for dietary health. A recent *Public Library of Science* article pointed out that in the US National Health and Nutrition Examination Survey (NHANES) the majority of the participants *underreported* their caloric intake to the point where it was not "physiologically possible" (Archer, Hand, and Blair 2013). While the concern may be that the public does not understand what a calorie is, calorie-shaming shows that the unit has social currency, and that it is heavily moralized. Participants in the NHANES study know that to *not* eat calories is better than eating them, and that even if they were not actually eating fewer calories, telling the survey they were gave them nutritional ethos.

The practice of measuring food, and ourselves through food using the trope of the calorie, has significant ontological effects. The eater realizes smell, texture, and taste through eating, but in the model of the metabolic motor, they realize calories as well. I can buy a one-calorie Diet Coke, plan a 500-calorie workout, or conscientiously "treat" myself to a 100-calorie package of chocolate cookie thin crisps. Political, legal, economic, and public health policies use the calorie to judge a nation's health, appraise poverty levels, and determine food "value." The World Health Organization ranks nations on their "per capita supply of calories" (WHO n.d.). The Global Hunger Index defines undernourishment as "calorie deficiency" (IFPRI 2013), and the USDA's MyPlate nutrition guide encourages caloric thinking to manage weight (USDA n.d.). Senate Bill 1420 in California requires menus to be labeled for calories, and this state bill has been copied in cities like Seattle and New York. Political and civic

engagement requires caloric literacy, and policies that attempt to socially engineer our eating habits reflect this (Rivera 2007; CSPI 2008; New York City Department of Health and Mental Hygiene 2006).

That the calorie looms large in our nutritional and political conscience becomes more apparent when companies stake their market share on producing foods with *no* calories. Food chemists have removed the calories from chocolate sauce, peanut butter, and mayonnaise. By turning attention to the fact that calories are absent from these foods, a company reinforces the calorie's role as a defining trope of food. Measuring the absence of nutrients, gluten, carbs, calories, or sugar serves as a reminder that the nutrient is a constituent of food, and that eating right requires scientific knowledge in order to negotiate the nutrients. The hegemony of nutritionist discourses is well illustrated by imagining apples labeled "flavor-free" instead of "gluten-free," or "carb-free" chicken breasts proclaiming to be "taste-free." These exercises point to the fact that the current nutritionist framework makes eating right about measuring, not tasting. Within this bizarre framework, and with the help of food production technologies—thickeners, emulsifiers, gums, and artificial sugars—eating becomes an act of "not eating," and not eating is socially rewarded. Ironically, knowing this skews nutrition research because study participants try so hard to adhere to scientific standards that they do not accurately report what they are eating (Mitka 2013).

This gets at the philosophical question: how do we "know" food? Nutrition requires eaters to evaluate and assess in order to know food. This kind of epistemology encourages the subordination of the subjective by the objective, the qualitative by the quantitative, the individual by the "normal," and the idiosyncratic by the standard, and it is a troubling trend. More troubling, in my opinion, is that many of the discursive practices of nutrition science delimit policies about food, underpin academic disciplines of food (dietetics, nutrition, food science, and the like), and reframe the relationship between food and the body. I know how to eat—properly, morally, ethically, healthfully—because I know how to count. Because the calorie serves as the character of comparison—and I use the word character on purpose because it connotes both a morality and an ethics—I would argue that the calorie is a key trope in the establishment of nutritionism.

Charismatic Nutrients: Aya H. Kimura

I want to situate two major points posed above by Charlotte and Jessica regarding morality and quantification in nutrition

science—in a more global picture. Ethical and reductionist aspects of nutrition science have not only been tied to a particular value system of the educated upper-middle-class experts in the United States but critically embedded in colonial relations (and on this point, even in the US it is necessary to talk not only about class but also explicitly about race as important factors shaping the notion of a good meal and eater).

For instance, protein figured critically in the interpretation of the social problems in the colonies, and in the conceptualization of indigenous “inferior food” (Carpenter 1994). In a famous study British scientists John Gilks and John Boyd Orr examined diets of tribes in Africa, and argued that the inferior physique and health of the Kikuyu people was attributable to the lack of protein in their vegetable-based diet (Gilks and Orr 1927). The notion that the lack of protein characterized the inferior diet of the colonies began to take hold, and nutrition programs focused on increasing protein intake among the natives. Protein even provided a scientized explanation for the West’s perceived superiority to the Orient. A widely used medical textbook by J. S. McLester of the University of Alabama (1939), for instance, argued that “the prowess and achievements of our early Anglo-Saxon ancestors have been attributed in part to the energy-giving effects of the meat which they consumed in liberal quantities” and “if man would enjoy sustained vigor and would experience his normal expectancy, as well as contribute to the improvement of his race, he must eat a liberal quantity of good protein” (McLester 1939). The nutritional dystopia conjured by Western nutrition science was inhabited not only by working-class immigrants, but also by the poor natives in the colonies.

Jessica writes about the calorie as the primary quantifying parameter. But I would argue that the calorie is simply one example of a reductionist move in modern science of nutrition (Scriniis 2013). In fact, the international development organizations that she mentions are now talking about the shortcomings of measuring food insecurity only in relation to the calorie and the need for more attention to micronutrient deficiencies. Micronutrient deficiencies, often dubbed *hidden hunger*, have attracted various funding for projects in international development during the past several decades (Kimura 2013).

The historic survey of international nutrition finds a continuous coming and going of nutrition *du jour*. In the post-World War II era, protein was seen as the most important feature of nutrition problems in the global South, compelling nutrition experts to debate over the urgent “protein gap” in the South and to devote many resources to inventing a super protein food. In the 1980s, it was vitamin A, with UNICEF

being the most vocal institutional sponsor to advocate for its efficacy in child survival. Micronutrients (iron, iodine, and vitamin A, but also zinc, which is increasingly in the limelight) were the stars of the 1990s, claiming the attention of international organizations and experts with the gravity of hidden hunger (Allen 2003).

Rather than seeing these changes in foci in nutrition intervention as a random occurrence, I argue that there is an historical pattern to the rise and fall of *charismatic nutrients* (Kimura 2013). By the term charismatic nutrients I mean nutrients that capture the attention of experts and the public as a symbol of the nature of the world malnutrition problem. They serve as the emblems of both the food and nutrition problem and its solution. These nutrients command center stage in international politics when their suboptimal intake defines the nature of the food problem in developing countries. I use the term “charismatic” not only to describe their authoritative position and popularity, but also to highlight that the attraction of these nutrients cannot be simply reduced to their scientific values, but rather depend on the social networks built around them—an important insight from Max Weber (1978).

Charismatic nutrients are a product of social and cultural forces as much as scientific discovery and progress. Charismatic nutrients are effective not only in adding nutrients, but also in staking out space for the international nutrition community. Nutrition experts need to fight for funding and program opportunities against other expertise areas, such as population control and agricultural improvement, which have historically claimed expertise in how to feed the global population (reduce the mouths to feed/produce more food). Similar to what Jessica described above, one of the important mechanisms of their social and cultural power is their amenability to quantification. By delimiting food insecurity problems to the lack of a particular nutrient (“it is the deficiency of vitamin A/iron/iodine”), it makes the food problem calculable for nutrition experts and international and domestic bureaucrats. Quantification has gained even more currency during the neoliberal era, given the heightened urgency of accountability politics and evidence-based programming (Merry 2011). Charismatic nutrients enable experts to state that they produced a tangible output, such as X mg of iron delivered to X children under five years old. This concreteness and calculability are invaluable in international development, where nutritional experts have to satisfy increasingly quantification-oriented parameters.

But there is more to charismatic nutrients than their compatibility with calculation and bureaucratic management. The power of charismatic nutrients in mobilizing international

support is that their deficiency comes with a convenient nutritional fix—when protein was charismatic, experts came up with super protein cookies; vitamin A supplements were said to be a magic “golden bullet” that was “dirt cheap” according to its promoters (Rovner 1986); and now we have fortified products such as the wheat flour and yogurt that are to add the missing nutrients to the diet of Third World people. Charismatic nutrients help embody the problem, capturing experts with a compelling tangibility and the promise of an easy fix.

Here, we can return to the morality argument made by Charlotte. As food historian Warren Belasco (2006) described, ingrained in the West’s understanding of the global nutrition problem is its self-understanding as the savior of the poor. The West’s imagination of a utopia was accompanied by the description of the developing world as a dystopia. In this historically powerful narrative, the West’s science and technology conquer nutrition deficiency. The nutritional fixes have almost always failed to address the fundamental structure of malnutrition because malnutrition and food insecurity together are a complex sociopolitical problem, rather than a simple deficiency of a set of nutrients. Yet such fixes never fail to appear again, albeit in different guises. Their tenacity can only be explained by understanding their multifaceted advantages, including their moral power—nutritional fixes are celebrated for the sake of the poor to be saved by the West.

Nutrition and Temporality: Hannah Landecker

When discussing nutrition as contested knowledge, there may be a tendency to think about the contest as between the experts and the lay public. But we should not assume that science is settled and the critical problem lies in understanding the ideological or political economic shapings of that science. Charlotte asks, *what else is going on here?*—making explicit the social and ethical dynamics of empirical work in nutrition, but one can also ask: *what is not going on here?* Or, in the case of the history of nutrition science, what *was not* going on? Present-day scientific arguments about shortcomings of dominant explanatory models in nutrition and metabolism show, for example, the glaring absence of attention to time, which Julie also turns our attention to in *Beyond the Sovereign Body*.

For example, one source of challenge to the energy balance model is coming today from research whose focus is the timing of eating and its relation to sleeping and metabolism. Experiments in rodents show that the timing of food intake can matter more than the quantity or kind of food taken in.



FIGURE 3: *Example of a 1-ounce serving of meat substitutes.*
 IMAGE FROM “WHAT I NEED TO KNOW ABOUT EATING AND DIABETES” (DM-226), NATIONAL INSTITUTE OF DIABETES AND DIGESTIVE AND KIDNEY DISEASES, NIH PUBLICATION 08-5043, 2007

One particularly revealing experiment fed two lots of mice the same high fat diet, but one group was restricted to eating during eight hours of the night (the time when mice are usually active and awake) while the other group could access food at any time, day or night twenty four. While the mice in the two groups ate the same amount, the mice that ate *ad libitum* suffered several consequences: their circadian day-night rhythm became disrupted, which the researchers could show both at the level of gene expression and of physiology—the mice woke up and ate more frequently—and also, over time, these mice developed various metabolic disorders such as fatty liver and high cholesterol (Hatori et al. 2012). Other research points to reduced fertility in female fruit flies whose feeding was restricted to a period of the twenty-four-hour cycle when they would not normally eat (apparently, left to their own devices, “fruit flies prefer a major meal in the morning” Gill and Panda 2011); again, a control group ate the same amount of the same thing, and the experimental variable was the (mis)timing of the feeding period.

Researchers are understandably reluctant to say this mouse and fly experimentation is directly applicable to humans, since mice are nocturnal and are mice, and flies are even further afield, physiologically speaking. Epidemiological data gathered about human eating habits has focused on counting up quantity and kind—thus little systematic information is available about eating rhythms and their relation to human health outcomes. Even research that connects sleeping and obesity in humans considers one factor at a time—looking at sleep duration and body mass, not the periodicity and rhythm of meal timing in relation to sleep in relation to metabolism (Nishiura, Noguchi, and Hashimoto 2010; Cappuccio et al. 2008). However, popular diet enthusiasms have not been shy about running with such findings, taking them as evidence in favor of ideas such as the 5/2 diet (restricted

eating on 2 out of 7 days of the week), or restricting eating to a particular time window of the day. The point is that in both the scientific and the popular literature on eating and timing, the calorie model is being explicitly contested: the results indicate that quantity is not everything, even the nutritional content of food is not everything—the when of food, and the periodicity of its intake, matters. Whether it will make a dent, however, in the cultural dominance of either the calorie or the charismatic nutrient is hard to say. Nutrition science has treated food as fuel since the nineteenth century, and food as the provision of essential “building blocks” since the beginning of the twentieth (Scrinis 2013). It is a little difficult to envision the rise of a charismatic metabolism, given the relative complexity of thinking about everyone having a different genetics, and epigenetics, and physiology—in interaction with a different set of inputs and life-rhythms. Even studying shift-workers and their metabolisms, a favorite subject of chronobiologists, turns out to be an incredible mix of confounding factors (Knutsson 2003).

And, of course, just because empirical work in metabolic science contests long-standing nutrition models, it is not therefore exempt from the diagnosis offered above, that empirical work in this area has also always been an ethics of the eating subject. Let us imagine for a moment that time and rhythmicity are allowed in to mainstream nutrition science. What will time do to our understanding of food and health and eating right? Certainly it disrupts the notion that just controlling the quantity or quality of food intake, or having the right calorie-counting app, will act on the body in the straightforward way we might want it to. It turns attention away, perhaps, from the role of individual willpower or governmental health paternalism in limiting quantity and increasing quality, and toward the physiological damage of the “open-all-night” character of contemporary capitalist life, particularly in America. Perhaps. It also raises the prospect of yet more impossible exhortations for individual self-care under structurally compromised conditions: to sleep and eat according to “natural” rhythms in a world where the lights are always on.

Investments in the Calorie: Julie Guthman

Despite new knowledge that challenges the centrality of the calorie, I agree with Jessica that the calorie remains the most salient metric by which Americans evaluate food. Arguably, the simplicity of the calorie is one of its selling points. Certainly dietary reformers have used that presumed simplicity in their messaging. Marion Nestle, for example, has spoken on

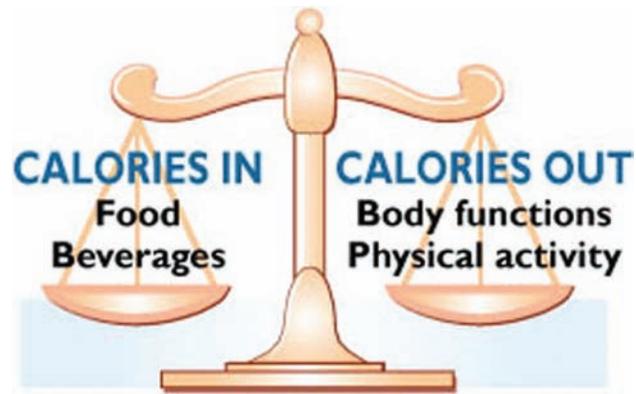


FIGURE 4: Dietary advice is often based on the energy balance model, but a range of recent scientific discoveries suggest that weight gain and loss is not all about calories.

IMAGE FROM OF THE U.S. CENTERS FOR DISEASE CONTROL AND PREVENTION

many occasions and stressed the simplicity of the energy balance model, a message that is also at the heart of her book on why calories count (Nestle and Nesheim 2012). The claim of simplicity is predicated on the idea that complexity gets in the way of dispensing, hearing, and following dietary advice (Yates-Doerr 2012).

And yet there are so many ways in which the calorie fails to serve even dieters. In *Nutrition Troubles*, Adele Hite recited some of the growing body of evidence that suggests that dietary fat, high in calories, is less likely to create weight gain than lower calorie carbohydrates. Drawing on studies of circadian rhythms, Hannah Landecker argues above that the daily timing of caloric intake may matter a great deal in weight gain or loss. Jessica Mudry’s observation that zero-calorie food is ontologized as food because it calls out a caloric content, even a nil one, argues further that many understand food through calories.

What I find most fascinating is that calories do not actually exist as constituents of food (Scrinis 2013: 116). There are no molecules of calories in a piece of chocolate cake; instead those calories, as measures of energy, only come into being through burning that cake. And it is far from clear that bodies “burn” calories in the same way a flame burns a piece of cake. The idea that you must consume more calories than you utilize in order to gain weight (and vice versa to lose weight) is in that way a truism; it tells little about how the body determines when and how such energy is stored, mobilized, or utilized or how food affects the regulation of these processes. Many factors—including molecules in food or lack thereof—can impact food-related physiological processes and behavior, including fat storage. A growing and wide ranging

body of research suggests that fat gain can be due to what you eat or what you do not eat; a genetic predisposition or an epigenetic effect; hormones, life stage, medications, environmental toxins, gut bacteria, or, quite possibly, a yet to be discovered biological phenomenon. Metabolism, as Hannah (Landecker 2011) has written, is neither food nor the body, but the indeterminate space between them that has no particular location. It is a construct of human knowledge that at best stands in for the multifarious pathways by which food as molecules is broken down and made into proteins, energy, tissue, and waste.

Why, then, has the energy balance model, which says that weight gain results from a surplus of calories relative to those expended, remained so paradigmatic? Why is the refrain “a calorie is a calorie is a calorie” so prevalent? Some of the comments throughout this special issue hint at some answers, albeit partial ones. Adele Hite’s discussion in *Nutrition Troubles*, about the change in dietary guidelines to discourage meat and fat consumption is instructive. What she shows is that politicians — and dietary reformers — put aside significant scientific controversy, in part because they were enamored with the pro-vegetarian proclamations of Lappé’s *Diet for a Small Planet*. The political economy followed, and the food industry capitalized beautifully on the low-fat craze by generating a raft of high-carbohydrate food that coincided closely with the beginning of the so-called obesity epidemic. Given her discussion above, Charlotte might suggest that there is something ideological about the calorie. The calorie, she has written, came into favor through the work of Wilbur Atwater, who in the 1880s sought to “teach . . . Americans — particularly the poor and immigrants crowding northeast urban centers — to choose” diets “that provided the most energy for work at the least cost” (Biltekoff 2013: 176). Although the discovery of vitamins supplanted the calorie paradigm, caloric concerns were incorporated into the paradigm of “negative nutrition” and its directives to avoid certain foods and avoid eating large quantities, ideas that squared with concerns about affluent lifestyles (ibid.: 22). With today’s so-called obesity crisis, these concerns have been transferred over to the poor, who seem to not take responsibility for their diets or their poverty (Guthman 2011). Calories live on because they are an agreed-upon metric to indicate excess.

Jessica’s research suggests that it is the standard of equivalence that the calorie provides that makes it attractive. In her 2009 book *Measured Meals* she makes a case that a discourse of quantification, driven by scientific rationality, has reconfigured food as a set of nutrient qualities which define its goodness. To this we can add Nick Calluther’s (2007) crucial insight about the calorie as an instrument of biopolitical rule.

Precisely because it makes dietary needs appear commensurable, it allows regulation and surveillance at the level of the population. Based on her 2013 book, *Hidden Hunger*, Aya might add that the use of this metric renders the problem of hunger technical, removing from sight the macrostructural causes of poverty and hunger.

Based on my work with students, my sense is that the persistence and privileging of calories also lies at least in part with the personal investments of dietary reformers and advocates themselves. Many of my students engaged in food justice work have been turned on by their own discoveries of “good food” and seek avenues by which they can “teach people how to eat.” In teaching courses on the politics of obesity, the disgust that some of my students have expressed about fat people is articulated through their own confessionals about gaining control of their bodies through good eating and exercise (Guthman 2009). These observations are in keeping with what feminist legal scholar Anna Kirkland (2010: 475) has argued is the reason that feminists have embraced the environmental account of obesity: they are part of the cultural subgroup with the most investment in both the personal appearance norms and cultural practices that mark elite status. So it may be that through their own practices of calorie counting and other roads to personal health, nutritionists and dietary reformers also feel compelled to bring what looks like success to others. What remains striking is that the goal of health gives cover for — and perhaps even dignifies — obsessions that might otherwise seem narcissistic and/or self-serving (Metzl 2010). ◻

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