

Big decisions, little decisions: The hierarchy of everyday life

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Abstract

Most of the decisions we make are not momentous. Should I have that cigarette now, go to class today, go through that yellow traffic light? Our theoretical stance is that all decisions involve an attempt to maximize utility. We need to explain how such everyday decisions are made easily, without a conscious sense of weighing options. We define a policy decision as one that dictates a way of handling the smaller decisions that it governs. I might have made a policy decision to avoid a certain kind of food or drug. When that food or drug is offered, I don't have to think much before rejecting it. People do violate their policies, either deliberately or impulsively. Occasionally, I do eat that tempting piece of Black Forest cake. The violation is a lapse. Enough occasional lapses, and the policy collapses.

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The decisions we face in life are often hierarchically structured. From mundane problems (Should we go out to dinner tonight? If yes, then where should we go? When we arrive, which of the menu options should I select?) to expensive, life-altering processes (Should we buy a new house? If yes, then where? When we choose a community, which houses should we consider? How much should we offer?), the structure offers cognitive savings, because a particular answer at a high level of the decision tree (No, let's cook!) obviates thinking about the lower branches. Decisions that we make repeatedly can inspire short-cuts (I would like to have pan-fried noodles tonight, so I propose going to Supreme Dragon).

In this paper, we discuss a particular class of hierarchical decisions¹. What we will call a big decision is one that sets a personal policy. That policy will in turn simplify a host of future little decisions². Examples of big decisions are becoming/not becoming a college student, committing/not committing to a personal relationship, and most importantly for this discussion, deciding upon a course of health-

related behavior such as joining/not joining a fitness program, starting/not starting a diet, or becoming a smoker or remaining a non-smoker. These choices are made deliberately, using Kahneman's (2003) System 2.

We postulate that for both big and little decisions, the decision maker (DM) employs a multi-attribute utility (MAU) model (Weiss, Edwards, & Mouttapa, this volume) to evaluate the expected utility of each possible option (e.g., should I start smoking or should I remain a non-smoker), and chooses the option offering the highest. An option is characterized by the set of consequences that the DM anticipates will occur as a result of choosing it. The utility of an option is expressed by the Multi-Attribute Utility equation:

$$MAU = \sum_j SV_j \cdot SP_j \cdot MS_j$$

where SV_j (subjective value) refers to the worth of the j -th consequence, SP_j (subjective probability) refers to its likelihood, and

MSj (momentary salience) refers to its importance at the moment.

Options have multiple consequences attached to them, which is why utility is viewed as incorporating multiple attributes. A person making a big decision will have a goal (“lose 20 pounds before the reunion”) and a view of the available options that might bring about that goal (“join Curves health club”, “adopt South Beach diet”, “give up desserts”, “do 30 minutes of yoga daily”, “hope/pray for weight loss”). Associated with each option is a set of anticipated consequences. These anticipations constitute a personal theory about the way in which the environment packages the consequences, and may or may not be realistic. Advice, whether from friends, marketers, or health professionals, often plays a role in constructing that theory. Part of the personal theory includes determination of which little decisions ought to be nested under the big decision. The nested little decisions (“to eat or not to eat that piece of cake”, “work out today”) have separate sets of anticipated consequences attached to them.

The packaging of consequences depends strongly on the environment, to be sure, but also on the individual needs and preferences of the DM. For example, purchasing a particular food (fries or veggies?) or drink (wine or tea?) has immediate flavor and price consequences, delayed health consequences, and might have social or self-esteem consequences as well. Fries have a higher value on the flavor consequence, whereas veggies are higher on health. The subjective probability parameter accommodates the individual’s prediction of how likely the particular consequence is to occur if that option should be chosen. The momentary salience of a consequence can depend on current health and economic status, state of deprivation, and present company. Physiological need states control the momentary salience of applicable consequences. Delayed consequences usually have less impact than immediate ones³. The momentary salience parameter was not included in the classical MAU model that was originally proposed as prescriptive for economic decisions. We include momentary salience in the

descriptive version of the model to account for decisions that are made quickly, without consideration of the full set of potential consequences.

The product of the three parameters for a consequence determines that consequence’s contribution to the total utility. Because this contribution is multiplicative, the only consequences that influence a decision are those for which all three parameters have non-zero values. If someone is not thinking about a particular consequence at the moment, it has zero momentary salience and is thereby irrelevant.

The Path to Immediate Action

Everyone has many personal policies in place, but they do not necessarily address the same issues. There are concerns for which an individual has not yet established a policy, either because the concern has not become important enough or because the person has consciously chosen not to make a big decision governing it. In such cases, a spontaneous decision must be made every time the concern arises. Big decisions can be broad in scope, such as one that calls for avoiding unhealthful foods, or narrow, such as one that calls for wearing a seatbelt routinely. Big decisions will often have other big decisions nested under them. For example, the big decision to avoid unhealthful foods may encompass subsidiary big decisions such as avoiding Mexican restaurants.

Big decisions that bear on health typically address two options. One option has salubrious consequences but does not provide much pleasure, while the other option is risky but fun. We often face the choice between a pleasant vice and a virtue consisting of the absence of that vice. The process of making the big decision, of setting a policy, is likely to be seen as rather unpleasant, since it involves serious consideration of consequences with negative values. Bad habits may persist simply because the DM prefers to avoid making a big decision that would change the policy. Reconsideration may not occur without prompting from an external source.

Little decisions are everyday decisions, governed by policies already in place. These

decisions often need to be resolved immediately, and are usually similar to others that have occurred in the past. Examples of small decisions that are governed by big decisions include going to/cutting a particular class, flirting/not flirting this evening, working out/not exercising today, grabbing a brownie/resisting temptation, or accepting/rejecting an offered cigarette. Little decisions determine the path of immediate action⁴.

Decision magnitude also addresses the probabilities attached to outcomes. When a decision recurs repeatedly, the consequences cumulate. Particularly in the health domain, little decisions often inspire actions that generate very small changes in probability. The increment in the likelihood of eventually contracting lung cancer as a result of smoking one cigarette is infinitesimal. Big decisions, on the other hand, can generate sizable differences; the change in the likelihood of eventually contracting lung cancer if one takes up (or quits) smoking is appreciable. Similar logic applies if we change the example to a beneficial behavior such as exercise. The hierarchical model is especially apt for describing initiation and maintenance of health-promoting and health-destructive behaviors.

Little decisions are not necessarily inconsequential; running a yellow traffic light or picking up a romantic partner in a bar can lead to a dramatic change in one's life. The decisions are little in the sense that one of the options is simply an implementation of the policy defined by the applicable big decision; choosing that default option scarcely requires any thought beyond determining which policy applies. No utility calculation is required for the default option implied by the policy, because that option inherits the MAU of the policy. Inherited utility is the reason that intention generally predicts action, but not perfectly. Much of the time the default option, which is consistent with intention, is chosen. Even if an unfamiliar option is presented, the policy usually makes the decision easy ("I've never had ostrich, and you make it sound delicious, but I'm a vegetarian"). Yates, Veinott, and Patalano (2003) have identified seven categories of decision easiness;

little decisions are easy, in their sense, because hardly any reflection is required.

Of course, people do make little decisions that violate their policies. There are a few very firm policies that are rarely violated (very high MAU for the policy), but most are applied more flexibly (MAU not as high). Although David was a dedicated college student, once in a while he missed a class for no academically acceptable reason. And despite Jie's avowed commitment to a low-fat diet, she occasionally surrenders to that tempting slice of pizza. If the applicable policy looms large, then a violation may be a deliberative choice ("Looks like a beautiful day for the beach. Perhaps I might skip class. I can get the notes from a classmate."). Occasionally, though, a lapse can occur for a seemingly trivial reason; an anticipated consequence with relatively low (but positive) value, such as the flavor of French fries, can take on high momentary salience via a cue such as aroma. That is, the MAU for the violation option exceeds the inherited MAU for the default option implied by the policy.

The special danger inherent in violation is that the DM may acquire new information that changes the parameters and leads to a change of policy, a big decision. Initiation can follow a violation. For example, Jie might have in place a policy that dictates not eating foods topped by whipped cream. One day David tempts her by offering a beautiful cake topped with whipped cream and cherries, and she tries it. It tastes so good that she makes the big decision to incorporate whipped cream into her diet occasionally, or perhaps regularly. More ominously, a friend may recommend a previously untried drug to an adolescent, and the subsequent events are so positive that the previous non-user turns into a user.

Variation in decision across what seem to be identical circumstances is a challenge for a utility-based theory, since it is hard for economists to believe that utilities change very much from day to day. Non-economic decisions are qualitatively different from the risky decisions gamblers face. Utilities attached to behavioral options do change, and can change

quickly. Values and probabilities may not change rapidly, but momentary saliences may fluctuate wildly. The French fries always taste good, but Ward's concern with calories and fat may depend on when he had his last meal and what he ate at that time, what the doctor told him during their last encounter, what he weighed this morning, and what his companions are eating. Although variation in little decisions can lead to policy change, variation does not necessarily entail violation. If the policy is broad enough, multiple alternatives can be consistent with the big decision.

Impulsive decisions are made quickly, using Kahneman's (2003) System 1. But even though an impulsive decision may appear to be made instantaneously, we suggest that MAU calculations are still carried out. The difference between deliberative and impulsive decisions is one of degree, not of kind. The same MAU model describes the integration. The difference is that for an impulsive decision, most consequences, especially long-term outcomes, receive zero momentary salience during the utility calculations. A single consequence may dominate the decision. In such cases, the arithmetic is simple, so the decision occurs quickly and there may be little subjective sense of weighing options.

An impulsive decision can be spontaneous, if there is no applicable policy in place, or can override an existing policy decision. Even as impulsive a decision as whether a driver (one who does not have a relevant policy in place) elects to run through a yellow light may involve a computation, as can be seen if a police car is visible at the intersection. Impulsive decisions may be more likely to occur when the DM is impaired by drugs or stress; impairment limits the ability to consider multiple consequences. A prime motivation for making big decisions is that people know their impulsive decisions are prone to be untrustworthy. If a policy is in place, one can fall back upon it to dictate the little decision. If no policy governs the situation, impulse is more likely to carry the day. When the choice between fries and salad is offered, a person with no policy can either decide impulsively or can deliberate on the merits of

the options. If deliberative thinking about the same set of options occurs repeatedly with similar results, the DM may realize that an implicit policy has been created. This insight may in turn simplify future decisions.

Emotional Consequences

Consequences reside in the imagination of the DM, and often have an emotional aspect to them. One can envision the sensory pleasure to be experienced if one eats that piece of chocolate or the adrenaline rush that will come as one views that exciting film (Mellers & McGraw, 2001). One can also envision the regret to be felt upon foregoing these pleasures, but in the case of the chocolate one can also picture the guilt that will follow indulgence. Anticipated regret increases MAU by entering the equation with a positive value; the more attractive the temptation, the more regret one might expect to feel upon foregoing it. In contrast, anticipated guilt refers to the reduced sense of self-worth generated by surrendering to the temptation. Anticipated guilt reduces MAU by entering the equation with a negative value. The momentary salience of emotional consequences is primarily governed by the current situation; but as advertisers and successful nags know, memory strength is another determinant.

Regret offers an explanatory mechanism for the puzzling fact that many (but not all) people exhibit variety in their choices, particularly for foods. Even if David very much enjoyed his lunch today, he will almost certainly eat something different tomorrow. The switch seems illogical, both from a reinforcement perspective and a statistical perspective. If something was way above average, it is unlikely that a different choice will be better. The explanation we propose is that each time a DM chooses one attractive option over another, there is some regret experienced for failing to obtain the option not selected. Regret is a consequence whose value is proportional to the value of the option on which the DM misses out. The importance attached to regret cumulates over opportunities, so that the unselected option increases in MAU. When the utility accrues sufficiently, the unselected option is chosen.

After that choice, the DM now regrets missing the previously chosen option. More regret is felt for missing the preferred option, so the preferred choice gains in utility and is likely to be chosen again next time. The cycle can continue indefinitely; if there are only two possible choices, one will be preferred most of the time, but the other will also be chosen occasionally. If there are multiple attractive possibilities, they will all be chosen occasionally, though not equally often. People who do not experience regret (Howard, 1992) ought not to be subject to this oscillation.

Lapse and Collapse

In the addiction literature (Marlatt & Donovan, 2005), occasional violations of policy are referred to as “lapses”. Our decision making perspective is that successful treatment of an addiction results in the implementation of a new policy. Accordingly, a lapse arises from either a deliberative decision or an impulsive one. Relapse prevention therapy (Marlatt & Witkiewitz, 2005) is often targeted toward eliminating impulsive lapses, for example by teaching the patient to avoid settings that might trigger cravings. A deliberate lapse would be an anomaly, a statement that the patient has in effect rejected the therapeutic goal.

Addiction therapists refer to “relapse” as the return to the dangerous behavioral pattern that preceded treatment. Because we wish to apply the same conceptual analysis to a broad class of hierarchical decisions, we prefer the term “collapse” to refer to abandonment of a policy as a result of repeated lapses. Consider a person who joins an exercise program, or a reading group, and subsequently misses sessions before eventually dropping out. We would not call this kind of withdrawal a relapse. The person is not reverting to a specific behavioral pattern, unless we want to stretch the language by thinking of not exercising regularly or not reading regularly as patterns. Nor would we wish to refer to the abandonment of a policy that promotes antisocial behavior in favor of a more beneficial pattern a relapse. We knew someone who decided to stop tipping in restaurants. The little decisions resulting from that big decision were easy for him. However, social disapproval led

him to tip occasionally (lapses from the policy), and a caustic remark from a server (analogous to therapy, perhaps) convinced him that this policy was not sound. He went back to tipping steadily again. Relapse does not seem to be an applicable term here; rather, we describe it as the collapse of his personal anti-tipping policy.

Lapses can lead to collapse because the DM has the insight that current policy is not governing practice. MAU for the policy decreases, because subjective likelihoods for some of the positive consequences are smaller than those used in the earlier, policy-setting computation. For example, a dieter may conclude that because she cannot stick to the regimen, the positive consequence of weight loss is not going to happen. Similarly, an alcoholic may conclude that an abstinence policy is too difficult to maintain. An alternative to collapse is that the DM may instead reaffirm the previous policy, attempting once again to make little decisions consistent with it. A third option is to modify the policy, allowing for moderate indulgence. Policy changes that completely give up previously well-established habits are especially difficult to maintain (Polivy & Herman, 2002).

The term “relapse” implies a two-state classification schema. People either are drug users or not, are unhealthy eaters or not, are spousal abusers or not. Physical addiction may indeed be a two-state construct; one is either addicted or not (there is debate about degree of addiction). But many unhealthy behaviors are the result of surrendering to temptation. Many people fight temptation every day, occasionally yielding without necessarily abandoning the relevant policy. Collapse describes a possible end state to that continual struggle, wherein the person decides that the policy is not feasible. Even collapse may be temporary; people who ultimately achieve long-term abstinence have often gone through repeated cycles of stopping and recidivism (Schacter, 1982).

An important empirical question is how many violations must be observed before the DM infers that the policy decision has been overridden. How many missed classes define the student as a dropout? How many brownies

define an unrestrained eater? The firmness of a policy depends on personal characteristics, of course, and also on the domain. Our intuition is that a small number (perhaps as small a number as one) of affairs is likely to undermine a romantic relationship, whereas missing many workout sessions need not make a person feel slothful.

Similarly, one who has not explicitly made a policy decision may infer that observed decisions have effectively imposed a policy. How many cigarettes cause the former experimental smoker to see himself or herself as a regular smoker? This self-definition may have dramatic importance for the DM's future behavior, and interventions can be directed toward broadening the definitions. For example, a therapist might try to persuade a dieter that one can maintain a policy of restraint toward other diet-busters while forgiving the occasional chocolate orgy.

Policy Change Without Lapse

A policy can be abandoned without a history of lapses. A non-collapsing ending would occur when the DM evaluates the policy as ineffective. People who begin a diet or exercise program for the first time do so because the expected positive consequences outweigh the negative. If one follows the program recommendations but the attained results do not live up to expectations, quitting is a plausible decision. The therapist has two possible counters. One is to make the program more effective, so that results will match expectations; that is usually difficult. The alternative is to make sure that initiators have more realistic expectations. In that way, they will persist even though the program may not accomplish everything they want. Note the critical distinction between what people want and what they expect. We hypothesize that people who drop out will have lower MAUs for the program than those who persist. Because effective programs for change are rare, it is likely that both dropouts and persisters will have lower MAUs than when they began.

It is also possible that a policy might be abandoned without collapse because the DM determines that success has eliminated the need

for it. A person might make the big decision to avoid high fat foods, and that policy would subsequently govern little decisions regarding food choices. Once the goal of reducing cholesterol or weight to an acceptable level has been achieved, unrestricted eating might be acceptable to the dieter, albeit not necessarily to the practitioner who recommended the change. The promise of eventual freedom might even serve as motivation to maintain the diet until the desired reduction occurs.

Personality and Decision Making

When two people in similar circumstances reach different decisions, it is natural to invoke personality as an explanatory mechanism. Stable differences in response patterns are primarily shaped by personal history and physiology. Our theoretical stance is that personality, along with everything else that contributes to a decision, is expressed via the model parameters. We envision a research agenda that explores connections between personality constructs and these parameters.

Traditional explanatory notions such as morality and will power can also be viewed through the lens of the MAU equation. A person who invokes moral considerations in making a decision attaches high momentary salience to consequences such as "incur God's wrath" or "contradict social norms", depending on the flavor of the particular moral code in force. A person with a strong will is one who adheres to established policy in the face of temptation. For that decision maker, the positive values attached to the temptation are not high enough to overcome the negative emotional consequence of guilt that will accompany the violation.

Decision Quality

The quality of a decision has two aspects. We apply Hammond's (1996) distinction between cohesion and correspondence theories of competence to decision quality. A decision is coherent to the extent that the DM incorporates personal knowledge as expressed by the parameters. The more personally relevant consequences that receive positive momentary saliences when the equation is computed, the more coherent is the decision. Impulsive

decisions are often poor because the DM ignores consequences. A decision will also be incoherent if values or subjective probabilities are recalled incorrectly. Coherence errors occur when the decision does not accurately reflect personal parameters.

A decision lacks correspondence when the DM's parameters do not match the environment. If someone is told by a trusted source that a drug has needed healing properties when in fact the drug is harmful, the decision to take it regularly might be fatal. That policy decision would be a good one in terms of coherence, but would be poor in terms of correspondence. Only correct real-world information can resolve correspondence errors⁷.

Intervention Strategies

The decision making approach posits that people choose behaviors that maximize subjective utility. What people perceive as personally advantageous at the moment may not be beneficial from a larger perspective. People will frequently make poor decisions that emphasize short-term gains at the expense of long-term deficits. Among the options in this category are substance abuse, unhealthy eating, unsafe sex, and failure to invest in education. These poor decisions may be failures of either coherence or correspondence. If the DM is cognizant of the negative consequences but does not assign them sufficient importance when the decision is made, the short-sighted choice is incoherent. If the DM is ignorant of the risks, the decision lacks correspondence.

People also make poor decisions that gratify themselves at the expense of other people. These decisions will lead to interpersonal conflict and perhaps to criminal proceedings. Examples in this category include domestic violence, sexual abuse, and property theft. The deficiency is likely attributable to poor correspondence; the DM places socially deviant values on particular consequences.

Although the personal and societal problems in these two categories span a wide range of professional domains, our stance is that a common thread underlies them all. The little

decisions that people make, the ones that lead to action, need to be regulated by appropriate big decisions. People may need help in formulating, or reformulating, personal policies. They may need help to avoid lapses, and to recover from them. That help can be delivered on a one-to-one basis, from a friend or relative, or from a professional advisor such as a physician or therapist. Alternatively, advice can be delivered in a small group convened because its members have acknowledged a common history. The most economical way to deliver advice is via schools or the mass media. Prevention campaigns are primarily aimed at helping young people with their early big decisions, but also can be aimed at the community at large, especially when new health consequences are discovered.

Therapeutic experts have learned ways to provide that help; usually the expertise is domain-specific. Seeing the commonality we highlight here, that self-defeating behaviors are rooted in poor decisions, may enable successful intervention tactics from one domain to be translated into another. Perhaps the main applied contribution of a global model is such cross-fertilization. Accumulated professional wisdom can be shared.

When professional wisdom is offered, another important decision the patient faces is whether to accept the advice. Particularly in the medical area, pejorative terms such as "noncompliant" or "nonadherent" are used to describe the behavior of patients who violate the recommended policies. Such thinking stems from the notion that a patient ought to have in place the global policy "follow the professional's advice". A patient who has not made that big decision will need specific information regarding the consequences of the recommended behaviors. One of those consequences may be the satisfaction inherent in following sage advice, but other consequences also play a role in the patient's ultimate decision.

The MAU model is a strictly cognitive conceptualization. It fits quite naturally into cognitive-behavioral therapeutic treatment. We think it might be useful for the therapist to present the model. It is obvious that a patient can

benefit from avoiding temptation; explaining how temptation translates into momentary salience may help the patient comprehend the model. We also think it will be helpful to make sure the patient understands that lapses arise from changes in momentary saliences, and this fluctuation may not be easily regulated. We recognize the danger in normalizing lapses, especially where the behavior is harmful to another person. The therapist does not condone wicked behavior by acknowledging that lapses may happen. The greater danger is that unexpected lapses may lead swiftly to collapse. The progression from lapse to collapse is one that involves self-perception, a process to which skilled therapists are sensitive.

Another therapeutic tactic suggested by the model is to encourage patients to deliberate before making a little decision if there is no relevant policy in place. For a quick decision, the momentary salience attached to many of the consequences is likely to be zero. Accordingly, a quick little decision may be a poor one, because consequences that the DM would, in a more reflective mode, acknowledge to be important are ignored. Greater attention to more consequences ought to lead to better decisions. Mere elicitation of the parameters attached to consequences (Leigh & Stacy, 1993) could be also a useful exercise; people are likely to increase the momentary saliences assigned to negative consequences if they are pushed to think about them.

The hierarchical perspective offers special promise in the health domain, where lifestyle decisions underlie so many modern ailments (Baldwin et al., 2006; Rothman, 2000). The grand theories in health psychology, such as the Health Belief Model (Rosenstock, 1974) or the Theory of Planned Behavior (Ajzen, 1991), speak to intentions; they are theories about big decisions. But the little decisions ruin us. If we lived up to our noble New Year's resolutions, we would not be surrendering to our preferred vices. Unfortunately, the consequences attached to the big decisions and those attached to the little decisions nested under them are not the same, so strategies that help people make sound big decisions only address part of the problem.

Interventions that address little decisions, such as installing an electronic pig that flashes and oinks when the refrigerator door opens, may help by manipulating the momentary salience attached to the consequences of everyday actions.

Discussion

The MAU model was introduced as a prescription for how people ought to make important decisions (von Winterfeldt & Edwards, 1986). It is considered an optimal method for combining the DM's preferences and knowledge. Here, though, we are proposing to turn the model into a description of how people actually make decisions. Is it plausible that a person can call to mind all of the consequences and can do all of the MAU arithmetic as quickly as people seem to make everyday decisions?

A simplified version of a utility model, without an explicit momentary salience parameter, is a reasonable first approximation of laboratory (Edwards, 1961) and real-world (Fryback & Edwards, 1973) gambling behavior, but in that domain there are generally only a few consequences to consider within each decision. Real-world behavioral options can have many consequences that an omniscient DM ought to take into account. The momentary salience parameter provides the model an explicit way to allow for forgetting or ignoring consequences, thereby deflecting Simon's (1983) criticism that utility theories cannot describe what humans do because their processing capacity is inevitably limited. The current formulation espouses a bounded rationality; consequences that are not considered do not affect the model's output because they are assigned zero momentary salience. In making an unaided decision, the maximum number of consequences that can have high momentary salience and thereby be relevant to the decision at hand is limited by the capacity of the DM's working memory. We would not be surprised if the maximum for spontaneous decisions was on the order of 7 ± 2 (Miller, 1956) consequences.

Our way of finessing the plausibility issue is to regard the model as paramorphic rather than literal. A paramorphic model (Hoffman, 1960; Weiss, Edwards, & Moutappa, this volume) is

one that is functionally similar to a specified model. A system for estimating the value of a contemplated action might well utilize the kind of pre-wired program that Cosmides and Tooby (1994) propose evolution to have bestowed on animals. An evaluation program would be advantageous in foraging. The hypothesized module is analogous to the visual system, which solves such complex problems as object recognition very rapidly.

Of course, plausibility arguments are less impressive than actual evidence. At the societal level, there have been changes in consumption patterns when information about a food or drug becomes widely known (USDHHS, 1994). These changes reflect big decisions by

consumers, changing their individual policies. We know of few studies that have pursued evidence that MAU underlies decisions at the individual level; an exception is the work of Karl Bauman (1980). Jie is currently following a similar line in a longitudinal study of adolescent substance initiation (Weiss, Edwards, & Moutappa, this volume). The empirical challenge is how to estimate, ideally at the moment of decision, the values of the parameters. Because the model allows for individual differences, not only in the parameters for each consequence but also in the number of consequences envisioned by the DM, there is potential for coming to grips with the complexity that characterizes what humans do as they confront a myriad of decisions daily.

References

- Adler, N. (1994). *Adolescent sexual behavior looks irrational – But looks are deceiving*. Washington, DC: Federation of Behavioral, Psychological, and Cognitive Sciences.
- Ainslie, G. (2001). *Breakdown of will*. New York: Cambridge University Press.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- Baldwin, A. S., Rothman, A. J., Hertel, A. W., Linde, J. A., Jeffery, R. W., Finch, E. A., et al. (2006). Specifying the determinants of the initiation and maintenance of behavior change: An examination of self-efficacy, satisfaction, and smoking cessation. *Health Psychology*, 25, 626-634.
- Bauman, K. E. (1980). *Predicting adolescent drug use: Utility structure and marijuana*. New York: Praeger.
- Chung, S. H., & Herrnstein, R. J. (1967). Choice and delay of reinforcement. *Journal of the Experimental Analysis of Behavior*, 10, 67-64.
- Cosmides, L., & Tooby, J. (1994). Better than rational: Evolutionary psychology and the invisible hand. *American Economic Review (Papers and Proceedings)*, 84, 327-332.
- Curry, S., Marlatt, G. A., & Gordon, J. R. (1987). Abstinence violation effect: Validation of an attributional construct with smoking cessation. *Journal of Consulting and Clinical Psychology*, 55, 145-149.
- Edwards, W. (1961). Behavioral decision theory. *Annual Review of Psychology*, 1961, 12, 473-498.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- Fryback, D. G., & Edwards, W. (1973). Choices among bets by Las Vegas gamblers: Absolute and contextual effects. *Journal of Experimental Psychology*, 98, 271-278.
- Hammond, K. R. (1996). *Human judgment and social policy: Irreducible uncertainty, inevitable error, unavoidable injustice*. New York: Oxford University Press.
- Hoffman, P. (1960). The paramorphic representation of clinical judgment. *Psychological Bulletin*, 57, 116-131.
- Howard, R. (1992). In praise of the old time religion. In W. Edwards (Ed.), *Utility theories: Measurements and applications* (pp. 27-56). Boston: Kluwer.
- Janis, I. L., & Mann, L. (1977). *Decision making*. New York: The Free Press.
- Kahneman, D. (2003). A perspective on judgment and choice: Mapping bounded rationality. *American Psychologist*, 58, 697-720.

- Leigh, B. C., & Stacy, A. W. (1993). Alcohol outcome expectancies: Scale construction and predictive utility in higher order confirmatory models. *Psychological Assessment, 5*, 216-229.
- Loewenstein, G., & Furstenberg, F. (1991). Is teenage sexual behavior rational? *Journal of Applied Social Psychology, 21*, 957-986.
- Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin, 127*, 267-286.
- Marlatt, G. A., & Donovan, D. M. (Eds.). (2005). *Relapse prevention* (2nd ed.). New York: Guilford Press.
- Marlatt, G. A., & Witkiewitz, K. (2005). In G. A. Marlatt & D. M. Donovan (Eds.), *Relapse prevention* (2nd ed.) (pp. 1-45). New York: Guilford Press.
- Mellers, B. A., & McGraw, A. P. (2001). Anticipated emotions as guides to choice. *Current Directions in Psychological Science, 10*, 210-214.
- Miller, G. A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review, 63*, 81-97.
- Pinkerton, S. D., & Abramson, P. R. (1992). Is risky sex rational? *Journal of Sex Research, 29*, 561-568.
- Polivy, J., & Herman, C. P. (2002). If at first you don't succeed: False hopes of self-change. *American Psychologist, 57*, 677-689.
- Raineri, A., & Rachlin, H. (1993). The effect of temporal constraints on the value of money and other commodities. *Journal of Behavioral Decision-Making, 6*, 77-94.
- Rosenstock, J. M. (1974). Historical origins of the Health Belief Model. *Health Education Monographs, 2*, 1-9.
- Rothman, A. J. (2000). Toward a theory-based analysis of behavior maintenance. *Health Psychology, 19*, 1-6.
- Schacter, S. (1982). Recidivism and self-cure of smoking and obesity. *American Psychologist, 37*, 436-444.
- Simon, H. A. (1983). *Reason in human affairs*. Stanford, CA: Stanford University Press.
- U.S. Department of Health and Human Services (USDHHS). (1994). *Preventing tobacco use among young people. A report of the Surgeon General*. Atlanta: US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- von Winterfeldt, D., & Edwards, W. (1986). *Decision analysis and behavioral research*. New York: Cambridge University Press.
- Weiss, J. W., Edwards, W., & Mouttapa, M. (this volume). The puzzle of adolescent substance initiation.
- Yates, J. F., Veinott, E. S., & Patalano, A. L. (2003). Hard decisions, bad decisions: On decision quality and decision aiding. In Schneider, S. L., & Shanteau, J. (Eds.), *Emerging perspectives on judgment and decision research*. (pp. 13-63). Cambridge, UK: Cambridge University Press.

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