FUTURES 2.0: RETHINKING THE DISCIPLINE

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What is the future of futures?

This essay is a thought experiment. If the field of futures were invented today, it asks, what would it look like? What would its intellectual foundations be? Who would it serve and influence? And how would its ideas and insights be put into practice?

I suggest that a brand-new field that concerned itself with the future—call it Futures 2.0 for simplicity's sake—would have four notable features. First, it would be designed to deal with problems characterized by great complexity, contingency, uncertainty and urgency—properties shared by the critical problems of the 21st century. Second, it would draw on experimental psychology and neuroeconomics to counter systematic biases that affect our ability to think about and act upon the future. (Sanfey et al., 2006) Third, would incorporate tools like social software, prediction markets, and choice architectures into its research methods. Finally, it would seek to lengthen "the shadow of the future" (Axelrod, 1984) of everyday choices, and influence the future by encouraging small cumulative changes in the behaviors of very large numbers of people over the course of years or decades.

To be clear, my purpose here is not to create a scorecard for evaluating current experiments with new methods or technologies, or to rank practitioners or organizations. Nor am I arguing that scenarios, forecasts, and other familiar tools—or decades of craft knowledge and experience with creating and using them—should be abandoned. It may seem odd (or even unfair) to omit references to current futures work in a project like this. But my approach is inspired by engineers' "clean-slate" design exercises that imagine how they would build new versions of familiar systems from scratch, and give them the conceptual space to see radical implications (or applications) of new science and technology. (Feldmann. 2007; Roberts, 2009; Mayer-Schönberger, 2009) By thinking about the potential utility of behavioral economics, neuroscience, and new technologies to futures work without regard to current practices, I hope to spot opportunities or questions that might be overlooked in a more incremental or evolutionary exercise. My approach is further inspired by James Martin's *Meaning of the 21st Century*, which argued that if we could learn to deal with global problems ranging from climate change to terrorism to food shortages, mankind would develop tools that would allow us to thrive for centuries to come. (Martin, 2006) The

tools of Futures 2.0 could be central to creating Martin's future; conceiving and designing them may require looking at the future, and how we use the future to inform the present, with fresh eyes.

As a result, the proposals outlined probably may not seem completely unfamiliar or implausible; readers are likely to see pieces of them in the form of exploratory essays, prototype projects, and emerging practices at various consultancies, research centers, and think-tanks. Since the behavioral economics and neuroeconomics literatures are outside the normal range of most futurists' readings, the essay may well provide additional rationale or justification for these efforts; I trust my readers to make those connections. But my hope is that these *ad hoc* experiments can be drawn together in a single program that provides a theoretical grounding for their integration, explains how they can be extended in the future, and how they might bring otherwise-unexpected benefits to the field. This essay attempts to provide that grounding.

The Intellectual Foundations of Futures 2.0

Futures 2.0 would be based on four premises. First, the biggest problems confronting us in the 21st century are quite different than those we faced in the 20th. Second, the range of actors who shape the future has grown dramatically. Third, humans are naturally ill-equiped to think rationally about long-term futures. Finally, expert knowledge is a less reliable guide to understanding the future than we realize. This section lays out the argument for each of these premises.

21st century challenges are different

Efforts to see the future are as old as civilization itself. However, modern futures and forecasting has its origins in the Cold War in the 1950s and 1960s, and was strongly shaped by it. During this period, practitioners developed techniques for mobilizing expert knowledge in statistics, social science, and electronic computing to improve corporate strategy and government policy. In the 1970s, with the development of scenario planning, technology forecasting, and facilitation methods, the field assumed a shape that is still familiar today. (Gharmari-Tabrizi, 2005; Bradfield et al., 2005; Cole, 2008; Masini, 2006) Recently several authors have argued that the

kinds of challenges we face in the 21st century will be different than those we faced during the Cold War, and the methods we developed them need to be revised.

Perhaps the best known (and almost certainly most controversial) work is Nassim Taleb's. (Taleb, 2008) Taleb's most recent book focuses on the challenge of what he calls "black swans," disruptive events that either are unpredictable or very hard for humans to think about seriously. Black swans have always been part of human affairs. But globalization, the growing interdependence of modern economies, and the explosive growth of financial services and information technologies have made black swans more frequent and more disruptive. In ancient agrarian economies, famines or floods were local, short-term events; today, a financial crisis in London can cascade into markets in the Middle East, Americas, and Asia in a few hours. Worse yet, because of the complexity of financial instruments and markets interrelationships, the impact and duration of black swans is impossible to predict. Agricultural and industrial economies grew slowly, limited by physical resources, land, climate and seasons, and human labor. In contrast, information-intensive economies can grow and crash very quickly, because they are shaped less by physical assets than by intangibles and ideas.

The Black Swan echoes Silvio Funtowicz and Jerry Ravetz's writing on the emergence of "post-normal" science. (Funtowicz and Ravetz, 1993) In Thomas Kuhn's famous characterization, "normal science" was a form of puzzle-solving, in which one could be reasonably confident that a well-framed questions had right answers. (Kuhn, 1962) Increasingly, however, the problems we face "are in principle not reducible to 'puzzle-solving' normal science in Kuhn's term." (Ravetz, 2006, 277) But while it is impossible to find objective, scientific answers for these problems, they cannot be ignored, even if one must proceed on the basis of uncertain and controversial information, and the long-term impacts of decisions are unclear. It also requires surrendering the assumption that expertise will yield better decisions. As Ravetz puts it, "conventional notions of expertise and professional competence are unsustainable in a world defined by politics… [and] fraught choices." It is impossible to make "hard decisions with soft numbers." (Ravetz, 2002)

Both Taleb and Ravetz essentially describe challenges dealing with "wicked problems." As Horst Rittel and Melvin Webber put it in a classic 1973

article, wicked problems are complex social problems that "cannot be definitely described." The costs and benefits of different strategies for dealing with them are hard to objectively determine. There are no optimal solutions, and indeed "no 'solutions' in the sense of definitive and objective answers." Finally, every wicked problem is unique, and every solution is highly consequential. One cannot conduct real-world tests of competing public health policies to see which is more effective, nor can large infrastructure programs be rolled up and returned to the builder if they cause unexpected problems. (Rittel and Webber, 1973, p. 155)

The people who will shape the 21st century… are ordinary people

Another factor that complicates futurists' work is the growing range of players who can influence, and insist on a role in shaping, the future. Users are becoming innovators, customers reinvent products or co-create them with companies, networked organizations multiply the power of small groups, and the capacity for small numbers of people to have an impact on the world—whether through cloud computing, IEDs and cell phones, or DIY bioweapons—is growing.

This movement has been building for decades. In politics, demands for greater public involvement have affected the ways governments make policy. The growth of the consumer rights movement over the last thirty years has shown businesses that consumer demands—not just expressed in terms of buying preferences, but in its influence on corporate policy—cannot be ignored. More recently, some companies have realized that consumers are a potential source of innovations and new ideas. On the dark side, the falling cost and growing power of weapons has given ever-smaller groups ever-larger destructive capabilities.

Movements like this used to require central organizations, but as Howard Rheingold and others have argued, mobile communication technologies (cellphones, text-messaging and Web-enabled handheld devices) allow groups to use the digital world to organize in the real world. (Rheingold, 2003; Arquilla and Ronfeldt, 1996; Arquilla and Ronfeldt, 1997) The anti-globalization groups who disrupted World Trade Organization meetings, for example, used websites and e-mail to spread the word of actions, and text messaging and cellphones to act together in real time. They have taken digital power to the streets. (Hawken, 2007) Smart mobs self-organize,

coordinating their actions without leaders; this gives them flexibility and resilience. They are good at cooperation, magnifying their power by sharing resources and information and harnessing the specialized skills and knowledge of individual members. (Pang, 2003)

In short, mobile and digital technologies—the core technologies of ubiquitous computing—multiply the power that individuals have to organize and coordinate with others to affect the future. This has three implications. First, forecasting that draws on the insights of people who are likely to shape the future can no longer focus only on elites. Second, it becomes more important for futurists to work in media that can reach and influence large numbers of ordinary people. Everybody is an influencer; the problem is making them aware of that fact, and enabling them to act on it.

But ordinary people think poorly about the future...

Finally, the same technologies that allow smart mobs to coordinate in the present can be used to help people think more clear about, and act to improve, the future. This is fortunate, for while humans naturally think about the future, we do so in ways that are at best flawed, and at worst are dangerous. Neuroscientists have discovered a close connection between memory, imagination and futures: similar portions of the brain are activated when we recall past events, imagine something in the present, and envision the future. (Szpunar et al., 2007) But humans evolved in a period in which we were fewer in number, consumed less, lived shorter lives, and mainly had to worry about surviving threats from our environment. The instincts that served us well in that kind of life do not help us deal with the problems created by our now being threats **to** our environment, or by the fact that we live in environments far more complex than those we evolved in.

Challenges to our ability to perceive problems

First, our brains are calibrated to respond most quickly to immediate threats, not to slow, long-term problems. For most of human history, being able to spot the jaguar in the trees or dodge the thrown stone was more important than responding to changes that unfold over decades. But what worked well in prehistory makes it hard for us to pay attention to global problems that play out over long periods. For the same reason, abstract threats (like climate change) are hard for us to comprehend and act upon. We respond more

strongly to moral outrages against individuals: the vivid plight of a single starving child touches us more than the systematic defunding of public health, even though the latter can have a far greater social impact.

Likewise, our love of stories leads us to put more trust in specific futures than in general ones. More detailed scenarios sound more plausible to us even though they're *always* statistically more unlikely than less detailed ones. Simple patterns and stories are useful frameworks both for storing information and for making sense of complex issues: Bart Simpson spoke to a deep psychological need when he said, "To those who say there are no easy answers, I say you're not looking hard enough!" This is a useful survival skill when processing short-term problems, but it can lead us astray when thinking about the long term. (Even smart people over-use simplicity. Economist Harry Markowitz confessed that he used a simple rule of thumb when starting his retirement account and never changed it—even after he won a Nobel prize for his work in portfolio theory.) (Thaler and Sunstein, 2008, p. 123)

Our over-reliance on patterns also appears in the form of starting-point biases. In surveys, for example, the order in which questions are asked can color the results, because early questions generate information that influences later answers. (Strack et al., 1988; Zaller and Feldman, 1992) The framing of information or choices has a substantial effect on analysis and decision-making. People think more favorably about a medical procedure if it is described as 90% effective than if it is described as 10% ineffective. (Ariely, 2008) We tend to use our current states or recent information to "anchor" estimations and predictions. (Aligica, 2005) Put another way, our views of the future are strongly affected by our present.

Problems with how we process information

We also treat evidence that reinforces our beliefs, or evidence that challenges them, differently. We recognize supporting evidence more quickly and consider it more credible, but treat contrary evidence with greater skepticism. Most people are "cognitive conservatives," explains psychologist Philip Tetlock, who "admit mistakes grudgingly and defend their prior positions tenaciously." (Tetlock, 2005, p. 126) Or, as Daniel Gilbert memorably puts it, "most of us have the equivalent of an advanced degree in Really Bad Science." (Gilbert, 2007, p. 180) Not only do we

unconsciously evaluate evidence that supports our preconceptions more generously than evidence that challenge them; we suffer from what Nassim Taleb calls "epistemic arrogance." In all sorts of areas, we overestimate our own certainty and breadth of knowledge, and underestimate what we do not know. (Burton, 2008)

Problems imagining our future selves

Perhaps most problematic for futurists, we have trouble accurately imagining our future selves. Indeed, we often see our future selves—and to a lesser degree, our past selves—as alien. (Ross and Buehler, 2001; Atance and Meltzoff, 2005) In everyday life this is a useful talent. (Gilbert et al., 1998) As Daniel Gilbert explains, our "fundamental inability to take the perspective of the person to whom the rest of our lives will happen" is part of a "psychological immune system" that helps us find a good side to bad events. (Gilbert 2007, p. 162) But it makes it harder to systematically do things (like putting away money for retirement) for that future person. As psychologist Paul Bloom writes, "Although it might be hard to think about the person who will occupy your body tomorrow morning as someone other than you, it is not hard at all to think that way about the person who will occupy your body 20 years from now." (Bloom, 2008)

These problems aren't confined to our distant selves. Most people underestimate the likelihood and potential impact of unexpected events on delivery dates or project timelines, and even when we are realists about how long tasks normally take, we underestimate how long **we** will take to complete those tasks. (Buehler et al., 2002; Roy et al., 2005) In a classic article, Daniel Kahneman and Amos Tversky identified this as the "planning fallacy," (Kahneman and Tversky, 1979) which Griffith and Buehler define as the "coincidence of a *general* belief that some class of tasks generally take longer than expected with a *specific* belief that a current task will be completed in a shorter time than usual." (Griffin and Buehler, 2005, p. 757) Further, we see exceptions to our plans as things we need not plan for: we improperly define some thing as unpredictable, when in fact they are not. This also leads us to assume that our superior knowledge equals greater control over our destinies, and an exemption from the statistical rules that govern other people. There are amusing version of this—most Swedish men think they are excellent drivers, most Italian men think they are excellent lovers, and most American entrepreneurs think they will be among the small

minority whose businesses succeed—but the less amusing consequence is that it discourages us from planning adequately for the future, and in particular planning for unpleasant but likely possibilities.

Fraught choices

These psychological limitations are especially troublesome when dealing with what Cass Sunstein and Richard Thaler call "fraught choices." (Thaler and Sunstein, 2008) A simple example of a fraught choice is the decision we make about retirement. In theory, saving for retirement is easy: you estimate how long you will live, determine what standard of living you'll want when you retire, compute your annual retirement income, then calculate how much you need to save each year to reach that goal.

In reality the decision is much more complex. First, those financial calculations are so complex they puzzle even experts. They require evaluating your personal goals now and in the future, assessing your comfort with financial risk, and calculating how much willpower you need to actually start saving. Second, you only make these calculations a few times in your life, and each time your circumstances change enough to render previous experience irrelevant. "Even hard problems become easier with practice," Thaler and Sunstein write, but "some of life's most important decisions do not come with many opportunities to practice." (Thaler and Sunstein, 2008, 74) Third, you probably will not know for years whether your decision was sound, how it could have been improved, or what alternatives would have been better. Finally, saving money for retirement requires paying costs now and deferring benefits—usually for decades. (Frederick et al., 2002)

These problems highlight the four properties of fraught choices. They are inherently difficult and complex. Each one is unique. You get very little clear feedback about your decisions. Finally, costs and benefits are often widely separated. In other words, they are very similar to wicked problems and post-normal science.

… and experts are not always much better.

One might expect that expertise would improve decision-making, particularly in an enterprise as complex as forecasting and futures. But in

fact, fifty years of studies of the influence of expertise in specialized judgment have shown that experts actually are not much better at lay people at choosing stocks, conducting mental health evaluations, picking winning sports teams, or delivering any number of other professional opinions. This is not an indictment of all expertise—particle physicists *are* more likely to solve problem in physics than the average person—but it should caution against putting too much faith in the power of experts as forecasters. (Armstrong, 1980; Camerer and Johnson, 1997; McKenzie et al., 2008)

The problem may be even worse when it comes to forecasting complex events that play out over years or decades. Berkeley psychologist Philip Tetlock conducted a long study tracking the success of political thinkers in predicting the future. (Tetlock, 2005) Tetlock was interested in understanding what kinds of people make good forecasters; how they're evaluated and held accountable in the marketplace of ideas; and how they deal with failure. Tetlock's findings are striking. Having more information and experience does not make political or economic forecasters more accurate. "Beyond a stark minimum," he found, "subject matter expertise in world politics translates less into forecasting accuracy than it does into overconfidence." (Tetlock, 2005, p. 161) In some fields, experts' success forecasting events is hardly better than random; in others, studies have shown that training makes a huge difference in success, but experience does not. In fact, after a certain point deep knowledge can hinder effective forecasting, because experts are better able to construct erudite-sounding (or erudite-feeling) rationalizations for their failure. Experts retroactively assigned greater certainty to forecasts they made that came true, and downgraded their assessments of competing forecasts: in other words, experts tended to suffer **more** from hindsight bias, not less. (Fischhoff and Beyth, 1975; Fischhoff, 1975; Bernstein et al., 2007; Blank et al., 2007; Fischhoff, 2007.) When we're right, we get smarter, and other people get dumber. We think we're better forecasters than we really are.

But while their records of successful forecasting are often no better than chimps throwing darts at a board, successful forecasters *are* much better than chimps at getting bananas even when they are wrong. As Tetlock explains, many experts are "very good at" making "predictions that are difficult to falsify" (by being vague about exactly when the future they predict will come to pass, for example), and "explaining errors away by concocting counterfactual history" (i.e., identifying an unforeseeable event that changed everything). (Schurenberg, 2009) When they do have to defend

specific claims that went wrong, they have a variety of rhetorical tools at their disposal. Sometimes near misses prove the overall validity of their claim; or the claims are right, but just off by a couple years; or their predictions would have come true but for some unexpected (but exogenous) event. Finally, sometimes one is responsibly wrong, advocating a worst-case scenario because, as one political scientist told Tetlock, "Crying wolf is the price of vigilance." (Tetlock, 2005, p. 135)

If psychological factors discourage forecasters from reviewing and learning from past mistakes, external factors reinforce these tendencies. Professional forecasters work in an ecosystem that rewards them more for being distinctive, flamboyant and memorable than consistent, reflexive and right. (Batchelor and Dua, 2006; Batchelor, 2007; Hanna and Philbrick, 1997; Hong and Kubik, 2003) As Richard Hermann and Jong Kun Choi observed in their study of political forecasters, "[l]earning is not the point of [forecasters' work and] political fights; winning is." (Hermann and Choi, 2007, p. 141) As one especially cynical expert said, "I woo dumb-ass reporters who want glib sound bites;" Tetlock adds, "In his world, only the overconfident survive, and only the truly arrogant thrive." (Tetlock 2005, p. 186) Indeed, confidence may be more important than consistency or clarity in predicting which futurists are well-received. (This is not confined to political forecasting, or to futurists: senior managers show a marked bias for overconfident project managers.) (Jørgensen et al., 2004; Hanson, 2006) Experimental psychologists have shown that we "tend to seek advice from experts who exhibit the most confidence – even when we know they have not been particularly accurate in the past." (Ariely, 2009). Put another way, most people "prefer cockiness to expertise." (Aldous, 2009) This helps explain the success of forecasters who use simple models of change, express great confidence in their predictions (and disdain for opposing positions, even—or especially—when they're right), and hold counterarguments in contempt. These "hedgehogs," as Tetlock calls them (echoing Isaiah Berlin) have more spectacular successes—predicting the breakup of a country, or the bursting of an economic bubble—than more cautious and incremental "foxes," but they also have many more failures. As Tetlock put it, "When hedgehogs were wrong, they were often very wrong… [but] when they were right, they were very right." (Tetlock 2005, pp. 100-101)

A last reason for treating expert knowledge about the future with kid gloves is that the presence of expertise about the future may encourage people to be less engaged in shaping their own futures. A study of popular responses to

climate change suggests that a higher degree of confidence in the reality of climate change **and** the reliability of climate science can promote passivity and a sense that experts will deal with the problem, rather than inspire people to change their lives. (Kellstedt *et al*., 2008; Swim *et al*., 2009) In another remarkable study, Jan Engelmann and colleagues used fMRI to observe the brains of people who received expert advice during a financial simulation. They found that subjects thought differently about their decisions when they received expert advice—even bad advice—than when they worked on their own. As the researchers put it, "one effect of expert advice is to "offload" the calculation of value of decision options from the individual's brain." (Engelmann *et al*., 2009) Put another way, "the advice made the brain switch off (at least to a great extent) processes required for financial decision-making." (Nir, 2009) In an era in which ordinary people play a bigger role in shaping the future, the prospect of an *inverse* relationship between how much confidence they place in expert opinion about complex problems, and how responsible they feel for acting to solve it, presents a substantial conundrum for futurists.

However, for all the flaws shared by professional futurists and ordinary people, thinking about the future is not only essential for our survival, it's part of our nature. Humans, as Daniel Gilbert memorably put it, are the only animals that think about the future. (Gilbert, 2007; Suddendorf and Busby, 2003 (1); Suddendorf and Busby, 2003 (2)) To deny the value of the enterprise would be to deny part of our humanity. And expertise is not completely useless, even if harnessing it is more complicated than we normally think. Rather than abandon efforts to make sense of the future, we need to better understand the psychological limits within which futurists and their clients work; determine how we can harness expertise in an era of black swans and wicked problems; and design systems that help humans deal with biases and make better futures. The next section of this article outlines some approaches to these problems.

New Tools and Practices

At the dawn of the 21st century, futurists face a new world. It is a world in which problems are very large, complex, and indeterminate. It is a world in which the power to shape the future rests with large numbers of people, making small changes over long periods, rather than a few elites acting decisively and heroically. It is a world that humans are ill-prepared to deal

with. And it is a world that threatens to make professional expertise more irrelevant than ever. The remainder of this essay discusses some tools and methods that Futures 2.0 could develop to improve professional forecasting in an era of black swans and wicked problems, and clarify the meaning of the 21st century.

Social scanning: Making environmental scanning shareable

Most futurists regularly scan the news, magazines, scientific literature, and other materials. Scanning is common but it is not competitive: we don't do it for money, but to enable us to make money. Turning this largely invisible private activity into a public good would raise the overall quality of scanning, and recognize and reward good scanners for their contributions to the field. (Cinquegrani, 2002; Marien, 2002) This would not require developing something as elaborate as a World Brain (appealing though that idea might be), or requiring all futurists to adopt common software packages. (Marien, 2007) We can harvest work that people are already sharing, and deploy the results in a Web 2.0, cloud computing framework. (Küsters *et al*., 2006)

A basic system might have a couple basic functionalities. First, it would gather and repost RSS feeds from futurists' blogs, social bookmarking services, and other free, publicly available services. Nobody who already has a blog or thousands of del.icio.us bookmarks should have to abandon legacy content, learn a new tool, or migrate to a new system; they can just keep doing what works best for them. Second, the system would perform a daily analysis of this content, and cluster together material that shares unusual terms, keywords, or links to common sources. Finally, it would deliver these results back to the community. The system would thus generate a more precise picture of what futurists are talking about, and what is capturing their attention. We can see what various futurists (somewhat independently) consider important, by comparing input from multiple sources. In other words, our collective reading patterns may reveal some insights that we could not create individually.

Prediction markets: Aggregate expertise, provide transparency and encourage specificity

Prediction markets (or decision markets) allow people to buy shares in the likelihood of future events. A market might cover technologies (for example, whether the next-generation Apple iPod will include wifi), politics, economics, or scientific events. A prediction market pays out $1 if an event takes place; if stock in the event trades at 10 cents, participants think there is only a 10% chance that the event will happen. So if you own 1000 shares of a low-probability event, you'll pay little for them, but if it happens, you win $1000.

Supporters argue that prediction markets offer several benefits. They allow information to move across organizational or national boundaries without regard to flow charts or reporting structures. They encourage participants to be brutally honest about the impacts of contingencies or unexpected events, and to deliver clear, unvarnished forecasts. (Hahn and Tetlock, 2005) For futurists, prediction markets offer both challenges and opportunities. (Hopman, 2007) When used with expert groups, prediction markets could let us aggregate and measure expert opinion in an environment that lets participants see and respond to each other's opinions—somewhat like the Delphi method. (Like Delphi, they also avoid some of the problems associated with doing quantitative forecasting through face-to-face meetings.) (Armstrong, 2006) In order for them to serve futurists well, though, two challenges need to be overcome.

First, prediction markets work best when dealing with events that have clear outcomes, take place in the near future, and are interesting to lots of people. This is why sports and elections markets work well. Compare this to a prediction market that says ubiquitous computing will erode freedom in the United States in the next twenty years. This market promises a return in decades rather than months; has a fuzzy outcome (how do you measure reduced freedom?); and is interesting to only a few people. So one task for futurists will be to learn how to break down big, long-term bets into many smaller ones; pay interim dividends; and design markets to attract lots of well-informed participants. Building big bets from lots of small ones is a second major challenge. Markets for discrete events are interesting to some forecasters, but others struggle to understand how groups of events might work together to create different futures. Learning to use conditional derivatives—contracts based on the outcome of other contracts— or the equivalent of derivatives, funds of funds, and other "decision instruments" could greatly enhance the power of prediction markets for futursts, and allow them to deal with a much wider range of future events. (Yeh, 2006)

Reviewing forecasts: Improving hindsight and understanding impact

Social scanning and prediction markets could help futurists and forecasters stay abreast of current professional interests. Other tools could help us better evaluate the utility of our methods and the impact of our work. These are necessary because experts' superior training and knowledge does not guarantee that they will be less likely to be affected by hindsight bias, cognitive conservatism, or epistemic arrogance. To the contrary, they can have sophisticated intellectual defenses that prevent them having to abandon cherished positions or admit they were wrong, and access to more information that makes it easier to cherry-pick those facts that support their positions. (Chapman and Chapman, 1969; Strickler, 1967) Tools that mitigate these tendencies, allow futurists to more clearly see their own past assumptions, and learn more effectively from successes and failures—in short, that help futurists better anticipate the future by more objectively engaging with their own pasts—would be very helpful.

Richard Hermann and Jong Kun Choi propose to use Bayesian networks to help futurists improve forecasts of disruptive events. (Hermann and Choi, 2007) Such networks, they argue, would make it easier to keep track of combinations of the different factors that can influence scenarios and futures, reduce the "the inclination to overweigh vivid information" that gets lots of press, and offload onto computers the work of "comput[ing] cumulative probabilities across the entire network." Such a system "may or may not improve predictions" by making forecasters more accurate over time, but at the very least it would "facilitate rational learning." (Hermann and Choi, 2007, pp. 156, 158, 160) Philip Tetlock proposes a permanent group to evaluate forecasters and their work. He argues that the U.S. Office of the Director of National Intelligence has the technical skill, financial clout, long-term perspective and seriousness of purpose to identify and encourage improvements in "analytical strategies... [that] can translate into billions of dollars and millions of lives saved." (Tetlock, 2009) An organization like DNI could also promote more organized comparisons of futures methods (Green et al., 2007) and counter the "shortage of clear guidance as to when and where–and how–particular methods can be useful." (Scapolo and Miles, 2006, p. 679) DNI could thus play the role that the Rockfeller Foundation played in the creation of molecular biology in the 1920s, or DARPA played in the creation of the Internet in the 1960s: a deep-

pocketed and visionary supporter of radical advances with public benefits. (Kohler, 1991)

Finally, ethnographic studies detailing how clients use our work, what makes it more useful, and when it has influence, would be useful for several reasons. First, while some futurists argue that utility is the real metric by which their work should be judged, practitioners sometimes know little about how their work is really used. Many futurists avoid getting involved in formulating corporate strategy, government policy, or product development, and could only benefit from ethnographic and sociological studies of how clients' futures are actually influenced by our work. Second, ethnographic studies could help refine the argument that "you can be useful without being right." This familiar claim raises several questions of tradecraft. How wrong can be you be and still be useful? Is there a point at which error overwhelms utility, or are there circumstances where being wrong is actually more useful than being right? Who is most responsible for the work being useful? In one sense, clients are the only ones who can create value from a prediction, for they're the ones who are in a position to act on forecasts. But what are futurists obliged to do to create value in a forecast? What are the ethical obligations implied by these positions? (Serra, 2006) As sociologists of science have shown, one can treat such questions as philosophical puzzles, or actually answer them using ethnographic tools (Shapin, 1982).

Together, tools for more efficiently sharing scanning, marketizing forecasts, giving forecasters feedback that helps them reflect on their work, and helps us understand how our work is used by and affects the futures of our clients will help us answer one of the more fraught issues in our field: namely, how important a factor accuracy should be for futurists. It is possible for our work to be useful to clients in a number of ways, ranging from anticipating specific events, to helping clients better prepare for a range of futures, to developing a greater mental flexibility about what the future holds. Knowing which of these functions matters most would help us understand how accuracy compares to—or intersects with and reinforces—other forms of value. At a practical level, clearer track records would show us if there are forecasters who are consistently better at identifying weak signals or likely futures, and help us see what is distinctive about their work and methods. At a more theoretical level, it could even help us make sense of whether prediction is impossible, or merely exceptionally difficult. To take but one example, the argument that predictions can be made false by people acting to prevent them from happening—that the existence of the prediction inspires

action to detail it—is philosophically compelling, but how often does it actually occur? We cannot know unless we follow our work into the world.

How new tools could improve professional practice

These new tools could benefit individual futurists, sharpen the practice of futures and forecasting, and strengthen the field as a whole. At the individual level, they could counter the kinds of psychological limitations and biases described earlier, and help individual futurists improve their work. Even experts dealing with relatively simple problems have trouble recalling how they arrived at forecasts in the past, and what probabilities they assigned to future events. For people working with complex phenomena like geopolitics, responses to climate change, or the interplay of technology and society, keeping track of the contents of one's intellectual portfolio is especially challenging. Prediction markets would encourage participants to think more clearly about what impacts they think discrete events could have; what discrete events are necessary to reach a particular future; how they believe different trends will interact; and when they think futures will happen.

These tools would also facilitate a degree of social coordination. The futures profession is decentralized, eclectic and intellectually varied: there are no schools that train its elite, few barriers to entry, no certification or regulatory body. Social scanning and prediction markets could gently knit practitioners together, give them low-level but unobtrusive knowledge of what people are working on or interested in, and identify who is good. Scanning today is ubiquitous, but also invisible, unrewarded, and private. Making it visible would help people who have common interests and practical concerns find each other. Making it possible to gain social capital and professional recognition from it would incentivize better scanning. Making it public would increase efficiency by letting experts scan in areas they know best, but aggregate the results into a broad view of the future. Prediction markets could unify lots of different kinds of futurists and bodies of expertise, and encourage collaboration (or fruitful competition) between technically-focused or political forecasters, scenario planners, and professional visionaries. Finally, the transparency and specificity of prediction markets and social scanning would nudge a market that rewards flamboyance, extreme claims, and public confidence toward distributing rewards in more consistent and reasonable ways.

Over the longer run, though, these tools could support the evolution of other innovations. They would let us tap into sources of information and insight about the future that are otherwise impractical to reach. They would let us organize both professional and citizen forecasters in exercises that allow them to explore a wider variety of options and possible futures. They would help individuals learn and connect with each other. As Scott Page reminds us, diversity trumps ability: a large number of different perspectives applied to a problem tend to generate better answers than groups of experts. (Hong and Page, 2004; Page, 2007) (This may be depressing for professionals, but it suggests than meaningful improvements through collective action may really be possible.) Finally, rather than confining thinking about the future to specific official events like strategy sessions and planning meetings, they would take thinking about the future out into the world, and make it more of an everyday activity.

Choice Architectures and Nudges: Lengthening the shadow of the future

This last feature ultimately could revolutionize the practice of futures, by making it better able to speak to the biggest problems of the 21st century—problems that cannot be solved by grand strategic responses orchestrated by elites, but can only be solved (or exacerbated) by the choices and actions of billions of people. But simply telling people to be more rational or thoughtful about the future does not work, nor can the most vivid scenarios inspire people to do the right (or merely self-interested) thing consistently, over years or decades, in the face of uncertainties, distractions, and disincentives. (Ramos, 2006; Rowe, 2003)

So how can you better prepare people to deal with the present in ways that preserve the future? How can you help people—potentially millions or billions of people—create better futures for themselves? Solving this problem is the grand challenge of Futures 2.0. One way would be to move from thinking of futures as an enterprise concerned mainly with the application of analytical methods to the production of texts about the future, and more as a set of social practices and performances. (Pina e Cunha *et al*., 2006) One particularly useful way to move from text to artifact would be to design what Richard Thaler and Cass Sunstein call choice architectures and nudges.

Choice architects are engaged in "organizing the context in which people make decisions." (Thaler and Sunstein, 2008, 3) Public policy makers, designers of tax and legal codes, theologians, and parents are all choice architects: they create frameworks that define acceptable choices, and assign incentives or costs to those choices. We live in worlds saturated with choice architectures: indeed, almost any object that communicates information to users and performs an action in the world—thermostats, gas price signs, credit card statements—is a choice architecture. Systems that present us with easy-to-understand choices that we act on immediately, like traffic lights and street signs, are pretty unambiguous: we understand why it is in our best interest to stop at a red light. In contrast, it is hard for passive choice architectures to work effectively in a world of wicked problems and fraught choices.

This is where nudges come into play. A nudge is "any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives." (Thaler and Sunstein, 2008, 6) Nudges are most useful for "choices that have delayed effects; those that are difficult, infrequent and offer poor feedback; and those for which the relation between choice and experiences ambiguous." (Thaler and Sunstein, 2008, 76-77) In other words, nudges help make wicked problems a little more manageable. By structuring initial choices wisely, it is possible to play on people's flawed thinking about the future-- in ways that help them reach their goals, and reach better futures. One example is Save More Tomorrow, a retirement program used by a number of states (and developed by Thaler). With Save More Tomorrow, participants in retirement programs automatically raise their contribution levels every time they get a raise. It does not try to overcome our reliance on simple rules of thumb, anchoring biases, or our aversion to risk and loss; rather, it exploits them. Nudges are about the future, because they encourage people to trade immediate rewards for larger (but sometimes abstract or uncertain) future rewards. But choice architectures are present in almost any legal or administrative rule, built environment, procedure, or product. So what can futurists offer as choice architects that others cannot? I think our particular value rests in our ability to work with very complex visions of the future; to help people make decision that play out over a long time, that are unprecedented or unique; and to help people prepare for futures even in the absence of clear outputs or measures.

Our capacity to build choice architectures and nudges into everyday objects is increasing, thanks to new information technologies. This will allow us to provide real-time information about users' current states or performance; make visible option they have for changing their behavior; what consequences different choices would have; and even how their performance compares to neighbors or peers. It will soon be easier to bring that kind of information off the Web or monthly bills, and put it onto the very devices that we have to make decisions about. Cheap, tiny sensors are making it possible to sense the state and measure the performance of built objects and environments. "Smart dust" computing systems are small enough to fit in pens or buttons. Thin flexible displays will let us put screens on almost any surface or object. Wireless networking systems will let all these technologies work together, and more important, let users compare and learn from each other. In other words, ubiquitous computing technology will provide users with real-time information that can illuminate their options, and the immediate consequences and longer-term implications of different choices. Devices could become tools for making decisions about the future.

You can glimpse the impact of future-oriented technological nudges in the Toyota Prius fuel efficiency calculator, or MPG estimator. It provides real-time information about your estimated gas mileage, based on how you're driving. Drive aggressively and your mileage goes down; more thoughtfully, and your mileage goes up. It is a very simple display of a single piece of information, but the effect on drivers can be dramatic: many report that they quickly learn how to drive more efficiently, and are aware of habits that they'd never paid attention to before. By making this information available in real time and in context, the Prius creates a feedback loop between a driver's behavior and their car's efficiency, and gives drivers the ability to be more thoughtful about their own choices and practices. (Pang, 2009)

Now imagine this kind of real-time feedback available in all kinds of products and use contexts, and using that feedback to illuminate the path to long-term goals. Imagine credit cards that give you information about your balance and recent spending patterns when you pull them out of your wallet. Imagine bicycles that tell you how much carbon you'll save today by bicycling to work rather than driving, and how much carbon you'd save over the course of a year (or ten years, or twenty) if you bicycled several times a week. Imagine household appliances that tell you how much it would cost to run them right now based on electricity grid load, water price, or the day's weather forecast (which would affect how much electricity the solar panels

on your roof would produce, or how much energy the house would need to maintain a comfortable temperature). Imagine houses that tell you how close they are to being carbon neutral, compare themselves to other houses in the neighborhood, and tell you how many barrels of oil they saved this year. In other words, imagine having the ability to see how your consumption and spending habits, transportation patterns, even specific ways you use devices, can affect your future, and world's future, over the long term.

Would people want this kind of functionality? The popularity of the Prius, the growth of online carbon calculators, electricity usage monitors like the Kill A Watt, and other tools already can help people measure (or at least estimate) their energy and carbon consumption, and the growing trend in health self-monitoring all suggest that users **would** see their value. The economic payoff of driving or heating your house more efficiently is pretty clear. Makers of expensive, energy-efficient products that cost more up front but offer significant long-term savings would have even more incentive to adopt devices that made those savings more visible. The killer app for ubiquitous computing, in other words, will not be shopping or navigation or sports scores. The killer app will be the future.

Conclusion: Tools, Futures, and Humans

2.5 million years ago, our hominid ancestors developed two abilities so unique, they help define us as human. First the evolution of our frontal cortex gave our ancestors the capacity to think about the future: to make plans, create tools in one place that could be used in another, and imagine various possible futures (Suddendorf 2003, Suddendorf and Corballis, 2007). Second, early hominids developed hands. Combined with an upright stance, this gave them a far greater capacity to build tools, and changed the way they related with the world. Hands are both a kind of meta-tool, and a means of sensing the world (Tallis 2003). Physical anthropologists and neuroscientists have not closely examined the relationship between these two developments, but the fact that they happened roughly in parallel suggests that for humans there exists a deep and abiding connection between tools and futures, and between material culture and the growth of stable societies. This further suggests that there is great potential to affect humanity for the better if we are thoughtful about the connections, and can develop futures practices to take advantage of them.

No one will deny that the world needs to think and act as if the future matters. But getting people to do so is a challenge: as we now understand, even if we are the only animals that think about the future, our ancient habits are poorly-adapted to the futures we and our descendents will confront. This essay has argued that recent work in behavioral economics, neuroscience, and psychology can inspire new tools for doing futures research, and choice architectures and nudges that help people see the "shadow of the future." By harnessing these fields, and reorienting the discipline, we can create a discipline that helps humans better deal with the critical problems of the 21st century.

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