

Principles for Thinking about the Future and Foresight Education

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Abstract

Most fields of study have introductory textbooks with the word “principles” in the title: “Principles of Economics,” “Principles of Ecology,” and many others. The principles explained in these textbooks are the core unifying and ordering concepts for their respective fields. They provide a frame of reference for students who are new to the field and taking the first steps toward mastering it. The abundance of “principles” textbooks and long history of the use of core principles in education suggest that a clear set of unifying principles may be a useful way to teach students how to productively think about and understand complex topics. This article identifies and describes a set of core principles for thinking about the future based on a review of more than 50 years of published futures research literature. The ten principles are as follows: The future is (1) plural; (2) possible, plausible, probable, and preferable; (3) open; (4) fuzzy; (5) surprising; (6) not surprising; (7) fast; (8) slow; (9) archetypal; and (10) inbound and outbound. The principles are described and their potential educational use is discussed. Core futures principles may be useful for introducing students of all ages to thinking about and preparing for the future.

Keywords

principles, foresight education, futures education, core concepts, disciplinary framework

Introduction

Most fields of study have introductory textbooks with the word “principles” in the title: “Principles of Economics,” “Principles of Ecology,” “Principles of Engineering,” and many others. The principles set forth in these textbooks are the core unifying and ordering concepts for their respective fields that have emerged over decades of scholarly work. Principles represent the foundational assumptions and perspectives upon which everything else is built. They provide an essential frame of reference for students who are new to the field and taking the first steps toward mastering it. Principles are an ancient pedagogical approach, dating back at least to Aristotle’s definition of first principles as the first basis from which a thing is known. The abundance of “principles” textbooks and long history of their use in education suggest that a clear set of unifying

principles may be a useful way to teach students how to productively think about and grasp complex topics and disciplinary frameworks.

This article discusses a set of core principles for Futures Studies based on a review and synthesis of more than 50 years of published futures research literature. The principles are not exhaustive, but represent the most widely expressed core ideas in the field. Ten principles are identified and described, including the future is (1) plural; (2) possible, plausible, probable, and preferable; (3) open; (4) fuzzy; (5) surprising; (6)

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not surprising; (7) fast; (8) slow; (9) Archetypal; and (10) inbound and outbound. These principles are intended to structure our thinking about the future, just as the principles of economics (e.g., people respond to incentives, trade can make everyone better off, society faces a short-run tradeoff between inflation and unemployment) structure our fundamental understanding of economic systems and how they function.

The ten principles are briefly described in turn in the following sections, followed by concluding thoughts about the need and usefulness of core principles in foresight education.

Principle 1: The Future is Plural

A core principle for thinking about the future is that it is plural: Rather than a single future, there are countless possible alternative futures (Dator 2002; de Jouvenel 1967; Masini 1993). Plural futures are foreign to our normal pattern of speaking and thinking (May 2002). In everyday English usage, we refer to “the future” as if it is singular; futurists often talk about “the futures” (Dator 2002).

Bishop (1998) maintains that viewing the future as plural is superior for understanding and preparing for the long-term future because single, clear predictions give a false sense of certainty. “Futurists believe that basing a decision on a single prediction is like putting all your eggs in one basket” (Bishop 1998, 40). An important goal of futures thinking is to help decision makers prepare for a range of plausible futures. There is no way to definitively prove that the future is plural, but the multiplicity of possible futures is apparent in the counterfactual histories of eminent historians, which reveal how dramatically differently events could have unfolded and that nothing in the past was inevitable (Cowley 2001; Ferguson 2000).

Principle 2: The Future is Possible, Plausible, Probable, and Preferable

Futurists often distinguish four separate but interrelated types of alternative futures:

possible, plausible, probable, and preferable (Henchey 1978; Hines and Bishop 2006; Masini 1993; Voros 2003). Considering all four types of futures yields a more comprehensive and insightful forward view. Possible futures are by far the largest and broadest class of alternative futures because the realm of possibilities is vast. This category includes futures which seem highly unlikely or “far out” because they may involve technology that does not currently exist or extremely low probability events. Possible futures may go beyond the bounds of plausibility. Futurists are reluctant to reject implausible ideas out of hand because “[t]he world is . . . full of things that intelligent and well-educated people at one time believed to be impossible” (Bell 1997, 78).

Plausible futures are a small subset of possible futures but are still a relatively large category. They encompass futures which most people would consider believable and are consistent with our current understanding of science, technology, and social and economic systems. Hines and Bishop (2006, 128) characterize plausible futures as having “a discernable pathway from the present to the future.”

Probable futures are a subset of plausible futures that are considered reasonably likely to happen. The probable future considered “most likely” is based on a continuation of current trends and is often called the business-as-usual, baseline, or “official” future. Traditional forecasting focuses on the business-as-usual future based on past trend data. Of course, current trends may not continue and therefore an extrapolation of current trends may be a poor indicator of where we are headed. Marcus (2009) notes that trends are about the past and it is more important to ask what critical factors could move trends in different directions.

Finally, preferable or preferred futures are of a different nature than possible, plausible, and probable futures, although they can overlap with any of these three categories. Preferable futures are concerned with what we individually or collectively want to happen in the future. They are explicitly subjective and derive from value judgments. Preferable futures for an organization or community are often developed through a participatory visioning process, such as Lippitt

(1998), Hicks (1996), Hines and Bishop (2006), and Ziegler (1991).

Principle 3: The Future is Open

Futurists frequently assert that “the future is open,” by which they mean it is not fixed and we have opportunities and freedom to influence the future in a positive direction (Bishop 1998; Dator 2002; de Jouvenal 1967; Slaughter 1993). There are physical, biological, and social constraints on what is possible, at least within a certain time frame, but within the realm of possibility the future is mostly open and our choices and actions can help create it. On his “Open the Future” Web site, Jamais Cascio’s answer to “Why do we think about the future?” is that futurists “think about the future because we believe two fundamental things: (1) that the future matters and (2) that we still have a say in the future we get. The shape of tomorrow arises from the choices we make today” (Cascio 2015). Cascio further believes that we can create a future that is open in the sense of being democratic, transparent, participatory, and filled with many viable options.

The assumption of an open future offers hope and opportunity: Positive change is possible. The future is a domain of freedom and empowerment because we can choose and act to bring about a desirable future (Bell 1997). If we are not locked into a particular path that will dictate our future, we can explore and pursue alternatives. As Slaughter (1993) observed, the openness of the future is what makes it worth studying. Open futures are a critical dimension of thinking about the future because of the powerful role of images of the future in shaping behavior (Costanza and Kubiszewski 2014; Polak 1973).

Principle 4: The Future is Fuzzy

Knowledge of the future is always imperfect and severely limited (Cornish 2004). As de Jouvenal (1967), Bell (1997), and others have

noted, there are no facts about the future. This seems obvious, and yet large sums of money are spent every year on sophisticated efforts to accurately *predict* the future in finance, business, the environment, and many other fields. Unfortunately, the track record of these efforts has been poor at best (Makridakis et al. 2010; Pilkey and Pilkey-Jarvis 2007; Sarewitz et al. 2000; Sherden 1998).

Our ability to accurately predict and our knowledge of the future of complex social-ecological systems are necessarily limited for several reasons. First is the nature of complex systems, including their emergent nature and sensitive dependence on initial conditions (Gleick 1987). Emergent properties of a system cannot be predicted from the parts (de Haan 2006). Sensitive dependence on initial conditions implies that one *may* be able to predict the behavior of a complex or chaotic system with a reasonable degree of accuracy in the short term, but not in the medium or long term. Carpenter (2002) notes that ecological forecasts are filled with irreducible uncertainties due to drivers of change beyond the scope of ecology (e.g., anthropogenic climate change, demographic change), unknown feedbacks in coupled social-ecological systems, and unpredictable human actions.

Second, knowledge of the future is imperfect because human perception is biased in many ways. Hammond et al. (1998) review eight key cognitive biases that affect our decision making and views of the future. For example, *recallability bias* causes us to give unwarranted weight to recent, dramatic events, and *confirmation bias* leads us to seek out and accept information supporting our existing views and to discount opposing information. Sommers (2012) cites recent neuroscience research suggesting that our brains are hardwired to not believe or even imagine unfamiliar futures and we are biologically predisposed to not imagine the possibility of significant change in the future and are often trapped in the “permanent present.”

Finally, even the way we typically talk about the future in Western cultures can trick us into thinking that our knowledge is much more robust than it is. Just as referring to “the

future” in the singular is a hindrance to understanding its plural nature, saying that “the future lies ahead” (as if we can see it in our path of vision) and “the past is behind” leads us to believe the future is clear and predictable. Some cultures take the opposite view. For example, traditional Hawaiians believed that we face the past—which we can “see” in our memory—and “the future lies behind” and is out of sight (Dator 2002, 16).

Despite our necessarily constrained knowledge of a fuzzy future, imperfect understanding can still provide useful, even invaluable, guidance (Cornish 2004). Foresight does not have to be perfect to help us make better decisions and avoid mistakes. Even limited insight into the future may be the most useful type of knowledge (Bell 1997, de Jouvenel 1967; Lombardo 2006). In the business world, for example, if your foresight is just slightly better than your competitors’, you have a significant strategic and competitive advantage.

Principle 5: The Future is Surprising

Related to the preceding principle of imperfect knowledge or fuzziness is the principle that the future will surprise us. Although change can be smooth and continuous—a trend line producing an expected future—it is often discontinuous and surprising, and even expected futures tend to arrive in unexpected ways and with surprising consequences (Saffo 2007). Extensive empirical research has shown that people consistently underestimate uncertainty and the possibility of rare events (Makridakis et al. 2010; Tversky and Kahneman 1974). Futurists assert that the most surprising future would be one with no surprises (Cornish 2004). Noting the prevalence of discontinuous change and surprise, Fuerth (2012, 10) observed that “[in] a complex universe . . . the only certainty is surprise.”

There are many types of surprise that characterize and will help shape the future. Toth (2008) reviewed various typologies of surprise and proposed his own three-part typology. First, “anticipatable surprises”—also referred to as “inevitable surprises” (Schwartz 2004)

and “predictable surprises” (Watkins and Bazerman 2003)—include known but unexpected events (e.g., a 500-year flood) as well as unknown events for which there are precursors or weak signals that could be discerned given a concerted effort to connect the dots (e.g., a scientific paradigm shift). Second, “conjecturable surprises” are not preceded by early indications but are plausible in hindsight once they transpire. Although much more difficult to identify in advance, conjecturable surprises nevertheless may be detected by a combination of imagination, expert knowledge, and luck. Finally, “out-of-the-blue surprises” defy detection by even the most creative minds and techniques. A hypothetical example of an out-of-the-blue surprise is when a social or ecological system moves beyond a threshold that was not previously known or understood and behaves in a new and unforeseen way (Walker and Salt 2006).

Principle 6: The Future is Not Surprising

The frequency and important consequences of surprising change might lead one to think that if we could step 20 or 30 years into the future, it would be an unrecognizable landscape. But in many ways—perhaps most ways—the future will look a lot like today and will not be surprising. As Saffo (2007, 130) has argued, “Even in periods of dramatic, rapid transformation, there are vastly more elements that do not change than new things that emerge.” Harman (1979) calls this the “principle of continuity” and points out that over time most aspects of culture and the institutional framework of a society continue without significant change. Unexpected social, technological, and environmental change is fascinating, but the inclination to see sweeping and surprising change emerging everywhere is a great liability for futurists and forecasters. The future contains continuity and change, stasis and flux (Bishop 2012; Lombardo 2006; Staley 2007).

Stability-reinforcing, anti-change forces are termed *stabilities* by Lum (2016). Common stabilities include rules, customs, and traditions; physical or logistical constraints that

dampen or prevent change; ingrained patterns of behavior; and powerful stakeholders, entrenched leaders, or others who benefit the most from the status quo. Economic factors also frequently reinforce stability, such as a technological innovation that is technically feasible and widely expected to have transformative effects but proves to be too costly and is therefore never adopted (Schnaars 1989).

Another factor promoting stability and continuity is the dynamic of “trend/countertrend” in which trends often create pressures for their opposite or countertrend (Weiner and Brown 2005). For example, adoption of a new technology may be slowed or halted by a countertrend of innovation and advances in the existing technology that was being replaced: “When a competitive technology arrives on the scene, don’t assume that the old technology will roll over and play dead” (Martino 1987, 149).

Principle 7: The Future is Fast

The idea that change is occurring at a rapid and perhaps accelerating pace is widespread in society and among futurists. Toffler’s (1970) classic *Future Shock* describes “the roaring current of change” and the stress and disorientation that individuals and organizations feel when they experience “too much change in too short a time” (3–4). An acceleration of the rate of change in recent decades has been observed, especially accelerating technological change but also social and environmental change (Colvile 2016; McNeill and Engelke 2016). The period following World War II has been termed the “Great Acceleration” (Hibbard et al. 2007), a time of significant increase in the scope, scale, and intensity of many types of change and its impacts on social-ecological systems. Perhaps it is no coincidence that the post-WWII period also marked the rise of modern futures studies (Kuosa 2011; Rejeski and Olson 2006), as a response to accelerating change.

Some futurists and futures organizations focus on accelerating or exponential change and its powerful potential role in shaping the

future. Examples are the Acceleration Studies Foundation (<http://www.accelerating.org/index.html>) and Singularity University (<http://singularityu.org/>). Ray Kurzweil’s (2005) “law of accelerating returns” proposes that the rate of change in technology and a wide range of human systems tend to increase exponentially. The acceleration in the pace of technical change is due to using our best technology to build the next generation of technology, and the rate of improvement in speed, efficiency, price–performance, and power speeds up from one generation to the next.

An implication of fast and accelerating change is that the future may be approaching much faster than we think. Significant change is possible in a relatively short time. “Almost *anything* can be done in twenty years” according to futurist and systems scientist Earl Joseph (quoted in Cornish [2004, 5]). It took just four years to build the first atomic bombs despite many experts’ insistence that it could not be done. And it took eight years from President Kennedy’s goal of going to the moon to the Apollo 11 landing. Rapid shifts in social norms, attitudes, and behaviors are also possible, such as the change in attitudes toward smoking and in smoking rates, legal acceptance of gay rights and gay marriage in the United States, and possible future shifts in attitudes regarding climate change (Ross et al. 2016).

Rapid change sometimes occurs in a punctuated and discontinuous manner rather than following a smooth steep or exponential curve—periods of abrupt change separate longer periods of low change or relative stability (Biggs et al. 2016; Lombardo 2006). Alternating periods of slow, continuous change and rapid, discontinuous change form a pattern of punctuated equilibrium, as in the theory of biological evolution (Gould and Eldredge 1977), which can result in regime shifts in social-ecological systems and massive higher order impacts.

Principle 8: The Future is Slow

Abrupt and rapid change attracts the most attention, but the future is also powerfully

shaped by slow, continuous, incremental change (Bishop 2012; Olson 2016). Examples of slow change having significant cumulative long-term impacts abound:

- Global population has been growing by just 1.18 percent annually and the rate is slowing, but that is enough to increase from 7.3 billion today to 11.2 billion by the end of the century (United Nations Population Division 2015);
- The growth of antimicrobial resistance is slow but over time could seriously threaten public health as the prevention and treatment of a wide range of infections become ineffective (World Health Organization 2015);
- Over the past 20 years, the slow encroachment of development has resulted in the loss of a tenth of global wilderness, representing an area twice the size of Alaska and about half the size of the Amazon (Watson et al. 2016).

Many additional examples of gradual change could be cited: aquifer depletion, tropical deforestation, loss of topsoil, infrastructure decay, and the slow adoption of some major technologies. Perhaps the ultimate example of slow change with massive long-term consequences is climate change, with its effects emerging gradually over many decades—unless we reach a major tipping point and experience abrupt climate change (Lenton et al. 2008). The possibility of abrupt climate change illustrates that currently slow change may accelerate and become rapid change.

Slow change frequently eludes the public policy attention it deserves for a variety of reasons (Olson 2016). For example, evolutionary psychology has found that our brains evolved to respond best to threats that are imminent and abrupt, making it easy to ignore changes that happen slowly. Our perception of slow change is vulnerable to distortion by a number of cognitive biases, such as *social discounting* (undervaluing future risk), *short-term bias* (reluctance to accept short-term costs now to avoid much larger costs in the future), and *optimism bias* (believing that we face lower

risks than others do). Slow change also generally fails to meet the criteria of newsworthiness, making it difficult to attract public and political attention.

Principle 9: The Future is Archetypal (or Generic)

Futurists cannot study the future directly—how do you study something that does not currently exist? Therefore, one of the main tasks of futures research is to study people's images of the future (Bell 1997) because these images help shape actions today and have significant consequences for the future (Ostrom et al. 2002; Polak 1973). Dator studied thousands of images of the future from a wide range of sources and found that they consistently fall into four general categories, which he calls the four generic futures: Continue, Collapse, Discipline, and Transformation (Dator 2009). These four archetypal futures each differ from each other in fundamental ways and are not simply variations around a single set of variables or drivers of change. It is important to emphasize that the four images do not in themselves represent “good” or “bad” possibilities: each of them may entail desirable and undesirable changes.

Continue, or Continued Growth, is an image of the future based on an extrapolation of current trends and expectations. This is the most common of the four archetypes because it is the “official” future of all governments, educational systems, and corporations. Continued *economic* growth is typically the focus of this archetype.

The second archetypal future is Collapse. Many different factors could cause or contribute to this future, including economic, environmental, agricultural, or moral collapse or decline. Pandemics, warfare, and other external threats could also cause collapse. Most people do not want to consider the Collapse future, although organizations, communities, cultures, nations, and civilizations collapse regularly due to a variety of factors (Diamond 2011; Perlin 1989; Tainter 1990).

Third, the Discipline future is an image of a society that is tightly structured around a set of

fundamental ideals that could include environmental, spiritual, religious, political, or cultural values. The rationale for this archetype is that our current system is unsustainable or undesirable, and that we need to dramatically reorganize our social, economic, and ecological systems so that they are in line with values and rules that will promote stability and sustainability.

Finally, Transformation is an archetype of the future that is usually “high tech” but could also be of a “high spirit” variety, involving transformation driven by significant shifts in values and culture. In the high-tech version of the Transformation archetype, the power of exponential growth in technology transforms every aspect of life. Rapid development and adoption of disruptive technologies such as artificial intelligence, advanced robotics, nanotechnology, genetic engineering, synthetic biology, and others create a world that may be unrecognizable to us today.

MacDonald (2012) independently validated Dator’s archetypes by analyzing many sets of scenarios developed by futurists and identifying four main archetypes, which he termed Progress, Catastrophe, Reversion, and Transformation, each of which has two variants.

Principle 10: The Future is Inbound and Outbound

The study of the future is the study of change, and change can be inbound or outbound:

our personal and organizational futures are shaped by two sets of forces: change that happens to us (from the external world beyond our control, which we call ‘inbound’ change) and change that we create ourselves (based on our decisions and actions, which we call ‘outbound’ change). (Bishop 2012, 13)

Individuals and organizations are often caught off-guard by inbound change because we focus most of our attention on what is occurring within our organization or field. Many of us read multiple magazines, journals, and online newsletters informing us about change going on within our field, but little or nothing

informing us about outside developments and possible inbound change that could help shape the future of our field.

The penchant to focus on things happening within our sphere is understandable. We tend to think about things we are interested in and have some degree of control over. But neglecting careful consideration of developments in the world beyond can make us vulnerable to being blindsided by inbound change. For example, self-driving, autonomous vehicles have the potential to dramatically shift the business models and value chains of scores of industries, and transform aspects of our culture, reaching far beyond transportation (Simao 2015; Wayner 2013).

Concluding Thoughts for Foresight Education

The future is highly complex and often paradoxical, making it a challenging area for students at all levels in the educational system. Further complicating matters are the many cognitive biases that limit and distort our perception of the future, the brain’s “hardwiring” that limits our ability to imagine significant change and, perhaps most importantly, the neglect of foresight education in most educational systems. The vast majority of students in schools around the world are never taught how to think critically about futures or strategies for developing and improving foresight (Bishop and Hines 2012; Lum 2016).

But clear thinking about the future—and related planning and decision making strategies that follow from this thinking—are essential for personal, organizational, and societal resilience and success. Every decision we make is about the future (Boulding 1973), every policy and plan is based on implicit or explicit assumptions about the future. The need for effective approaches to teach the future is evident, and a compelling case can be made that understanding the core ideas of futures thinking and practice is vitally important for every citizen, now more than ever.

The ten principles for thinking about the future described in this article were originally developed as part of an effort to improve futures

awareness and literacy among environmental and natural resource professionals (Bengston 2017). But as a set of proposed core principles, they clearly have applicability for foresight education in other fields and for students at all levels in the educational system. Identification of core principles for a given field of study—and integrating the principles into a coherent educational framework—is an effective way to teach complex and challenging topics. For example, the National Research Council's (2012) report *A Framework for K-12 Science Education* identifies the core principles of four broad areas of science education: (1) physical sciences, (2) life sciences, (3) earth and space sciences, and (4) engineering, technology and applications of science. The principles are placed in a comprehensive science education framework designed to help students build on their knowledge and abilities over many years, and to support the integration of scientific knowledge with the practices needed to engage in grade-appropriate scientific inquiry. Similarly, the ten principles described in this article could be part of a comprehensive framework and vision for foresight education, to help students think more deeply and productively about the future and prepare for uncertain and changing futures.

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