Creativity, Wisdom, and Our Evolutionary Future
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Introduction

"The ultimate metaphysical ground is the creative advance into novelty".
Alfred North Whitehead

In this paper I develop an integrative theoretical framework for understanding creativity, synthesizing themes and principles derived from mythology and philosophy, the physical and biological sciences, psychology, social and economic history, technology, and art and the study of beauty. I demonstrate how the creative process is integral to natural and human evolution and how human creativity builds upon creative evolution in nature. Further, I describe the relationship between creativity and both heightened future consciousness and wisdom, arguing that the latter two capacities clearly embody a creative dimension and form the leading edge of the future evolution of the human mind.

The theoretical framework presented is ontologically balanced, incorporating both the mental and physical sides of the creative process, and addressing both individual and collective dimensions within creativity. Moreover, a number of the specific scientific and philosophical theories on which I ground my perspective are themselves integrative and temporally panoramic in scope, pulling together past, present, and future. Yet, there are certain limitations to my approach that should be noted at the onset.

First, the literature on creativity is vast, and I have selectively sampled some of the key ideas that have emerged in the study of creativity. Second, understanding the nature of consciousness is a critical dimension to understanding the psychology of creativity, and though I discuss "future consciousness" in this paper, a more thorough treatment of consciousness connecting it with creativity is in order at some point in the near future. Third, I only scratch the surface on how culture influences our ideas on the uses of technology. And fourth, though I do include, as stated above, a number of integrative theories—some cosmic in scope—that address the future, there are a significant number of other futurist integrative theories that are not discussed in this paper. In particular, there is a large sampling of such theories and approaches debated and discussed in two recent issues of *Futures* (Vol. 40, Issue 2, March, 2008 and Vol. 42, Issue 2, March, 2010). These integrative futurist theories, in fact, frequently address how consciousness importantly figures in their visions and frameworks of thinking.

If not infinite, the universe (or meta-verse) is indeterminately vast and rich, and human history reveals myriad "theories of everything" to explain it all. Standing on the shoulders of many giants, but clearly not all, this paper presents a big picture vision of creativity. A further step in this ongoing inquiry—a much more expansive project indeed—will be to more thoroughly and deeply examine the nature of consciousness and how it fits into this theoretical framework for creativity (see Lombardo, 2009a, 2011b for preliminary and foundational discussions on the ontology of consciousness), and to directly address at length how my integrative view, with expanded treatments on

consciousness, culture, and technology, aligns (or doesn't align) with other integral futurist theories, such as those examined in the above cited *Futures* issues.

The Mythos and Philosophy of Creation and Creativity

"…every work of art comes into being in the same way as the cosmos—by means of catastrophes, which ultimately create out of the cacophony of the various instruments that symphony we call the music of the spheres."
Wassily Kandinsky

Ancient—if not all—prehistoric cultures were intensely fascinated with the question of creation. How did humankind, the world, the cosmos come about? Explanations of creation can be found in all ancient cultural myths and religious traditions (Kirk and Raven, 1966; Fraser, 1987; Boorstin, 1992; Noss, 1999; White, 2003; Wright, 2009). Generally, ancient peoples believed it was personified deities that possessed the amazing power to create and were responsible for bringing forth the universe (including humans) in all its richness and complexity.

In the minds of early humans, creation and the puzzle of how it all came about was conceptually linked with creativity in humans. Human creativity—the power to invent, to discover profound new truths, to "see" into the future—was invariably thought to be a gift of the gods. Or in the case of Prometheus and the wondrous secret of fire, stolen from the gods. Such gifts were not granted to all, however. It was the oracles, prophets, and shamans—those who communed with the gods (or spirits) on favorable terms—that had epiphanies and revelations that went beyond the knowledge or capacities of the common individual (Jaynes, 1976; Armstrong, 1992). Even in modern times, creative artists, composers, and thinkers, will often state that their insights and compositions came into their minds already formed—as if such creative products derived from some external source, perhaps even divine in nature.

Diverse principles or themes can be found throughout ancient myths and philosophies to explain creation. Creation was often associated with the reproduction of life, and hence, for example, in ancient Egypt it was Isis, the great earth mother goddess, that was the giver of life and the personified source of creativity (Eisler, 1987; Shlain, 1998; Lombardo, 2006a). Along similar yet complementary lines, the male principle of virility, personified as a bull, was also used to explain creation (Bloom, 2000). Combining both themes, creation was connected with the dynamic sexual coupling of male and female as seen in the Greek vision of Ouranos impregnating Gaia, and in the Taoist image of the female Yin and the male Yang who generate all the myriad forms of nature through their rhythmic dance. (Franz, 1978; Lombardo, 2006a).

With the rise of Judaism, and later Christianity and Islam, creativity (and creation) was still attributed to a divine source—almighty God—yet now the divine source was personified as a "solitary" male and the act of creation was fundamentally an act of the purposeful manifestation of life and the universe out of nothing. But as many have asked through the ages, how can something come to be (be created) out of nothing?

Still, the idea that the richness of being—or even being itself—emerges or is brought forth out of the "abyss," the "void," or that which has no form can be found in numerous ancient myths and philosophies, as can the related idea that the order of the

world emerges out of chaos or the undifferentiated. The ancient Babylonians and Egyptians subscribed to various versions of this theory, as did ancient Greek and Hindu philosophers. For example, the pre-Socratic philosopher Anaximander viewed creation as a differentiation out of the amorphous and primordial "indefinite" (Kirk and Raven, 1966).

As a variation on this theme, creation and the birth of the new was also seen in numerous myths as arising out of death and destruction; out of the chaos and the disintegration of death, new order—new forms of being—emerge. The Greek philosopher Heraclitus saw fire (conflagration) as the "father of all things" (Kirk and Raven, 1966).

In ancient times, then, two archetypal and complementary visions of creation informed many cultures: The novel and the new is born either out of cosmic sex (Eros) or cosmic death, destruction, and chaos (Thanatos). Some thinkers synthesized these two opposing views. The ancient Greek philosopher, Empedocles, for example, explained the dynamics of the world in terms of the oppositional forces of love and hate (Lombardo, 2006a). And Hindu cosmology, personified in the "Dance of Shiva," viewed existence as a cycle of creation and destruction, followed by new creation.

With the emergence of abstract and naturalistic philosophy in pre-Socratic Greece, key figures built on earlier mythological ideas (Kirk and Raven, 1966). Democritus, in his theory of atoms, outlined a cumulative theory of creation, arguing that the new and complex emerges from the concatenation of simpler and smaller parts. This idea was even later applied to the evolution of life: present living forms were thought to have come together through the merging of distinctive body parts (Nisbet, 1994; Lombardo, 2006a). Viewing creation as a "coming together" of existing realities is thematically connected with the ideas that creation is somehow sexual (a coupling) or, as in Empedocles, related to love, for he saw cosmic love as synthetic, while cosmic strife was destructive and fragmenting.

All these ancient mythological and philosophical themes can be seen as anticipations or antecedents of more modern theories of creation and human creativity. They provide the historical foundations for our contemporary understanding of creativity within nature.

The Physics of Creativity and the Creativity of Evolution

"The creation of the universe is usually envisaged as an abrupt event that took place in the remote past. It is a picture reinforced both by religion and by scientific evidence for the 'big bang'. What this simple idea conceals, however, is that the universe has never ceased to be creative."
Paul Davies

As the contemporary physicist, Paul Davies (1988), notes above, creativity is ongoing within the history of the physical universe. Creation did not end at the beginning, however conceived; it was only getting started.

Especially in the West, we do not see the physical cosmos as a creative (or self-creative) reality. We follow a Newtonian model of the universe in which matter is dead

and inert, simply pushed and pulled about by physical forces (Lombardo, 2006a); and/or we accept the Judeo-Christian explanation that God created all the forms of nature at the beginning of time.

Yet, contrary to both Newton and *Genesis*, within contemporary cosmology and evolutionary theory, the universe is generally viewed as possessing an ongoing history of creative and emergent realities (Smolin, 1997; Lombardo, 2002; Kauffman, 2008). Further, creativity within nature appears (to a degree) to be cumulative, building upon what existed before but equally transcendent in manifesting novel realities that go beyond what existed before. In essence, natural evolution is a creative process, ongoing, cumulative, and yet transcendent.

If indeed this view of natural creativity is correct, then creativity need not involve an intelligent or purposeful agent generating it (contradicting the divine source theory of creation). Moreover, the foundational dynamics and underpinnings to creativity in humans (intelligent and purposeful agents) exist within nature itself; creativity is not something unique in humans.

What, indeed, do we know (or at least surmise) regarding the creative process in the evolution of nature. By the time of Darwin, nature was no longer seen as a stable reality created by God as it presently is. Rather nature, both biological and geological, was understood to be dynamical with a long history of change. Even the heavens no longer seemed stable or eternal as most ancients believed (Green, 1959). For Darwin, living species evolve—and hence emerge—through a gradual process of natural selection of variable offspring. Biological evolution of the new is driven, at least in part, through adaptation to environmental conditions which change over time as well. Further, there is both becoming and passing away, for species disappear (go extinct) as well as emerge. Further still, living forms are interconnected, provoking each other into change, through competition over resources and niches; there is a clearly a self-provoking quality to creation within nature. Based on such natural processes, out of simple beginnings emerge a great variety and complexity of biological forms (Lombardo, 2006a). This envisioned evolutionary process involves both cumulative growth and progressive differentiation.

More recently, Stephen Gould and Niles Eldredge add to this vision of creative biological evolution the idea that the emergence of new species is often relatively sudden (in geological terms) rather than slow and steady as Darwin envisioned it. There is “punctuated equilibria”: Species may stay relatively unchanged for extended periods and then holistically and quickly transform; the process is not slow and piecemeal. Regardless of what instigates these sudden shifts—a frequently cited cause is dramatic environmental change—creative evolution is Gestalt-like and relatively quick (Eldredge and Gould, 1972; Gould, 2002).

The contemporary biologist Lynn Margulis further proposes that biological evolution at times has involved symbiosis, where distinct species integrate forming more complex species. She contends that this is how eukaryotic cells (cells with nuclei) emerged, through a coming together of prokaryotic cells (cells without nuclei). Nature, in fact, is filled with symbiotic relations and interdependencies. Hence, the creative evolution of the new is not simply driven by competition; there is also integration among simpler forms, whether the forms physically merge or simply develop reciprocal living

arrangements (Margulis, 1993, 1998). What emerges out of such symbiotic integrations is something new and creative.

Self-organization in natural evolution is a theme that frequently shows up in contemporary open systems or complexity theory (Lombardo, 2002). Progressively, especially over the last century, principles of self-organization and evolution have been applied not only to biology but to nature as a whole (Christian, 2004; Smolin, 1997; Watson, 2001, 2005). What Darwin was describing in his theory of biological evolution was just one piece of a general cosmological process.

For Ilya Prigogine, diverse types of natural systems evolve through self-organization. Natural systems undergoing increasing turbulence can jump upward to higher levels of organization and complexity; hence, the expression “order out of chaos” is used to capture a fundamental dimension of evolutionary change within nature (Prigogine and Stengers, 1984). Connecting with ancient themes, chaos is viewed as a prelude (even necessary condition) for creation.

Pulling together Darwin and Prigogine, Stuart Kauffman argues that the evolution of life involves both competition and natural selection, and self-organization—an integrative, complicating process (Kauffman, 1995). Moreover, for Kauffman the emergence of more complex natural forms is to a great degree unpredictable; the universe is filled with novel, emergent realities that cannot be predicted from simpler constituents that preceded them (Kauffman, 2008). In arguing for such a view, now framed at a cosmic level, Kauffman aligns himself with the great twentieth century philosopher Alfred North Whitehead who stated (as quoted earlier) that “The ultimate metaphysical ground is the creative advance into novelty".

Anticipating Kauffman, the philosopher, J.T. Fraser (1978), also weaves together the themes of order and chaos in his explanation of the ongoing evolution of nature, as well as similarly arguing that new levels of complexity can not be predicted or understood relative to lower levels of complexity. A further common theme found in such theories is that creation occurs at the interface of order and chaos, of structure and flow (Smolin, 1997).

Building on such ideas, Kevin Kelly argues that self-organization is a result of the interaction of many parts within a system, rather than the coordination of parts from some top-down command center. There is no need for a singular creator orchestrating or generating the emergence of the new. Hence, there is an unpredictability and “out of control” quality to this pluralistic process of interactive self-organization (Kelly, 1994).

As we move into the new Millennium, the theory that the cosmos as a totality has evolved through a succession of creative jumps in complexity has become fundamental to the scientific picture of nature (Watson, 2001). Distilling the essence of this vision, Harold Morowitz presents a list of twenty-eight creative steps in the emergence of everything within the universe—each step conceptualized as more complex than preceding steps. This comprehensive panorama of the ongoing act of creation includes the successive emergence of stars, galaxies, chemical elements, solar systems, planets, geospheres, cells, animals, mammals, hominids, tools, agriculture, cities, and philosophy (Morowitz, 2002). Creation is not guided or orchestrated from above in this process; creation is not planned out; creativity is intrinsic, pervasive, and essential to the dynamics of the universe itself. What’s more, it is an adventure, filled with novelty and unpredictability, rather than a foregone conclusion (Prigogine, 1997).

To recapitulate: cumulative growth; ongoing change and creativity; differentiation and syntheses; relatively sudden holistic transformations; chaos, unpredictability, novelty, and adventure; and self-organization all show up as fundamental themes in the modern scientific vision of creative evolution in nature.

But there is more. The art movement of Futurism, which emerged early in the twentieth century, began its manifesto with the following words: "We want to sing the love of danger, the habit of energy and rashness...We declare that the splendor of the world has been enriched by a new beauty: the beauty of speed" (Lista, 2001). And indeed, the pace of change in contemporary times seems to be speeding up, perhaps to the point of a mad frenzy (Gleick, 1999).

Many argue that evolution has been accelerating across the great panorama of cosmic time and that what we see in our contemporary world (how quick things move, how fast things change) is simply a manifestation of this general natural phenomenon of accelerative evolution. As Murray Gell-Mann notes, evolution in the cosmos has moved through roughly six fundamental levels of increasing complexity and organization: the physical quantum; physical macro-gravitational; chemical; biological; cultural; and technological. (See also Eric Chaisson, 1981, 1987, 2008 and J. T. Fraser, 1978, 1982, 1987 for similar schemas of stages.) For Gell-Mann (1994), each stage brings with it a faster, more complex process for further evolution. That is, evolution is evolving, and each stage finds a way to speed up the process of more change, more increasing complexity and order (Anderson, 1996; Lombardo, 2006b). To drive this basic point home, when scientists and historians are asked to identify key advances in the history of life on the earth, they generally agree on which constitute the most important jumps forward and, if plotted on a graph, the key identified jumps are coming closer and closer together in time (Kurzweil, 2005).

As Toffler (1971) and Gleick (1999), among others, point out, we live in an era of accelerative change—for Gleick, it is "the acceleration of just about everything". Though Kurzweil (1999, 2005) primarily applies the "Law of Accelerating Returns" to the exponential growth of information technology, the same basic principle can be applied to all forms of change in human society. Innovations (ideas and inventions) feed back into the entire social-technological system, stimulating further changes and developments. Growth is a positive feedback loop; creation feeds on creation, hence, the accelerative growth of natural evolution. As David Christian points out, the most salient and dramatic fact within recent human history that seems responsible for the rapid evolution of society and technology is the accelerative growth of human innovation (Christian, 2004). Humans, coupled with their technologies, are highly creative beings—an advanced expression of the creative evolutionary process in nature—and it is our evolved creative capacity that is generating the accelerative speed of change within our world.

The Psychology of Creativity

"I live on the fringe of society, and the rules
of normal society have no currency for those on the fringe."
Tamara de Lempicka

In the twentieth century it was the Gestalt psychologists who developed the classic and highly influential four-stage theory of human creativity according to which human creativity involves the successive stages of preparation, incubation, illumination, and verification. Preparation is immersion in study and problem solving activities, addressing some fundamental and recalcitrant puzzle for which there is no apparent solution; incubation is leaving the problem alone at a conscious level (as some would argue, letting the unconscious do its work); illumination is the sudden flash of insight where the solution emerges all at once—the parts of the puzzle, the important bits of relevant information come together, in fact, re-configure into a novel "Gestalt" or whole; and finally, verification where the presumed solution is critically examined and tested in order to see if it really works (Koffka, 1935; Kohler, 1947).

It is important to note that within this model, creativity involves an initial intense study of the domain, requiring great expenditure of time and energy (and often struggle and frustration) and the trying out of different unsuccessful ways of thinking about the problem—creativity isn't easy and it doesn't come to the naive or unschooled in a domain. Second, the creative insight is a holistic emergence: When it comes it isn't piecemeal; there is rather a dramatic re-organization of consciousness. (This point parallels the ideas of punctuated equilibria and self-organization within the natural science of evolution.) Next, even if the creative flash is intuitive (a holistic realization) the preliminary study and the final stage of verification both involve linear and logical thought processes. The problem must be thought out and the solution must be thought through, using the analytical and rational modes of thinking. Finally, creative acts are often connected with problems, puzzles, challenges, and conundrums. One could say that they are adaptive efforts to deal with the difficulties of life. Creation is a stress-induced problem-solving activity.

Representing opposite poles of psychological theory, Carl Rogers, the humanistic psychotherapist and B.F. Skinner, the behaviorist and experimentalist, once debated in print the pros and cons of their seemingly contradictory positions concerning how best to understand human psychology (Rogers and Skinner, 1956). Of special note was the question of what would be the ideal environment to support the fully functional, psychologically healthy, and productive human being and, further, what would be the best environment for stimulating human creativity. Though they differed in their responses—Skinner arguing for a highly structured and consistent environment and Rogers emphasizing the importance of positive affect and unconditional positive regard being given to people—it is fascinating that ultimately both of them agreed that it is love and affection (or for Skinner positive social reinforcement) that engenders creativity within people.

Hence motivation and even emotional affect seem to play a significant role in human creativity, above and beyond simply cognitive processes and capacities. Further, creativity is not something that simply goes on "in the head"—at the very least, it appears to be nourished and provoked by certain environmental conditions.

In the late 1950s, Skinner's operant conditioning explanation of human behavior became the object of a highly critical assault that bears on the creativity issue. The linguist, Noam Chomsky, argued that human language is a highly creative act structured by abstract syntactical generative rules; it is not something that can be explained as a set of learned habits (Chomsky, 1959, 1966). Almost all human linguistic utterances are

creative in the sense that they are not replications of expressions heard before; rather they are invariably novel. Knowing a language is to know a set of generative rules that allows one to create a potentially infinite number of grammatically correct unique sentences. From Chomsky's perspective, at least regarding language, all humans are creative; it is not something reserved for a select few.

Coincident with Chomsky's critique of Skinner, the tide in theoretical psychology began to turn: Human behavior could not be accounted for in terms of learned habits—there was creativity throughout all expressions of mind and behavior. The psychologist, Karl Lashley, in fact, had argued years earlier that basic motor behaviors were self-generated and self-organized rather than simply retrieved from literal records within the brain and nervous system. Even human memory, which could be seen as simple retrieval of engrams in the brain, increasingly was seen as a creative process; the past is reconstructed rather than played back in the human mind. The human mind exhibits novelty and inventiveness in much of what it does (Gardner, 1985; Baars, 1986).

Still, humans display degrees of creativity, and psychologists such as Abraham Maslow attempted to identify what personality characteristics were connected with notable creativity in behavior and thinking. Maslow formulated his theory of self-actualizing individuals (similar in ways to Rogers' "fully functioning persons") in whom creativity is especially pronounced. Self-actualizing individuals are autonomous; growth motivated; open to new experiences and learning; spontaneous and "fresh" in their thinking and behavior; playful; ethical; and have high frequencies of peak experiences. At the opposite end of the psychological continuum would be individuals who are more conformist; more motivated by stability and security; and more defensive and closed to new learning and new experiences. Hence, degree of creativity was connected with personality type (Hergenhahn and Olson, 2003; Maslow, 1968, 1972; Rogers, 1961).

Research in split-brain operations (involving the severing of the corpus callosum which connects the two cerebral hemispheres in the brain) conducted by Roger Sperry and Michael Gazziniga (Sperry, 1964, 1968), presented the view that each cerebral hemisphere seems to specialize (to a degree at least) in complimentary functions. The left hemisphere appears more logical, analytic, sequential, detail oriented, and rule governed; the right side appears more intuitive, holistic, simultaneous, and unbound by rules (Hampden-Turner, 1982). As this view gained currency, it was generally accepted that the right hemisphere was the creative half of the brain. The idea from Gestalt psychology that creativity involves holistic thinking seemed to support this view. Holistic insight and/or intuition—the self-organizational dimension of the mind—is where creativity lies. It became popular to develop learning activities that would strengthen right hemispheric capacities (visualization, intuition, big picture thinking) presumably to enhance creativity in individuals. Yet, as the Gestalt psychologists also pointed out, the first and final stages of human creativity involve logical and analytical processes (study and verification), and in considering a fully functional (integrated) brain, it is the working together of right and left—of intuition and logic, of big picture thinking and analysis—that yields intelligent, verifiable and valuable creative results.

In the 1960s Arthur Koestler wrote *The Act of Creation*, a monumental and inspiring study on the history and psychology of human creativity (Koestler, 1964). Pulling together research and thinking from numerous areas—itself an act of prodigious creativity—Koestler presented his "bisociation" theory of creativity. For Koestler, high

creativity involves synthesizing two (or more) ideas from disparate or disconnected domains; it is seeing the previously unrecognized connection between things. Koestler's description of how Kepler "bisociated" the question of the form and dynamics of planetary motion with the structure and dynamics of the Holy Trinity—thus providing a scientifically accurate understanding of the elliptical orbits of the planets around the sun, as well as a theory of astronomical gravity—is a fascinating discussion of the creative mind. Knowledgeable about both of these seemingly disconnected areas of study, Kepler connected them in a way no one could have imagined, thus providing a perfect illustration of Koestler's idea that creativity is the synthesis of already familiar yet disconnected elements. The new builds upon the old through the synthesis of existing elements but the particular insightful combinations realized are unique.

More recently, positive psychology has contributed to the study of human creativity. Barbara Fredrickson has proposed the "Broaden and Build Theory" of positive emotion and cognition. According to her, positive affective states, such as love, have a constructive impact on cognitive capacities, making the human mind more expansive in scope, more sensitive, more transformational, and more creative. Negative emotions, such as fear and depression, have debilitating effects on intelligence and thinking (Fredrickson, 2005). Thus it is interesting to note, that contrary to the idea that stress provokes creativity, Fredrickson, in line with Rogers and Maslow, sees love, joy, and emotional exuberance as more conducive to creativity.

It is clear that cognitive and emotional processes form a reciprocal or interactive relationship within the human mind, each impacting the other. Negative cognitions tend to produce negative emotional states and vice versa. Hence, as a general rule upbeat emotions such as love, hope, enthusiasm, and courage positively impact human thinking—including creativity—whereas negative emotions such as fear, anxiety, sadness, and depression damp out effective and creative thinking.

Bringing human motivation into the picture, recall that Maslow saw self-actualizing individuals as more growth motivated than stability motivated. Individuals can be more or less motivated toward what is new and different; more or less motivated toward security, safety, and stability. What is new—what is a change in one's way of thinking or behaving—is risky though; seeking out and believing in the new requires courage and hope. Adventure and uncertainty can generate fear and anxiety in humans, pushing them back toward stability and security. Yet, creativity clearly involves sticking one's neck out into the unknown and uncertain. Hence, stability and security motivation (often driven by fear) works against creativity, whereas courage, risk taking, hope, and growth motivation support creativity. It is a common view that creative people are more non-conformist in their personalities and lifestyles, willing to be different, willing to be risky.

As the contemporary philosopher, Paul Feyerabend (1970) argued, "certainty is one of the cheapest commodities." A life ruled by the need for certainty and hence mental security is not conducive to creativity. Creativity involves the courage to be wrong, to take chances, to stick one's neck out into the unknown. In fact, highly creative people find it exhilarating to take chances without knowing for sure whether their actions or ideas will pan out; that is the appeal of it. One could propose that highly creative people live more in the future—in so far as the future involves novelty and change—than in the habits and securities of the past.

Mihalyi Csikszentmihalyi, one of the leading modern positive psychologists, has devoted a great part of his career to the study of creativity and flow. For Csikszentmihalyi, “flow” is the psychological state in which a person is immersed in a challenging task that requires maximal focus and engagement. Optimal flow is the reverse of either paralyzing anxiety (the task is too difficult for the person’s talents) or boredom and tedium (the task is too easy). When a person is in flow, the task requires the full exercise of his or her highest capacities; the person is relatively unselfconscious; and the activity is found intrinsically rewarding, generating a positive affective state. Flow generates creativity. Flow also generates growth and self-actualization. Hence, although there are clearly cognitive elements involved in creative flow, the motivational-emotional factors also play a role. Creativity occurs at the cutting edge of human effort, where the challenge is difficult enough to make the outcome uncertain. A certain amount of stress and risk is necessary—not too much, not too little. As Csikszentmihalyi points out, this is motivating and critical to human happiness (Csikszentmihalyi. 1990, 1996; Csikszentmihalyi and Nakamura, 2005).

Logic, learning, and holistic insight/intuition; synthesis and integration; right and left brain complementarity; cognition, motivation, and emotion; personality and individuality; challenge, sustained effort, and concentration; a conducive environment; and a lifestyle that embraces adventure, uncertainty, non-conformity, and a positive attitude toward the future: all are significant contributory factors to human creativity.

Social Evolution and Creativity

"In Italy for thirty years under the Borgias, they had warfare, terror, murder, bloodshed.
They produced Michelangelo, Leonardo da Vinci, and the Renaissance.
In Switzerland, they had brotherly love, five hundred years of democracy and peace,
and what did they produce? The cuckoo clock."
Orson Welles

Thomas Kuhn, in his highly influential book, *The Structure of Scientific Revolutions* (1962), argued that the growth of science consisted of two relatively distinct phases. First there is “normal science” where scientists operating within an accepted paradigm solve problems and make discoveries consistent with the paradigm. Such scientific progress is cumulative, building on previous units of knowledge within the paradigm. But when tensions, anomalies, and difficulties become too great within a paradigm, when problems accumulate in number and importance, a scientific community may enter into a revolutionary period. The old paradigm is challenged, new ways of thinking emerge, and there may be a “paradigm shift” where the old paradigm is abandoned in favor of a new one. This paradigm shift is relatively sudden, dramatic, and holistic; there is death and birth; there is a “Gestalt switch” in how the world is seen; the facts even change (Feyerabend, 1965).

Kuhn’s theory is a good introduction into the social dimension of creativity. Creativity can occur at the collective level as well as at the individual level. For Kuhn, creativity in science is holistic—a total transformation of the mindset of scientists. It is preceded by a period of chaos (numerous competing paradigms generating uncertainty

and confusion) and death (the destruction of the old as a prelude to the new). Kuhn was criticized for this totalistic vision of scientific revolutions. Weren't there facts, principles, elements of knowledge preserved though perhaps reconfigured in the new paradigm? In reading Kuhn, it sounds as if his answer to this question is "No." For Kuhn, there clearly are elements of death and extinction in social revolutions and social creativity. (See Wendell Bell, 1997, for some of the controversies and debates.)

It is noteworthy that Kuhn's model of social development in science parallels Gould and Eldredge's model in biological evolution. There are periods of relatively stability, at best involving cumulative or gradual change and then there are short unsettling periods of disruption and holistic change. Creativity in science (and perhaps in social creativity as a whole) is pulsatory. Further, it is significant that chaos plays an important role in Kuhn's model of revolutionary change. As in Prigogine's theory of self-organization, in Kuhn the creative surge forward into a new paradigm is preceded by a period of chaos, where the security and predictability of the old paradigm evaporates. Creativity demands that we blast through the constraints of security and the past.

Indeed, inspired by open systems theory, it has become popular in contemporary times to identify chaos as a precondition to both individual and social creativity. Just as flux is a necessary stimulus for physical and biological evolution (Kelly, 1994; Rucker, Sirius, and Mu, 1992), revolutions in thought require turmoil and turbulence, require fluidity and flexibility.

The popular science and philosophy writer, Howard Bloom, has been developing a general theory of creative evolution over the last decade that integrates natural phenomena from the physical and biological with the social and the psychological. In his recent book *The Genius of the Beast* (2010), he presents his theory as a framework for explaining the oscillations of economic development within human history. His theory pulls together a variety of themes already discussed.

For Bloom, human society and economic productivity are oscillatory in development, with alternating periods of growth and expansion and diminution and retreat. This oscillatory pattern is a function of the primordial dynamics of human nature and the physical cosmos as a whole. Bloom sees the cosmos as embodying a "transcendence search engine" that generates evolution and creation, and this deep dynamical dimension to nature also manifests itself in humans. The "boom and crash/ bust" cycle can be found throughout human history and economic growth and derives off of biological and emotional roots in the make-up of our psyche, which in turns derives from a fundamental evolutionary dynamic in physical nature.

Bloom describes the "pendulum of evolutionary creation" in terms of a variety of complementary processes: mania and depression; exploration and digestion; expansion and consolidation; explosion and contraction; proliferation and pruning; binge and purge; gluttony and self-denial; confidence and fear; enthusiasm and doubt; individualism and centralization; invention and selection. The process sounds like a great Yin-Yang; it sounds like a variation on Empedocles, of love and hate.

Exploring a similar line of thought in his previous book, *The Global Brain* (2000), Bloom presents his hypothesis that society is dynamically balanced through diversity and conformity generators; we flower and diffuse and then we constrain. In essence, there is a pulsatory nature to growth, evolution, and creation that swings between

exuberant expressiveness and inventiveness (diversity) and a conservative phase of withdrawal and selective reduction.

Though Bloom sees these two phases of creative evolution as sequential, it is noteworthy that they correspond with the Darwinian idea that evolution moves through the generation of mutational diversity and natural selection, which prunes back on nature's mutational experiments. The diversity phase in Bloom also aligns with the theme of chaos: try lots of things out, who knows what will work, simply invent and then test. Indeed creative individuals in stage one of the Gestalt description of creativity do go through a brainstorming phase of trying out many different solutions to the problem or challenge they are confronting. The same applies to society as a whole when it faces collective challenges.

It is also important to note that Bloom gives a strong emotional color to this evolutionary process. To recall, in a similar vein, Fredrickson's theory connects positive emotionality with expansive and inventive thinking, and negative emotionality with constrained thinking. In essence, Bloom wants to highlight the importance of affective energy level as a critical component in the evolutionary process in humans. The creative phase is charged with amplifying emotionality; the retrenchment phase is dampened by repressive emotionality.

In *The Global Brain*, Bloom argues that the growth of human civilization has occurred primarily through the dual processes of reciprocity and conquest. New levels of organization and complexity emerge through either cooperative sharing and integration, or through one social system assimilating and to some degree destroying another one. The theme of reciprocity connects with similar ideas in the writings of Robert Wright and Matt Ridley, in their respective efforts to explain how society and human economy grow.

Wright, in his book *Non-Zero* (2000), argues for a universal explanatory principle in understanding social evolution. Societies grow through the development of cooperative efforts and mutually beneficial exchanges; societies grow through integrating together already existing parts. Wright's theory emphasizes the creation of new reciprocities as the key element in social growth. Active networking and cooperative functional syntheses are key to social evolution. (Note the parallels with Margulis on biological evolution.)

Ridley argues in *The Rational Optimist* (2010) that civilizational progress has been driven by barter, the exchange of unique products (ideas or devices) between distinctive cultures or people, thus providing each party with more than what they produced on their own. Barter is fueled through social interaction and communication, and if each party involved ends up depending on the other party for various products and ideas, a reciprocity forms in the process. Further, barter generates increasing diversity of products and ideas for all of those involved. I would propose that it provides the raw materials for creativity. The more diverse elements a society or individual has to work with, the more ways these diverse elements can be combined to form new more complex elements and forms.

As David Christian (2004) argues in his massive history of the universe and humankind, *Maps of Time*, there has been an ever-growing rate of innovation across the centuries, and this acceleration of innovation is being fueled by increasing trade, exchange, communication, and sharing among the peoples of the world. Of course,

diverse elements need to be synthesized into new emergent wholes, but innovation is stimulated by having an increasing variety of parts to work with. Following from Koestler, it would also make sense that the stranger and more contrasting the ideas are between sharing groups, the greater the chance for exceedingly novel bisociations being produced.

As one final relevant point, the evolutionary writer, David Loye, has proposed that cultural evolution occurs in a manner similar to biological evolution, following the basic principles of diversity generation subsequently followed by cultural competition and selection. We invent products; we advertise and market them with the intent to sell and to influence; we compete with numerous other parties who have similar ideas and products; and the marketplace of consumers selects out those versions that are deemed the best (Loye,1998). Social creativity emerges out of competition.

Technological Evolution and Creativity

"And Strange to Tell Among that Earthen Lot,
Who is the Potter, Pray, and Who is the Pot ?
Omar Khayyam

As Kurzweil and Gell-Mann, among others, have argued, the development of technology is an expression of evolution. In fact, technological growth exists at the leading edge of evolution. What's more, technological evolution is moving faster than biological evolution and the rate of change is increasing. Kurzweil proposes that the evolution of information technology, in particular, obeys the "law of accelerating returns," whereby advances that occur feed back into the total Gestalt of information processing devices, contributing to further evolution. It is an accelerative positive feedback loop (Gell-Mann, 1994; Kurzweil, 1999, 2005; Moravec, 1999).

Yet, even if technological evolution is accelerating, would we want to describe it as a creative process? How can machines be creative? How can machines, in fact, drive their own evolutionary development since humans are integrally involved in the creation of machines? Don't humans guide the development of machines?

One opening point to keep in mind in answering these questions concerns the nature of evolution. As described above, the history of evolution involves novel emergent forms often arising through the synthesis of simpler constituent forms. Evolution in its creative thrust moves in the direction of increasing complexity—and one could also argue—in the direction of increasing intelligence and creativity; successive products of evolution speed up the process of evolution. Hence, even if humans are integrally involved in the creation of machines, the technological systems being produced could in fact turn out to be more complex, intelligent, and even creative than the biological systems (us) that were involved in their creation. The created can exceed the creator.

The contemporary writer, W. Brian Arthur, has recently proposed what I would describe as an ecological theory of technological evolution and creation (Arthur, 2009). New technologies emerge through the combination and functional synthesis of existing technologies. In fact, for Arthur all technological innovation is really just combining

together existing technologies into novel configurations. Note the similarity with those theories already reviewed which describe creativity as a synthesis of existing elements; the same applies to technology. (Competition and a "natural selection" process invariably refine the products further.) Continuing this comparison with biological evolution, Arthur treats technology as an ecosystem consisting of a plethora of "technological genes." Instead of imagining each machine as a distinct and separate reality, imagine instead that the universe of technologies is a pool of various technological elements (genes) that are used to create new machines; the same technological genes (for example, the wheel or the circuit) can be used (or form part of) numerous different machines. And therefore, each time a new technology is created it enters the gene pool of available technologies to be potentially used in the creation of other technologies. Further, the technological ecosystem forms a hierarchy of parts within parts, just as individual machines usually consist of sub-components which in turn consist of smaller components. The technological ecosystem is a vast and ever growing reserve of component genes to be combined together in ever more complex configurations.

Yet, even if there are innumerable and varied parts out of which new machines can be built, a machine only achieves reality if its parts form a functional whole—if the parts work together to efficiently realize some purpose. Functional machines—like creative ideas—are holistic and efficacious syntheses. Moreover, though the raw material of technological evolution is provided by the gene pool of existing technologies, in synthesizing parts, there is invariably tweaking and modification of the parts so they harmoniously work together as a whole.

At this point we come to the significance of humans in the process of technological evolution. Based on the ideas of Andy Clark, I would propose that humans are "natural born cyborgs." Since the beginning of tools and other instrumentalities, humans have been functionally united with their technologies to realize their purposes and ways of life (Clark, 2003, 2008). The human and the machine is a functional Gestalt; there is, in fact, no human without the technologies. Everything humans do involves either the direct involvement of technologies or the support of technologies. We are technologically enhanced beings that exist in a technologically enhanced environment (Lombardo, 2011a; Lombardo and Blackwood, 2011).

One could argue that humans guide the creation and use of machines, but this is too one-sided a viewpoint. Technologies provide affordances for human use, that is, opportunities for action or the realization of ends, and humans are influenced and guided by the technologies at their disposal. Technologies are not value free or neutral (Postman, 1992). Further, we increasingly use technologies to create new technologies; that is, the creator is clearly no longer just the human but the cyborg. And in both regards, technologies often present unanticipated effects that go beyond what the human creator envisioned. Hence, there is a novel and creative aura surrounding the ever-growing sphere of human-technological systems.

Consequently, if we are to accurately describe the creative evolution of technology we should see the process more as the creative evolution of cyborgs or functional syntheses of humans and machines. All of Arthur's main points still apply, only now we bring a new component—the human—into the ecosystem and gene pool. Humans, of course, are creative in this evolution, not only getting ideas for new

inventions but stimulated and informed by knowledge of existing inventions. But it is undeniable that the tool informs the user. We may ask who indeed is the user? Are not humans the vehicle for the re-production and evolution of machines. We are being molded and transformed in this process as much as the machines are, and the machines clearly contribute to the overall technological evolutionary process as much as humans do. There is, indeed, creative evolution in the world of technology.

Creativity and Art: The Beauty of the Gestalt

"Beauty will save the world"
Fyodor Dostoevsky

Art (including music, sculpture, architecture, crafts, and design) is frequently seen as the epitome of human creativity and the deepest expression of the human spirit. Further, art brings with it the added dimension of beauty—the creation and experience of it. How are beauty and art relevant to our understanding of creativity?

First, I would propose that art is fundamentally both ecological and cyborg-like, involving numerous technologies and modes of interaction with the world. If we look at the earliest discovered examples of human art, including cave paintings; body ornaments and jewelry; sculptures; musical instruments; synthesized pigmentations used for body decoration; and even vessels, utensils and weapons, in all cases materials within the physical world are used to create the works of art (White, 2003). Paintings require surfaces, pigments, and instruments; and ornaments, sculptures, and cookware are all crafted out of physical substances and natural objects. The human artist masters the tools and materials of his or her trade, and this knowledge and skill is synthesized with the materials involved creating the works of art. Further, though art is an expression of human imagination and inventiveness, the forms, images, icons, and motifs of art derive to greater or lesser degrees off of patterns and features of nature. Nature provides the raw material and nature inspires.

In a sense, art is a technology. As early artists learned the tools and materials of their trade they showed selectivity in what substances and objects they used, and they began to modify and craft these various instrumentalities and substances toward artistic ends. The technology of art evolved. Creativity in art emerges in the interactive synthesis of artist, materials and tools, and inspirations from nature.

There are numerous theories regarding the purpose of art, and throughout history and across different cultures, art has been an expression of diverse goals and human intentions. One could argue though that much of art, past and present, is the purposeful creation of something beautiful. Yet, even beauty throughout the ages has various meanings (Eco, 2004). Granting these points, I will focus on the idea that the purpose of art frequently is the creation of beauty, and that beauty, among other things, is a Gestalt, a "syntheses of diverse elements" into a harmonious or congruent whole.

The connection between harmonious synthesis and beauty in art can be seen in the universal aesthetic appreciation of the human form. Subject of painters and sculptors through the ages, the body is a Gestalt, the various parts forming an integrated whole. If the artistic creation captures the harmony, proportionality, symmetry, or balance of the parts, it is seen as beautiful. There may be numerous other qualities

we connect with beauty in art (whether or not the subject matter of the art is the human body) such as grace, power, sensuality, realism, vitality, color, and richness but all of these additional qualities contribute into the overall Gestalt of the work of art; they are the varied dimensions that synthesize together to make the piece striking and beautiful. (A symphony, whether thematic or abstract, could be described along similar lines: a Gestalt—a temporal harmony of the parts, a synthesis of dynamical dimensions—emerges in the playing of the piece of music.)

Now let us also bring in the concept of the unique, the novel, the different. Throughout history, much of art could be described as representational. Yet if art simply re-presents the world around us, how is it either unique or creative? For one thing, art is always selective, just as all human perception of the world is selective; we don't just take everything in; when we produce representations of the world, we abstract, we select, and we streamline (Lombardo, 1987). In this process we attempt to capture the essentials, the meaningful dimensions or features of the world. Hence, all art highlights and selects certain features to render or manifest, and the attempt is made to present these features as a coherent and meaningful whole. Art (whether representational or not) presents unique (stylized, selective) yet synthesized meaningful wholes. We will judge the creativity and intelligence of the artist in terms of his or her unique and distinctive capacity to reveal something meaningful and whole to the viewer or listener. It is an aesthetic experience, usually involving both cognitive and emotional features.

Consider the nude paintings of Tamira de Lempicka (Neret, 2007). I would describe her visually powerful paintings as expressions of the "beauty of the body Gestalt." The human body, of course, has been painted and sculptured throughout the ages. The harmony and grace—the synthetic beauty of the body—has been captured in multitudinous ways by numerous artists. With Lempicka though, we see a dramatic emphasis on the muscularity and voluptuousness of the female body, with strong lighting and shading and dynamical, expressive poses and postures, producing paintings that capture and highlight the beauty and sensuality of the body in a unique way.

The paintings of Georgia O'Keefe are also very distinct and highly recognizable (Benke, 2000). In particular, she captures the beauty of flowers—another common subject in the history of art—in her own flowing, flamboyant, richly saturated, and sensual way. Thick swaths of swirling colors configure together into magnificent displays. The lines and individual colored forms flow in harmony, in visual rhythm. Her paintings of flowers are Gestalts; her paintings select and highlight; her paintings effuse beauty. Again, the quality and creativity of the art is embodied in its unique synthesis and vision.

Salvador Dali clearly attempts to move beyond the surface of reality in his great surrealistic masterpieces (Descharnes and Neret, 1998). Dali's paintings can be seen as visual and conceptual experiments, combining together what seem to be incongruous elements into scenes and displays that presumably have meaning(s) and overall coherent themes. Dali is a visual philosopher, a researcher into the elements of ontology. If creativity is combining into synthetic wholes, elements that haven't been connected before, then Dali is highly creative, continually meshing elements from all over the place, and then even twisting and distorting these elements further into strange apparitions.

There are, of course, innumerable other artists that could be considered in this discussion of creativity and beauty in art. My main points, though, are that beauty is harmonious synthesis and what makes the work of art creative is the unique and selective fashion in which the synthesis is realized. Of course, all great artists have constructed their works on the ideas and styles of other artists, just as all great inventors or creative thinkers have been influenced by others. Creativity is the unique syntheses and combinations of things that came before.

In thinking about creativity in art, the topic of beauty comes to the forefront; and beauty is, I would suggest, an important consideration in understanding creativity across the board. The harmonious coordination of the parts of a machine; the mathematical and integrative abstractions of scientific theories; the elegance of profound philosophical insights; the dramatic and effective interweaving of plots and characters in great novels: all of these exhibit beauty. A prime example of this point is the way Kepler, Newton, Einstein, and other great scientists aspired to capture the deep natural beauty of the "harmony of the spheres" in their theories of the physical world. In looking for the truth they looked for beauty. It was Pythagoras and then Plato who much earlier had pondered the connection between beauty and truth. And later, with the rise of industry and technology, humans also pondered the connection between the functional machine and dynamical beauty.

Coming full circle, we find in our contemporary world, a new wave of evolution in beauty and art, empowered by the continued development of machines and our intimate connection with them. Information technologies are opening up whole new arenas for artistic expression. Fractals are a strong example of how, through mathematics and computers, we have "discovered" and are able to create an infinite variety of complex visual forms that are both perceptually arresting and unique, and yet highly suggestive of patterns in nature (Briggs, 1992). I would describe fractals as "symmetries in motion." Art has always been a hobby of mine; over the years I have painted and sculptured. With the development of computer graphics and fractal generating programs, I have been able to create visual displays that far exceed, in complexity, variety—and dare I say—beauty, anything I have ever done before. Machines are empowering the creation of new forms of beauty; empowering the act of creativity even further.

Before leaving the topic of artistic creativity, one final artist I wish to consider is Vassily Kandinsky, one of the most articulate, original, and influential abstract painters of the twentieth century (Becks-Malorny, 2003). What I wish to highlight about Kandinsky is that if one examines the development of his paintings over the decades of his career, one clearly sees a transformation—an evolution—in style and composition. The early Kandinsky is stylistically competent (as is the early Dali) but there is nothing special about his early paintings (the same again is true of Dali). Yet, Kandinsky worked at discovering and creating a way to paint that was both powerful and uniquely his own. The creative act took time and hard work, and went through notable stages. His creations pulsated upwards from the mundane to dynamical geometrical configurations. It took Kandinsky decades to evolve his unique Gestalt, demonstrating a deep truth about the creative process: although creativity can be viewed as a relatively sudden confluence—the insightful flash—it is also important to keep in mind Edison's observation that "Genius is one per cent inspiration and ninety-nine per cent

perspiration." There is pulsatory development in creativity, punctuated along the way with periods of great effort and study.

Creativity, Future Consciousness, and Wisdom

"At times of challenge and uncertainty,
nothing seems more important than wisdom."
Stephen Hall

To review, the universe is a self-creative, self-organizing reality. Evolution is creative, generating a succession of novel and emergent forms across time. The evolution of life is a manifestation of this cosmic creative thrust; in the evolution of life there is becoming and passing away, but there is embedded within this flux, a general direction toward the emergence of higher levels of complexity. Moreover, evolution is evolving, with new levels of complexity speeding up the process of change and creativity.

Psychological, social, and technological theories of creativity all highlight the central significance of synthesis, of holistic combinations of existing parts that manifest new qualities and capacities. There are emotional and motivational undercurrents to human creativity, enhancing or dampening the process, and a pulsatory dimension, suggestive (if not reflective) of the pulsatory and stepwise pattern of creation found in physical and biological evolution.

In the ongoing creative process, inclusive of nature and humankind, there is order and chaos; becoming and passing away; invention and destruction; uncertainty, risk, adventure, and increasing speed; and at the psychological and social levels, love and courage set in opposition with fear and trepidation.

The emergence of technology brings with it the functional and ever evolving syntheses of humans and machines, which amplify and further accelerate creative evolution. And in considering the world of art, the connections between synthesis, harmony, uniqueness, and beauty within the realm of creativity become apparent.

Human beings exist in an ecological reality (the physical, biological, psychological, social, and technological in networked interaction) where change is ubiquitous and accelerative. This multi-faceted interaction of the parts, both competitively and symbiotically, generates ongoing creative transformations. Sustainability—in the sense of the continuation and preservation of what is—is not an option. We grow or we die; we create or we perish.

This is where the central importance of heightened future consciousness and wisdom comes in. If the future is the ongoing expression of the act of creation, and if we are participating in it, we need to strengthen those capacities that will help us to resonate with and flourish within this increasingly creative reality. I would propose that many of those needed capacities are embodied within heightened future consciousness and wisdom (Lombardo, 2009b, 2010).

Many of the psychological capacities I have identified as being connected with heightened future consciousness (Lombardo, 2005, 2006a, 2007) are distinctly

conducive to creativity. As one basic point, it would be oxymoronic to suppose that heightened future consciousness is not creative, since if the future is a creative process, then one cannot have heightened awareness of the future (its strange, wondrous, and even frightening possibilities) without an appreciation of its creative dimension. Consciously resonating with the future involves heightened awareness of the (potentially) novel and new. Listed below are those particular qualities relevant to creativity;

- Open-mindedness; curiosity and wonder; the ability to deal with uncertainty; humility
- Hope, optimism, courage, and a constructive attitude toward the future—a positive spirit of adventure
- A strong sense of self-efficacy and self-responsibility regarding the future
- A love of learning; positive affect and flow associated with learning
- A well-developed understanding of contemporary trends and affairs
- Multi-faceted modes of understanding—both rational and intuitive capacities
- Synthetic and integrative "Big Picture" understanding of the world
- An expansive and integrative sense of time (of past and future)—awareness of trends, challenges, and future possibilities
- Open and imaginative mindset about future possibilities
- Practical knowledge for meeting challenges and solving problems; proactive engagement with the world
- Heightened self-awareness; a strong sense of personal growth; a self-transcending, self-actualizing personality

How do these qualities support or enhance creativity? In what ways do these qualities have creativity at their very core?

- Positive emotional and motivational states, such as hope, optimism, and a sense of ongoing personal growth, all heighten creativity. A constructive attitude as opposed to a defeatist or depressing attitude is essential to creative problem solving.
- Courage and the capacity to deal with uncertainty, risk, and adventure are all connected with creative personality types.
- Self-efficacy and self-responsibility are at the foundation of self-autonomy, which is essential to creativity. In fact, creative personalities are often very self-driven and non-conformist. They carry individual self-determination to an extreme.
- Learning, supported by curiosity and wonder, provides the raw material for creative syntheses, since creativity works on a diverse and rich foundation of knowledge and ideas; curiosity and wonder motivate individuals to explore new areas of inquiry and grapple with unanswered questions.
- Synthetic and big picture thinking—that is, putting the pieces together—is a core dimension of creativity. If one can't synthesize, one can't create.
- Highly developed logical and intuitive skills are the two essential cognitive capacities exercised in coming up with creative ideas and thinking and testing them out. Creative individuals both see and think, placing each capacity in the service of the other.
- Of course, being open and imaginative is the fountainhead of creative ideas.

- The capacity and willingness to address problems, conundrums, and difficulties is a common feature among individuals who come up with creative ideas and solutions.
- Self-actualizing, self-transcending individuals participate in personal creativity, seeing their own identity as an act of continual creation. Creativity is at the core of their being and the future is seen as an opportunity for further growth and development.

I have described wisdom as the highest expression of future consciousness. Consequently, all the creative qualities of heightened future consciousness identified above also apply to wisdom. Of particular significance, wise people are constructive, optimistic, motivated toward continuous learning, and they possess a high tolerance for dealing with uncertain challenging realities.

Consider my evolving definition of wisdom:

Wisdom is the highest expression of self-development and future consciousness. It is the continually evolving understanding of and fascination with the big picture of life, of what is important, ethical, and meaningful, and the desire and creative capacity to apply this understanding to enhance the well being of life, both for oneself and others.

In various articles I have provided more detailed and extensive lists of the qualities of wisdom (Lombardo, 2006c, 2009b, 2010, 2011a) but what I want to highlight at the moment are those noteworthy qualities connected with creativity.

Though wisdom is often associated with knowledge derived from the past—in particular, the accumulated knowledge of sages and philosophers—I have proposed that wise people use such accumulated knowledge to address issues and problems in the present and the future. Though grounded in the past, the arena of action for wisdom points toward the future. In fact, heightened future consciousness requires a deep understanding of trends and patterns through time, and consequently so does wisdom.

To expand further on this point, I have suggested that wisdom, by definition, is not static but dynamical and perpetually evolving. Wise people possess curiosity and wonder and are always learning; that's what makes them wise. Wise people are open to the world and to the unknown. Moreover, wise people see the contingency of all human knowledge (they will acknowledge their mistakes and errors); accordingly, they always see and desire the possibility of growth within themselves. And in this regard, a good dose of humility is an essential quality of wisdom (Hall, 2010; Meachem, 1990). Hence, I would propose that wisdom is a self-consciously creative and evolving capacity in humans; in those who are wise. Wisdom is a verb, a journey, rather than a noun and a destination.

It is one of the most salient and defining features of wisdom that it is founded on broad and integrative knowledge. As with heightened future consciousness, the wise person is proficient at synthesis, at pulling together all the pieces. Again, this is critical to the creative capacity.

Based on my review of Eastern and Western traditions in wisdom, it is clear that a global, forward-looking conception of wisdom must combine the logical and the intuitive (Lombardo, 2011a). The West has been more logical, the East more intuitive in its respective conceptions of wisdom (Takahashi, 2000; Takahashi and Overton, 2005).

Wisdom in its broadest sense synthesizes both logical and intuitive skills (Nisbett, 2003; Sternberg, 1990; Sternberg and Jordan, 2005) incorporating another key foundational dimension of creativity.

Since wisdom is evolutionary and self-transcending, knowledge of the contemporary world is critical to wisdom. Wisdom must be at the "cutting edge" or else it ceases to be wisdom. Wisdom involves using the best available knowledge, knowledge that, as part of the creative human universe, keeps growing and transforming. Also, wisdom, as a practical form of knowledge, addresses contemporary and future issues; hence, wisdom clearly embodies an up-to-date realistically grounded knowledge of trends, challenges, and opportunities.

Yet granting all these points, the quality of wisdom that connects it most strongly to creativity is the fact that wisdom is intelligent and perspicacious problem-solving and opportunity-generating thinking. To simply repeat the solutions or ideas of others is, at best, wisdom second hand. To be truly wise is to think on one's feet and to creatively and intelligently address the issue at hand. It is a common statement made about wisdom that it can't be captured in a set of formulae or general rules; it is uniquely personified within a wise person.

When we notice a "wise" solution, conceptualization, or action, it is its synthetic and creative nature that makes it appear distinctly wise. Wise people pull together what is important, meaningful, and best within a given context, and come up with answers, actions, or thoughts that are compelling, convincing, and inventive. We often find wise people amazing in their insights. In the face of wisdom, we often ask ourselves why we couldn't I have thought of that. Wisdom, though creative, makes sense.

What's more, there is frequently a noticeable beauty in the wise insight. Wisdom is elegant, captivating, inspiring, visionary, and revelatory. And to recall, we do not judge just anything as creative in human affairs just because it is different; we also critically judge creativity based on what works, what functions, what synthesizes into harmonious parts, what is informed. This is wisdom. This is beauty and functionality evinced in the workings of the human mind.

Further—and perhaps most profoundly—as one its central features, wisdom brings together the informed and the ethical; it synthesizes broad knowledge with what is good. If we follow Plato, what is most beautiful is the highest good, and consequently one could succinctly describe wisdom as the synthesis of the true, the beautiful, and the good, clearly the highest expression of human creativity.

This leads us to a final question regarding wisdom: what is the connection between wisdom and technological evolution? Technology is at the leading edge of creative evolution and, as I argued above, humans are inherently cyborgs, technologically enhanced beings existing in a technologically enhanced environment. It seems to follow that wise people are fundamentally wise cyborgs, a development that will only become more pronounced in the future. The wise cyborg, as I have described such a person, uses technologies to support and enhance the acquisition and exercise of wisdom. Given the creative dimension of wisdom, the wise cyborg uses technologies to create; to synthesize; to solve problems; to meet challenges; and to construct opportunities (Lombardo and Blackwood, 2011). Since wisdom and technology are usually not seen as cognate realities—in fact, contemporary technological developments are often described as working against wisdom (Carr, 2010)—it is a

challenge to our present limited mindsets to creatively envision and concretely realize the wise cyborg. The synthetic and evolutionary trajectory of human existence seems to clearly point in this direction.

Summary and Conclusion

"Let us make man in our image..."
Genesis

"God is creating at every moment of the world's existence in and through the perpetually endowed creativity of the very stuff of the world."
Arthur Peacocke

The cosmos reveals a pattern to creativity. Through grounded in the evolutionary dynamics of nature, some of the qualities of creativity only emerge at the human level, further amplifying the intelligence and power of the creative process. Understanding why creativity is such an essential feature of the cosmos and human existence provides us with a general sense of the directionality of the future. Key connected themes that describe the structure and dynamics of creativity include: Order and chaos; life and death; synthesis and destruction; combinatory foundations coupled with transcendence; competition and symbiosis; self-organization, novelty, and emergence; rhythmic pulsation; trial and error; reason and insight; immersion and flow; emotionality and self-actualization; and interaction, diversity, and reciprocity.

Since the future will be evolutionary, creative, surprising, and perpetually disruptive, we require heightened future consciousness and wisdom to flourish within this transformative reality. Indeed—and this point cannot be understated—one only "survives" by evolving and creating. Wisdom is ethically in-formed creative acts of synthesis and problem solving. Wisdom intelligently participates in the ongoing act of creation, in the imaginative synthesis of the true, the beautiful, and the good, in the opening up of the future in its myriad possibilities.

If one identifies the fundamental forces of nature with what the ancients saw as the divine and mysterious powers of the gods and goddesses, then human creativity is indeed a gift of the gods. Yet it is a gift not transcendent to us but infused within us, and it is a gift with which we seem compelled to further tinker and refine. We may have stolen or appropriated fire from the gods, but like everything else in nature, we can't leave well enough alone.

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