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Author
Zimmerman, Frederick J

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Habit, custom, and power: A multi-level theory of population health

Frederick J. Zimmerman*

Department of Health Policy and Management, Fielding School of Public Health, UCLA, Los Angeles, CA 90095-1772, USA

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ABSTRACT

In multi-level theory, individual behavior flows from cognitive habits, either directly through social referencing, rules of thumb, or automatic behaviors; or indirectly through the shaping of rationality itself by framing or heuristics. Although behavior does not arise from individually rational optimization, it generally appears to be rational, because the cognitive habits that guide behavior evolve toward optimality. However, power imbalances shaped by particular social, political, and economic structures can distort this evolution, leading to individual behavior that fails to maximize individual or social well-being. Replacing the dominant rational-choice paradigm with a multi-level theoretical paradigm involving habit, custom, and power will enable public health to engage in rigorous new areas of research.

Introduction

Thoughtful introspection suggests that we are thoughtfully introspective. Science says otherwise. An abundance of carefully conducted research now demonstrates that we are imperfect optimizers, slapdash rationalists. The past 20 years have seen an explosion of research in neuroscience, psychology, marketing, and behavioral economics, all of which suggests that our minds are more efficient than rational (Rice & Unruh, 2009). Where the rational choice model claims that behavior is the aggregation of individual decisions, each a thoughtfully deliberative weighing of pros and cons, newer research shows that behavior is not reducible to individual decisions, that decisions have momentum, and that behavior is the accretion of patterns, not the aggregation of choices.

But if we are not careful and deliberative, if instead we are predictably irrational, profoundly influenced by default options, framing, and heuristics, how are we able to make good decisions at all? How is it that, despite it all, most of our decisions are rational, or at least rational-seeming? If we are such bad decision-makers, why aren't we in worse shape? This question has tremendous implications for public health (Ubel, 2009).

This paper lays out an alternative paradigm for human decision-making, a paradigm that acknowledges its debt to rational choice, but is not indentured to it. This alternative paradigm locates the genesis of thought and action in cognitive habits: clusters of cognitions that are triggered as a group by a single cue—much as a musician plays a scale, not a set of individual notes. These cognitive habits evolve over time in response to selective pressure, and can be distorted by powerful individuals or groups (cigarette manufacturers, soda marketers, specialty physicians) who have a vested interest in influencing behavior. This paradigm insists on rigorous integration of research on individual choices with scientific disciplines that model the elements of choice in its neuroscientific underpinnings as well as in its social, economic, and legal contexts. This alternative paradigm is called multi-level theory. It stands in sharp distinction to the pervasive paradigm of rational choice theory.

Multi-level theory is an effort to bring theoretical thinking in the public health upstream (McKinlay, 1975; Pearce, 1996). Upstream from obesity lie diet and physical activity, but upstream from these issues are territories as yet uncharted by public health, contested, and which must be hard-fought: the realm of choice theory and, farther still, social theory. A map of this region is essential, along with a strategic understanding of how this terrain is controlled. Without aggressive intellectual inroads into these areas, public health risks being swept away in the downstream effluvium of forces it cannot apprehend (Krieger, 2011; Mooney, 2009; Pearce, 1996).

Cognitive habits

Suppose that God had given you the task of designing a decision-making machine for his new creature, Adam. You might start by giving Adam some likes and dislikes and a calculation engine that tells Adam to choose the option corresponding most closely to his preferences. His behavior is the collection of these choices, with no correlation among choices other than that implied by Adam's stable preferences. Fig. 1 presents the rational-choice theoretical model.

* Tel.: +1 310 825 1971; fax: +1 310 825 3314.
E-mail address: fredzimmerman@ucla.edu.

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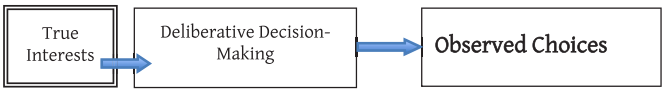


Fig. 1. The rational-choice theoretical model.

With this rational machine, Adam can get about in the world and make basic choices: but not always efficiently. To begin with, a choice at one time has no influence on a choice at another time, and unless two decisions are exactly alike, they must be considered separately. If Adam encounters a banana and rationally chooses not only whether but also exactly how to eat it, the second banana he encounters requires just as much thought.

In a better machine, though, the next time Adam sees a banana, he ought not to start over from scratch. He ought to have learned something from his previous encounter, and if so, he will peel the banana now with less deliberation and greater facility. Each time Adam both refines his approach and thinks about it less until at last the peeling and eating of the banana become automatic, with little, if any, conscious deliberation. Adam, to his credit, is using cognitive habit to optimize his behavior.

Multi-level theory is a new name for a theory informed by new science, but much of the theory is old. Over a hundred years ago, William James included in his *Principles of Psychology* a chapter devoted to habit, in which he observed that the brain is "an organ in which currents pouring in from the sense-organs make with extreme facility paths which do not easily disappear" (James, 1890). Thorstein Veblen wrote extensively about habits of mind (Twomey, 1998), and the related concept of habitus is an essential component of Bourdieu's social theory (Bourdieu, 1992).

For these authors, habit means a full sequence of thoughts or actions that can be triggered by a single stimulus, and once triggered, continues to the end. The essential element of habit is accordingly not repetition, but cohesion. A habit is a group of thoughts or actions that hang together, not a single action that is repeated.

James, Veblen, Bourdieu and others have been joined in their understanding of habit by modern neuroscientists, who have discovered in the basal ganglia complex webs of cognitions, triggered by a single stimulus (Graybiel, 2008a; Graybiel, 2008b). In one experiment, mice are placed behind a gate at the beginning of a T-maze, and when a warning cue sounds, the gate is opened (Barnes, Kubota, Hu, Jin, & Graybiel, 2005). As the mouse runs down the main shaft of the T, he hears a cue indicating whether the reward is to the right or the left. At the fork, the mouse turns and obtains the reward. In the first trials, the mouse's brain is highly active, but after some time, the brain begins to learn the maze: brain activity decreases in the middle of the run, and shifts outward to the enjoyment of the reward at the end, and, eventually, to anticipation of the reward as soon as the warning cue sounds (Fig. 2). The brain can perform a sequence of actions without thinking about the individual pieces—only invoking the whole. For the mice in this T-maze, the tasks "Start", "Cue Onset", "Turn Onset", and "Turn Offset" have lost their individuality as discrete thoughts: they do not merit thinking about, and instead are part of the cohesive whole of running the maze. For modern neuroscience, as for James, Bourdieu, and Veblen, what is important about habits is not that they are repetitive, but that they are sequences of brain activities that have become welded together—what the neuroscientist Ann Graybiel calls "chunked" (Graybiel, 2008b).

For mice, cognitive habits are about fairly simple behaviors, but for more sophisticated creatures cognitive habits can involve complex cognitions. Say the word "confounding" to a member of the general public and you'll draw a blank stare. But say "confounding" to an epidemiologist, and you'll trigger an entire set of complex cognitions involving variables, association, causality, and outcomes, and all of it triggered by a single cue. Psychology itself is said to emerge from such cognitive habits (Bandura, 2006).

These habits are malleable: easy to modify, adapt, or even to break. When the mouse's cue indicating a right or left turn is changed from a sound to a texture on the floor, the mouse rapidly learns the new cognitive habit. If the reward is removed from the end of the maze, the mouse returns to active deliberation, but if the link between stimulus and reward is reestablished, so too is the cognitive habit.

Cognitive habits accordingly permit learning. They are building blocks that can be assembled in a variety of ways to create different structures, and it is these structures that constitute our thought and our behavior. Unlike rational choice, in which thought alone begets behavior, in multi-level theory, thought and behavior are assembled from cognitive habits (Bandura, 2006; Bromley, 2008; Hodgson, 2004a). The conscious brain decides to go for a run, but the unconscious brain knows how to put on shoes, walk out the door, and choose a route: it is the unconscious brain that takes care of all the discrete steps of the run.

In a 1965 study reported in the book *Nudge* (Leventhal, Singer, & Jones, 1965; Thaler & Sunstein, 2008), Yale undergraduates were given information about tetanus, and urged to get vaccinated. Half were asked to make explicit plans, including visualizing the path they would take to reach the health center. Such visualization is a kind of learning, or "chunking" of cognitive tasks, and it was highly effective: those in the visualization arm obtained vaccinated at 8½ times the rate of the controls. It was not about information, or motivation, or rationality, it was the chunking together of the steps needed for vaccination that effectively increased rates.

Rational choice misses the point that cognitive habits determine how heavy are the costs of cognition and decision-making (Rice &

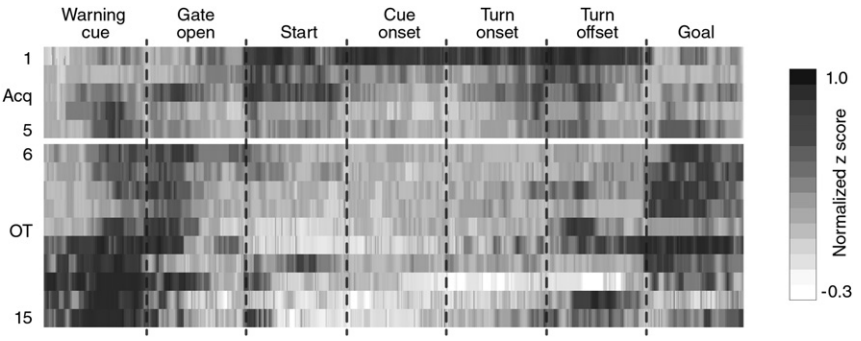


Fig. 2. Changing brain activity with learning by mice in a T-maze. Dark areas indicated highest activity. Acq = acquisition stage; OT = overtraining stage. Each row represents 40 trials. Source: Barnes et al., 2005.

Unruh, 2009). When a set of deliberations have been encoded as cognitive habit, they are not thought about, and therefore, not burdensome. Habit reduces costs.

Since brain activity is valuable, the chunking together of discrete cognitions into a cognitive habit represents efficiency in behavior and decision-making (Desrochers, Jin, Goodman, & Graybiel, 2010). The mouse that depends on cognitive habits runs the maze more competently and with less thought over time. A rational mouse would run the maze exactly the same way every time, and with exactly the same cognitive effort. By definition, the rational mouse would be cognitively engaged and deliberative about all the decisions in the maze. It is—perhaps ironically—precisely the creature of habit who learns, whose habits can become more efficient over time.

The role of learning is one of the major differences between the cognitive-habits model and the rational-choice model. The rational-choice model assumes that people are "lightning calculators" (Twomey, 1998), with a memory and decision rule. The cognitive-habits model assumes that people improve through trial and error. A learning machine improves by making its algorithms—its cognitive habits—more efficient. A calculating machine only calculates. A learning machine learns.

Fig. 3 presents what might be called the Behavioral Economics Theory of Behavior (with apologies to psychology, marketing, sociology, and other related fields). It shows how cognitive habits influence not only observed behaviors, but our ways of thinking about choices even when we make deliberative decisions. These cognitive habits include heuristics, metaphors, rules of thumb, cognitive frames, folk theories, and processes of social referencing, and even incentives (Ariely, Loewenstein, & Prelec, 2003).

In multi-level theory, observed behavior arises as much from cognitive habits as from conscious deliberation. This process is efficient, but can go awry, as a host of recent books detail (Ariely, 2009; Kahneman, 2011; Lehrer, 2009; Rice & Unruh, 2009; Thaler & Sunstein, 2008; Wilkinson, 2008).

These cognitive shortcomings have varieties: What we can easily think of must be fairly common; what's less than an anchor-value must be fairly low; if we think it, it must be right; if we have it, it must be good; if our friends think it, we should too; what is hard to think about must be hard to do; and many more besides.

Yet they all can be traced to a single cause: the otherwise very sound substitution of cognitive habits for critical thinking—in effect, the assumption that having seen a banana we know a plantain. This chunking, far from representing a cognitive bias, is generally helpful. It is wrong to imagine that we have two brains—one intuitive, one rational; one hot, one cold; one fast, one slow—thereby making each of us a two-headed monster. Instead, we should recognize that we have one brain, but its functioning is idiomatic.

Many of the most important health-related behaviors emerge from cognitive habits: eating behaviors, physical activity, prescription adherence, smoking, drinking, aggressive behavior, injury avoidance—these are all worked into our daily lives in such a way that we carry them out without ever giving it much thought. There is an automaticity to these behaviors, with a particular cue triggering an entire behavioral train without engaging conscious thought (Cohen & Farley, 2008).

Cognitive habits are drivers of behavior and shapers of thought. They directly determine health behavior and profoundly influence the ways we think about those health behaviors we do consciously examine. Cognitive habits are formed early. They are laid down beginning in early childhood, and can be changed thereafter only with considerable effort.

Because people are learners, not calculators, the focus of both research and policy should be placed on the learning process of the cognitive habit model—which can produce better and worse outcomes—rather than on the decision process of the rational choice model—which by assumption cannot be improved on.

As Adam moves around his world, we learn about Adam's learning through science, not revelation. Our understanding of Adam is best informed and most quickly advanced not by an almost religious belief in Adam's innate perfection, but in our own close observation of his behavior. This behavior is better sometimes than others, and changes over time.

Evolution

If you are looking for a vegetable whose preparation tries your patience, look no further than the fava. It must be shelled twice, and the bitter inner skin is difficult to remove. Tricks abound for making the process easier, but even with boiling in salt water and plunging into a cold bath, shelling favas is no one's idea of a good time. One San Francisco food writer, lamenting the substantial work it takes to get a quarter-cup of usable beans concludes, "you are so sick of them you'd rather eat a peanut-butter sandwich" (Brickman, 2011). Is eating fava rational?

Across the Mediterranean region, fava is widely consumed and even beloved. The preparation of fava beans has in many cultures acquired the status of a habit—it is a set of actions that can be engaged in as a whole, without having to think of the steps along the way. Thinking of the process as a whole enables people to sidestep the distracting rational questions of whether each step is really worth it every time one prepares fava beans.

The preparation and consumption of fava beans exists as a cognitive habit at the individual level, but is also shared widely within a social group. Like all cognitive habits, it has a distinct existence at the neurological level, at the individual psychological level, and at the social level.

It would be possible to measure the existence of a cognitive habit around fava-bean preparation by measuring brain wave activity as a person prepares the beans, as with Graybiel's mice. If brain activity is low during preparation, then the activity has become automatic: a set of tasks that have been chunked together and need minimal thought to keep going, a habit. One could measure this brain activity pattern in a large number of people, and

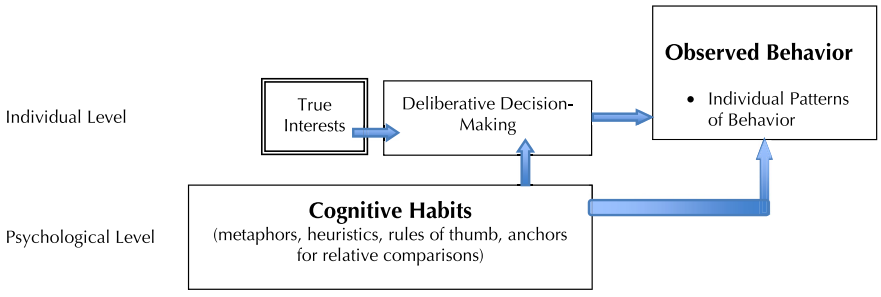


Fig. 3. The behavioral economics theory of behavior.

create a histogram of habit in the general population. Alternatively, one could produce a very similar histogram simply by asking people to self-report their degree of comfort with fava preparation on a Likert scale. Doing so would be less precise, but far cheaper. These two measurements occur at two different levels—the neuroscientific level and the psychological level—but they both measure the same cognitive habit.

We could also measure the existence of cognitive habits at the social level (Anderson, Scrimshaw, Fullilove, & Fielding, 2004). The histograms could be described by the population mean and standard deviation of the cognitive habit. While this summary would again be less precise, it would be better adapted to use in population-level theories. At this level, cognitive habits are called custom, and include norms, common assumptions, shared values, language and law.

Each level has its own rigor, but an essential part of this rigor is that it can speak to the rigor of the other levels. This cross-level compatibility distinguishes multi-level theory from rational choice theory, because rational choice has no objective correlate in the brain, exists only at the individual level, and cannot speak to other ontological levels. Multi-level theory, by contrast, enables us to more fundamentally understand the social dynamics of how cognitive habits develop and change over time.

Cognitive habits are in no way subject to the constraints of logic. One can reflexively choose an apple over an orange, an orange over a banana, and a banana over an apple. One can steadfastly oppose government deficits and equally steadfastly oppose tax increases and spending reductions. One can go broke saving money on large purchases. Although they are not subject to logic, cognitive habits are subject to an equally rigorous discipline—that of selective pressure. The development of cognitive habits, as well as their refinement, pruning, and alteration, occurs through evolution, a process that involves variation in habits, selective pressure, and replication (Cosmides & Tooby, 1994; Stoelhorst, 2008).

Part of the feedback process in this evolution relies on one's own assessment of the value of a habit, and is one important way in which habits are trimmed, modified, expanded, and reproduced. Habits that are useful get used, and therefore are reinforced. Habits that are not useful fall into disuse and in time are forgotten. Painful habits are actively extinguished.

If this were the only way in which habits evolved, the cognitive-habit model would be similar to the rational-choice theory. What makes the evolution of cognitive habits profoundly different is our sensitivity to influence by others.

Selective pressure is exerted by friends, family, co-workers, and strangers who either punish or reward actions and who either reinforce or dissipate mental associations. This pressure can be wholesome or hurtful. Parents who consistently say "no" to sugary snacks before dinner extinguish over time children's habit of asking for them. On the other hand, children who bring raisins as dessert in their school lunches may find that their peers make fun of their dessert—a punishment that exerts selective pressure against the parents' attempt to create a habit of mind in which *dessert = fruit*. Teenagers whose friends play sports after school come to see sports as a natural and normative part of adolescence—a reinforcement of the habit of mind that *sports = normalcy*.

Selective pressure on habits of mind is exerted both consciously, as by adults who wish children to behave in a certain way, or unconsciously, as by peers. Each "Ew!", every chuckle, all of the sidelong glances and subtle shifts of body language exert their own mild but persistent selective pressure on the habits of minds of others, in a Ouija board of social discipline.

Fava, it turns out, is an anti-malarial drug, rich in pro-oxidant compounds that inhibit the growth of the falciparum parasite in the blood (Nabhan, 2004). Its effects are enhanced by the addition of certain spices, including cinnamon, nutmeg, clove, and peppers, the ingredients in the seasoning known in Egypt as *ras el hanout*. Using fava as an anti-malarial is tricky, but cultural evolution taught Mediterranean peoples to avoid the green pods or to remove the inner skin before eating, and gave many recipes for the safe consumption of fava. The culture of fava consumption, which is completely coterminous with the malaria parasite, is a fine example of collective cognitive habits encoding unconscious, but valuable knowledge.

Habits of mind are offered to us by our social environment as the bequest of previous generations. They are a bank of wisdom, deposits of common sense and discoveries that were earned by the toil and experience of those who lived long ago (Hodgson, 2004a). Delicious eggplant, fava beans, tapioca, and mushrooms—all foolhardy risks long ago—are ours only because of the legacy of habits of preparation.

When it works properly, the evolution of cognitive habits reveals the collective and historical wisdom of a social group, not only about methods and procedures, but also about what has value (Stoelhorst, 2008). In this sense, rationality is collective, not individual (Bromley, 2006). Over time, the flow of selective pressure smoothens out the rough edges of our imperfect thinking, making of individual predictable irrationality generally more optimal social custom.

But just as prices can be distorted, so can the evolution of cognitive habits. Just as true interests can be different from revealed preferences, the true interests and wisdom of a group can be different from those discernible in their collective cognitive habits. Because our cognitive habits are so susceptible to influence, it is useful to understand how we can be led away from optimality by those with the power to do so.

Power

If, as William Foege has written, "the philosophy of public health is social justice" (Foege, 1987), then the analysis of population health must be the study of power. Indeed, to ignore power would be to ignore the most important determinant of population health—it would be possible, but it would be theoretically impoverished, ad hoc, and boring. As many in public health have argued, rigorous analyses of power are possible (Mooney, 2009; Solar & Irwin, 2010).

Just as neuroscience and psychology inform a rigorous study of cognitive habit, a sophisticated theory of power has been developed in sociology, which can readily be applied to the analysis of power in public health.

Power can be defined as the capacity to cause pain or pleasure to others at relatively little cost to oneself.

This definition of power is precise enough to narrowly identify a core construct, yet broad enough to encompass several manifestations of power. Two key elements are the identification of power with a capacity, and the importance of relative costs in creating this capacity.

A big fellow with a baseball bat and a small, unarmed fellow meet in an isolated dark alley. The big fellow has power over the small fellow by dint of his size and weapon. He does not need to use the bat or even brandish it; his power derives from the potential energy of the bat. Power is capacity, not use. Give the small fellow a gun, however, and the power imbalance shifts. Power depends on relative costs. Sweden dramatically changed the balance of power for sex workers when it made the purchase, but not the sale, of sex a crime. Sex workers now have recourse to the police when a transaction goes awry, knowing that they, unlike the John, have little to fear from the police.

Although power emerges from natural differences in advantages (size, money, rhetorical gifts) and from technology, it is structured and shaped by ethics and law, which strongly influence the relative

costs of the use of these advantages and technology (Bray, 2010; Bromley, 2006). Indeed, much of ethics is about creating such scruples, so as to limit imbalances of power that would otherwise make civilized life impossible. Where there is oversight, accountability, monitoring, transparency, and social opprobrium, power is limited. Where there is secrecy, licentiousness, and broad legal freedoms, power is greater.

This definition of power makes it measurable, either cardinally or ordinally. In game theory, bargaining power is the value of the concessions one can extract by threatening to leave an agreement—and thereby imposing costs on a bargaining partner—relative to one's own costs of leaving the agreement. In a quite different context, Martin Luther King, Jr., had power not only because his soaring rhetoric had the capacity to profoundly affect his listeners' emotional state, but also because the cost that he perceived of going to jail was small *relative to* the opportunity to make his message heard.

But the most fundamental, and also the most nuanced, forms of power are those of a parent over his child. This power can be physical. When a toddler doesn't want to get out of the tub at bathtime, her mother may, after a suitable warning, gently lift her out and begin to dry her off. The power may be rhetorical: a parent may explain at great length why food goes in our mouths and not over the side of the high chair. Or it may be experiential: a routine of reading before bedtime gradually gives the child a taste for reading, which endures so long as to become a natural part of the child's personality. This is power. Whatever the forms of power, it is always directed toward the same objective: to induce in the child an instinct for particular social behaviors. When Mom says bathtime is over, we stand up, put our feet over the side, and exit the tub. When bedtime is announced, we put on our pajamas, snuggle up to Dad, listen to a book and feel sleepiness arrive. Power is in no small part the power to create cognitive habit: a series of behaviors that are chunked together and triggered by a single cue.

Adolescents are infantilized by the power of their parents. Adults accept it. (And grandparents, wise enough to know its limits, just relax.) There is no state of nature, in which we are free from power. The question is not whether we can be free from power or not, it is whether those who influence our cognitive habits are those who love us, or those who want our money. If nature gives us a sweet tooth, it is our parents who give us either donuts or peaches.

Steven Lukes has identified three dimensions of power: direct power, agenda-setting power, and power over opinions and the framing of thoughts (Lukes, 2004).

Direct power is at play in situations of frank physical aggression. Homicide and intentional injuries are major public health concerns, and the leading cause of mortality and morbidity in many age groups (Blane, Smith, & Bartley, 1990). This form of power is limited primarily by legal means. Physicians have direct power over the patients in their care. This form of power is limited by strict ethical guidelines.

A second dimension of power is agenda-setting power, or the power to allow debate over certain options and make other options out-of-bounds for discussion. In public health, this kind of power has been deployed to devastating effect. When a patient-outcomes research project determined that certain commonly-used surgical procedures are ineffective for back pain, a group of orthopedic surgeons successfully lobbied to slash funding for the Agency for Healthcare Research and Quality, which had funded the research (Deyo, Psaty, Simon, Wagner, & Omenn, 1997; Rosenstock & Lee, 2002). Since then, any attempts to use the science of effectiveness to limit reimbursable procedures have been—first *de facto* and now *de jure*—off-limits (Neumann & Weinstein, 2010).

Agenda-setting occurs at the more individual level as well. Those who have written about structural violence point out how the set of choices facing individuals is structured to benefit those in power (Farmer, 1996, 1999; Galtung, 1969). The powerless, left to choose within a constricted choice set, may suffer as a result (Barnes, Hanoch, Wood, Liu, & Rice, 2012), and although their suffering is incidental to the power dynamics involved, it is no less real. An understanding of the importance of the choice set to individual choices and therefore to population health has been hardwired into public health since John Snow disabled the Broad Street pump. The field can productively build on these insights by formally analyzing the power that shapes both such choice sets, and—equally importantly—people's perceptions of their own choice sets.

The third dimension of power captures how power can cause pain or pleasure to others not by making an objective change but by making a subjective one. In this dimension power is the capacity to change minds, making the outlandish reasonable, and the acceptable desirable.

Not so long ago it would have seemed outrageous to consume a large soda with every meal; now it is commonplace. This shift did not happen because a rational population suddenly came to believe they were better off drinking soda than water or milk. It came about because technological changes led to a massive increase in the power of marketers to exert selective pressure on the evolution of our cognitive habits (Zimmerman, 2011).

Rational choice theory formally denies the possibility of this third dimension of power; behavioral economics ignores it. Multi-level theory takes an alternative approach. In recognizing both the influence of cognitive habits on the way we think, and the influence of power on cognitive habits, it places the full spectrum of determinants of behavior back in the realm of theoretically informed research.

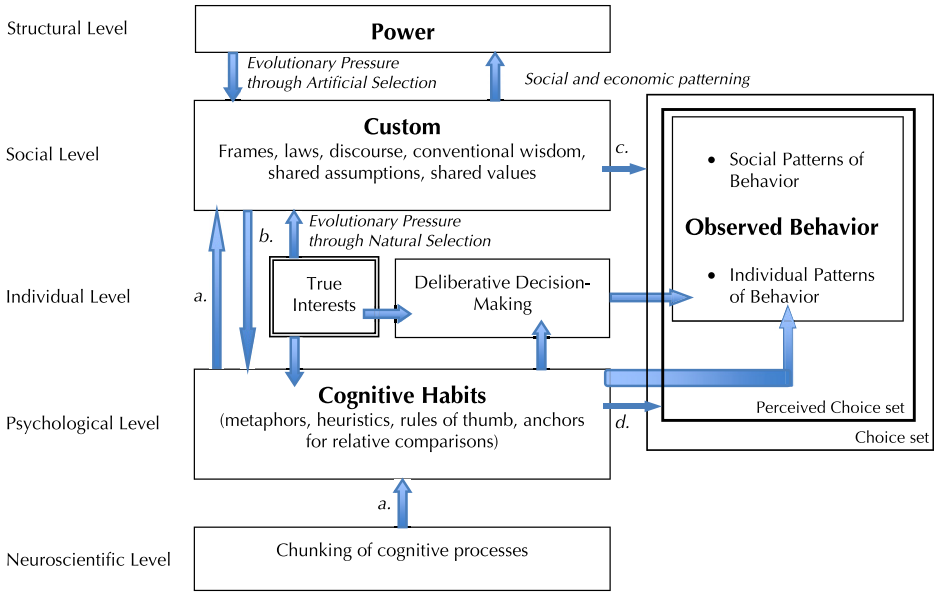
Lukes' theory of power emphasizes three dimensions of power, but he is clear that these are not three different types of power. Rather, the three dimensions of power are all dimensions of the same, unitary phenomenon. It is precisely the fact of the integration of the three dimensions of power that makes power such an integral part of multi-level theory. Power shapes the evolution of cognitive habits, and cognitive habits shape the ethical and legal structures that give rise to power.

Without each of these elements, a theory of population health looks quite different:

- If there were no power imbalances, the operation of true interests on the evolution of cognitive habits would lead to cognitive habits that are optimal, and would appear rational. That frequently happens, but not always.
- If everyone were rational—calculating instead of learning, and incapable of making decisions they regret—imbalances of power would be much less important, for rational people would find strategies to place themselves out of harm's way.

The full multi-level theory is presented in Fig. 4. Structure is the rules of the game, the distribution of power (or capacity to cause pain or pleasure in others) at any given time. The powerful seek to influence the evolution of structure: their method is to influence our cognitive habits. Individuals have complete agency to make their own decisions, but these decisions are structured by their cognitive habits and by the rules of the game.

The part of multi-level theory that emphasizes cognitive habit, custom, the role of custom in setting the rules of the game, and the evolution in custom through selective pressure owes much to the tradition of institutional economics, in particular the Veblen and Commons tradition (Bromley, 2006; Dawson, 1994; Hodgson, 2004a, 2004b, 2008; Ramstad, 1991). Multi-level theory contributes to this foundation a stronger theory of power, along with a more explicit recognition of how power can influence the evolution of custom.



Causal Processes in Italics.

a. *Emergence (Bandura, 2006; Hodgson, 2006; Hodgson, 2004)*
b. *Reconstitutive downward causation, in which the social environment reifies particular cognitive habits (Hodgson, 2004)*
c. *Laws and other aspects of custom determine choice sets.*
d. *Cognitive habit shape perceived choice sets, which may be more restricted than actual choice sets.*

Fig. 4. Multi-level theory of behavior.

The theoretical paradigm presented in Fig. 4 is an epistemological commitment. It claims not only that these are the causal pathways of behavior, but *only* these are causally relevant; that's what makes it a theory rather than a model. The theory will no doubt be refined in time, but though it may evolve, it may not expand—or else it will be a different theory. The relationship of this theory to existing conceptual models is discussed in the Appendix A.

True interests

The invocation of the capacity of power to distort cognitive habits raises the issue of discerning true interests. If a child prefers soda to milk, how can it be determined that this is a choice arising from a distorted set of cognitive habits rather than from his own natural cognitive habits?

To begin, it should be emphasized that "true interests" apply only at a certain level of abstraction. It is reasonable to assert that true interests prioritize health over ill-health, but it would be unreasonable to invoke true interests as a preference for apples over oranges. This distinction may seem obvious or trivial, but some economists have suggested that even the statement that people prefer health to ill-health is presumptuous (Cutler, Glaeser, & Shapiro, 2003; Finkelstein & Zuckerman, 2008).

More concretely, public health and related disciplines have made progress in identifying true interests. First, to an expanding extent, true interests can be directly measured in quality-of-life work and in happiness studies. This research has revealed, for example, that the obese suffer from reductions in subjective quality-of-life that are at least as great as their medical morbidities (Fontaine & Barofsky, 2001), and that greater income does not lead to sustainable increases in happiness (Easterlin, McVey, Switek, Sawangfa, & Zweig, 2010; Frey & Stutzer, 2002).

A second strategy to discern true interests starts by directly examining distortions. In carefully controlled experiments, advertising has been shown to influence food choices of participants. Presumably the food choices in the control group—not subject to the self-interested manipulations of advertising—are closer to true interests than those in the intervention group (Harris, Bargh, & Brownell, 2009; Harris, Pomeranz, Lobstein, & Brownell, 2009).

Finally, a third strategy relies on what might be called "a theory of revealed social preference," the notion that social options chosen in societies with minimal power imbalances are closer to individual true preferences than those chosen in societies characterized by large power imbalances. Political scientists have used this approach to argue that people prefer relatively tight controls on pollution, even where power dynamics prevent these preferences from being voiced (Lukes, 2004).

Although none of these approaches is adequate by itself to isolate true interests from distorted interests, taken together they provide a sufficiently reasonable estimate of true interests to enable researchers to make useful statements about which power structures promote true interests and which distort cognitive habits away from true interests.

The willingness to thoughtfully engage the identification of true interests is a tradition in public health, and a significant difference between multi-level theory and rational choice theory, which sees the independent identification of true interests as impossible. As one researcher sardonically remarks, "Why let things be difficult when, with just a little more effort, we can make them seem impossible?" (Lukes, 2004).

Multi-level theory and rational choice theory: a tale of two paradigms

This conceptual apparatus allows our causal maps to be more accurate. There are two frames for decision-making, equally valid, but unequally applicable. The rational-choice model says that we

are vassals of fixed preferences, in homage to which we weigh the costs and benefits of each option in our choice set. The habit-custom-power multi-level frame recognizes that our choices and the preferences behind them are profoundly influenced by cognitive habits, which have an ontological existence at a social level, called custom, and this custom evolves over time both in response to natural selection—toward our true interests—and in response to artificial selection—toward the interests of power.

The differences in these paradigms have profoundly different implications.

- Rational choice narrowly examines individual choices; the multi-level theory of habit, custom, and power focuses on patterns of behavior. This distinction carries over to specific disciplines. Rational-choice economics is the study of individual decisions. Multi-level economics is the study of the economy.
- Rational choice invokes the brain as a mere calculating machine; Habit and custom constitute a learning machine.
- In rational-choice theory decisions are individually solipsistic; in multi-level theory individual decisions are informed by social context.
- A rational change knows no improvement. For rational-choice proponents, as for Pangloss, all is for the best in the best of all possible worlds. A learning machine may have imperfections, but it can learn, and therefore improve.
- In rational-choice theory only the government has potential power, and its only power is to distort the otherwise perfect decisions of individuals. Power is a central focus of analysis in multi-level theory.
- Both trickery and regret are formally excluded in rational-choice theory, and any unhappiness can be laid only at the feet of the individual who, however unlucky his circumstances is better off than he might have been. Multi-level theory looks for ways to change social, political, and economic structures to better promote true interests.
- Rational choice has the appeal of introspection; multi-level theory does not.

All social theorists make epistemological commitments. If public health does not forcefully reject the rational-choice paradigm, it will soon find that not only its prescriptions, but its very goals, are logically invalidated by the axioms of rational choice (Mooney, 2009; Pearce, 1996; Rice & Unruh, 2009). What, after all, is public health if individuals are perfect choosers?

For many purposes in public health, rational choice will remain an acceptable approximation, just as Newtonian physics remains an acceptable approximation in modern physics. But although classical physics can accurately predict where a cannonball will land given its initial force and direction, it is neither correct nor useful in guiding modern missiles to their targets. For that one needs lasers and transistors, both of which depend on quantum mechanics. Rational choice theory will continue to be a useful approximation in many settings, but it must become subservient to the more scientifically complete multi-level theory, the adoption of which will alone permit significant advances in population health (Mooney, 2009).

Conclusion

Conceptual models abound in public health, but conceptual models and theory serve different purposes. While a conceptual model taxonomizes the factors involved in a health outcome, a theory proposes a specific causal mechanism for how these factors work. This distinction is that between nouns and verbs. We in public health have better luck communicating with each and others when we are careful and conscientious in our use of verbs. We now have a good sense of what upstream factors influence health, but we need a better sense of how they operate. Multi-level theory can provide this causal insight.

Multi-level theory provides a theoretical framework that is consistent with an emerging field of public health psychology (Hepworth, 2004; Von Lengerke, 2006; Von Lengerke et al., 2004). Both frameworks emphasize the role of power in shaping the context in which health decisions are made. Multi-level theory contributes to this earlier and more empirically developed literature by offering a specific causal mechanism for how individual psychology evolves in response to the application of power, as well as a fully-specified link to brain processes through its reliance on the concept of cognitive habit. By linking these two literatures together, each can enrich the other.

The point of multi-level theory is not to supplant previous theoretical work, but to valorize it. What is original in multi-level theory is not the particulars of the theory, nor any new empirical finding, but rather the opposition of the multi-level, science-based paradigm to the intuitive appeal of rational choice.

To assert that people are rational is to forcefully grasp the knife at the wrong end—with predictably bloody results. Of course people are rational—we think, we deliberate, we choose carefully. That is the beginning and end of rational choice theory. Multi-level theory reveals how our deliberate choices are informed, constrained, and shaped both by our biology and by the social medium in which we live. We must not seize upon an erroneous assumption of fixed preferences and deliberative reasoning as the handle we need to dissect the rationality of individual choices. Instead, we must seize upon modern understandings of cognitive habit and social forces to dissect the role of power in population health. Appendix A offers an example.

The surprising fact is that individuals, in their imperfections, do not decide much of their behavior. Instead, many—perhaps most, and in some sense *all*—decisions about behavior are collective decisions. And this is a good thing: it is a sign of efficiency, not indolence; of wisdom, not folly. But because decisions are collective, we face a common threat, read in our calcifying inequality, discernible in our ever-increasing healthcare spending, and visible in our growing obesity. Guided by the insights of multi-level theory, public health can map out the upstream causes of these threats to population health, and make the downstream world a healthier, happier, and freer one.

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Appendix A. Multi-level theory and the social patterning of poor diet

Poor diet is one of the leading causes of poor health, which, with lack of physical activity, leads to an estimated 300,000–400,000 deaths per year in the U.S. (Galea, Tracy, Hoggatt, DiMaggio, & Karpati, 2011; Mokdad, Marks, Stroup, & Gerberding, 2004), nearly as many as tobacco. Dietary behavior is especially obviously dependent on habits of mind. Menu planning, shopping, food preparation, and the act of eating, all arise as much from custom and a reliance on social referencing, behavioral habit, and habits of mind as from conscious deliberation and rationality. One author refers to eating as an "automatic behavior" (Cohen & Farley, 2008).

Behavioral economists and marketers have begun to explore the influence of cognitive habit on eating, demonstrating, for example, that people will eat more when in the presence of another person who eats a lot (Cohen & Farley, 2008; Wansink, 2004); that people will eat more when the portion size is larger (Wansink, 1996; Young & Nestle, 2002); that people will eat differently when exposed to the choices of others, including strangers (Ferraro, Bettman, & Chartrand, 2009), and to the cues of advertising (Harris, Baargh, et al., 2009). For behavioral economists, these results are curiosities of behavior that can be exploited in highly context-specific ways to nudge people toward healthier choices, for example by placing the healthiest foods at the beginning of the lunch line (Thaler & Sunstein, 2008).

For food marketers, however, people's dependence on cognitive habit in food choices opens the gates of power. Product placement, aggressive marketing in schools, pouring rights contracts, improved packaging and food product engineering, more retail food points of sale, increased marketing at the point of sale—all these are either new or greatly expanded since 1980. It has been argued that the tremendous increase in obesity since about 1980 is largely due to a significant expansion in the power and scope of food marketing (Zimmerman, 2011).

One view of this literature is to argue that eating is an automatic behavior; people tend to be irrational, especially around automatic behaviors; therefore of course our diets are poor. Multi-level theory emphasizes that most if not all behavioral patterns are inflected by power imbalances, but the question is which power matters. We see people automatically engaging in unhealthy eating behaviors, and erroneously conclude that the solution is to make eating less automatic. Yet on the contrary, precisely because choosing healthy foods is complex, the eating of healthy foods can become a norm only if it becomes automated. If public health advocates want to encourage healthy diets by encouraging everyone to think carefully about what they eat at every meal, success can only ever be tragically fragile.

Multi-level theory emphasizes not only departures from what might be considered rational choice, but also the ways in which these departures are economically patterned and socially systematized to benefit those with power. By understanding multi-level theory as fundamentally about the power to influence how we think, this paradigm shifts attention away from the peccadilloes of not-fully-rational choice and onto broad social patterns. Both rational choice theory and behavioral economics are inadequate to explain the rise in obesity since 1980, and unable to offer any system-wide or whole-population solutions. Because the increase in obesity has been highly similar for the wealthy and the poor and across all racial/ethnic groups (Ljungvall & Zimmerman, 2012), it is clear that whole-population solutions are required. While the nudges proposed by behavioral economics may produce results in small groups, they are unlikely to effect the social change required by this epidemic. For that, an understanding of power is required. In particular, it will be necessary to aggressively limit or tax that power itself: obesigenic food advertising and marketing (Harper & Mooney, 2010).

A whole-population approach, by limiting the effects of power over our food culture, also has the potential also to reduce health disparities related to differences in diet.

Social epidemiologists have shown that obesity is more prevalent in low-income and minority neighborhoods, and that a major contributing factor is poor diet (Dubowitz et al., 2008; James, Nelson, Ralph, & Leather, 1997; Martikainen, Brunner, & Marmot, 2003). One set of explanations has relied on the role of constraints: many low-income people live in food deserts, where fresh fruits and vegetables are not easily available (Beaulac, Kristjansson, & Cummins, 2009); and even when they are, their cost is prohibitive (Drewnowski & Specter, 2004; Monsivais, Aggarwal, & Drewnowski, 2010). Although such explanations have brought important perspectives to this issue, they may do more harm than good: explanations that so foreground constraints on individual choice reify the rationalist—and individualist—theory of decision-making.

By contrast, multi-level theory stresses structural issues that operate at the social level. Specifically, food marketing is more extensive in low-income and minority neighborhoods (Yancey et al., 2009), and this marketing exerts selective pressure on the evolution of dietary customs in these neighborhoods. This marketing is all the more effective in that people's cognitive resources are depleted in these neighborhoods because of the constant strain of a vulnerable existence. When under time pressure, consumers simplify decision-making in various ways, such as spending less time on each piece of information and selectively attending to the most important items (Payne, Bettman, & Johnson, 1993). The fact that cognition is a scarce resource makes the use of cognitive habits efficient, but it also opens them up to greater manipulation when people regularly face cognitive overload (Baumeister, Muraven, & Tice, 2000).

These are two very different causal theories, which produce different policy solutions: the individualist theory emphasizing relative prices and alleviation of specific constraints, and the multi-level theory emphasizing structural approaches, for example by limiting the marketing of obesigenic foods (Cohen, Scribner, & Farley, 2000).

These examples raise the issue of power, which must be carefully and explicitly foregrounded. Most models of the social determinants of health refer to power in general terms, if at all. A notable exception is the recent WHO report presenting a conceptual model of health inequalities, which laudably defines power both thoughtfully and unabashedly (Solar & Irwin, 2010). The report acknowledges turbulence in the literature. Many conceptions equate power with its ill effects: power is the ability to determine the behavior of others or to alter the course of events to suit one's own needs. This kind of definition of power is oriented on the observable effects of power upon others: power as the outcome of a particular intent, and is linked to domination and oppression. On the other hand is Arendt's (essentially unique) conception of power as conferred politically through collective action. Both such definitions are too narrow to capture the full array of power that would be recognized in public health, and both define power as an outcome, rather than as a causal mechanism.

Multi-level theory follows Steven Lukes (2004) in avoiding these outcome-based definitions of power. By defining power as the capacity to create joy or sadness in another at relatively little cost to oneself, the door is left open for power to be exercised in positive ways, or—equally importantly—for the use of power to produce unintended consequences with ill effects for health.

At the same time, it is important to be realistic about the uses to which power is most often put. As the WHO report urges us to "skepticism towards depoliticized models of empowerment and approaches that claim to empower disadvantaged individuals and groups while leaving the distribution of key social and material goods largely unchanged". Population health improvements will often depend on changes in allocations, changes in laws, or changes in the objectives of the powerful.

For the specific problem of poor diet, the power imbalance to be redressed is the power of food marketers over the cognitive habits that undergird dietary behavioral patterns. It will not be easy to promote laws that limit obesigenic food marketing, but a failure to do so will impair progress in dietary change, because the rise in obesity is rooted in power.

A lot is at stake here for public health. Economists have argued that although Americans are becoming more obese, they are

nonetheless better off for it (Cutler et al., 2003; Finkelstein & Zuckerman, 2008). But they would, wouldn't they? When one embraces a rational-choice theory in which all that is chosen is optimal, then any observed outcome must be optimal. By contrast, multi-level theory recognizes that in its imperfections, the world as we know it offers opportunities for improvement. Public health seems more naturally suited to multi-level theory than to rational choice, and if nothing else is taken from multi-level theory, the role of power over our ways of thinking should not be forgotten.

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