Chapter 13
Interdisciplinary Exploration and Domain-Specific Expertise Are Mutually Enriching

Don Ambrose

Abstract Interdisciplinary and domain-specific investigative trajectories represent very different approaches to the study of creative intelligence. They proceed in opposing directions and seem to generate contradictions. Interdisciplinary work seems to make domain-specific inquiry look excessively insular while domain-specific work seems to undermine the credibility of investigations that cross disciplinary borders. In actuality, these two very different approaches can enrich each other if their adherents develop healthy forms of mutual respect.

13.1 Introduction

In order to extend our knowledge of creativity and other dimensions of creative intelligence such as giftedness and talent development we need to employ both domain-specific inquiry and interdisciplinary exploration. Both of these investigative tracks have been established in creative intelligence fields but they seem to be moving along without doing much to inform each other. If we can find ways to share more ideas between these tracks we might accelerate progress.

Scholarship on domain-specific expertise has become vibrant in creativity studies (e.g., Baer 1998, 1999, 2010, 2012a, b, 2013, 2015, 2016a, b; Baer and Kaufman 2015; Beghetto et al. 2015; Kaufman et al. 2017; Silvia et al. 2009; Simonton 2009). It also influences gifted education (e.g., Olszewski-Kubilius et al. 2017; Subotnik et al. 2011). The core idea behind much of this work is that creativity and giftedness go beyond general cognitive processing and are more dependent on the development of knowledge, skills, and dispositions within specific domains. For example, a person can be a creative writer but not a creative composer if she developed considerable expertise and talent in the domain of writing but has little interest or talent in music.

D. Ambrose (✉)
College of Education and Human Services, Rider University, Lawrence Township, NJ, USA
e-mail: ambrose@rider.edu

There also has been some interdisciplinary inquiry aimed at clarification and extension of our knowledge of creative intelligence (e.g., Ambrose 1996, 1998, 2003, 2005a, b, 2006, 2009, 2014a, b, 2016, 2017a, b; Ambrose et al. 2003, 2012, 2014; Ambrose and Cross 2009; Ambrose and Sternberg 2012, 2016a, b; Gardner 1988, 2006; Gruber and Bödeker 2005; Kalbfleisch and Ambrose 2008; Lindauer 1998; McLaren 2003; Root-Bernstein 2014; Root-Bernstein 2001, 2003; Sawyer 1998; Shiu 2014; Sriraman and Dahl 2009; Thiessen 1998; VanTassel-Baska and Stambaugh 2006). Key ideas in this work have to do with the notion that our conceptions of creativity, giftedness, and talent development can be enriched by borrowing theories and research findings from diverse disciplines, many of which are not normally associated with high ability. Notably, the *Journal of Creative Behavior* and the *Creativity Research Journal* explicitly recognize the importance of interdisciplinary work in the field of creativity studies.

My work is primarily on the interdisciplinary inquiry track. When research on domain-specific expertise began to accelerate I first wondered if it would run counter to interdisciplinary investigation and undermine it in some way because the two tracks pursue very different, seemingly contradictory purposes. But I now think those concerns were somewhat premature.

A metaphor can be helpful here. Assume that a group of scholars show up in "Creative Intelligence City," an imaginary metropolis encompassing all of the phenomena pertaining to creativity, giftedness, and talent development. Those who are inclined to carry out domain-specific inquiry will lodge themselves within a big, prominent office building in the city and explore the inner workings of that particular "domain." The building is analogous to an academic discipline or professional field. Assuming that the field is well established and rich with accumulating professional knowledge, that domain is a lofty, sturdy skyscraper. The steel frame in the superstructure and the pilings drilled down into the bedrock provide the theoretical and philosophical frameworks of the field. The floors are where the work of the field takes place. The valuable, practical work of the field is done in the lower floors where the professional practitioners labor and interact with "customers" who come in from the streets. Researchers navigate around in these floors as well but their offices are located in higher floors where more abstract knowledge production takes place. The top floors are where the eminent leaders and gatekeepers of the field make many of the decisions about the operations that take place in the building. The external walls are the epistemological borders that separate the field from other fields in the external environment. These walls are insular or somewhat porous depending on the size of the windows and whether or not they open fully. The basement of the building is where resources and old ideas are stored. While the building looks well established and solid it can change over the course of time. New findings and emerging theories can initiate the building of additional floors or wings, and parts of the structure can be dismantled, but most skyscrapers stay quite stable over the course of time. The evolution of the field mostly takes place through the addition of knowledge and the discarding of no longer valid constructs within the structure.

There certainly is more than enough work to do within a skyscraper so those who are inclined to do domain-specific work like to confine their thinking within the walls of the building. When they take a break every now and then to gaze through

the windows they capture occasional glimpses of other domain buildings but they quickly get right back to producing and using domain-specific knowledge. Moreover, the infusion of rapidly evolving information technology enables them to generate far more professional knowledge than ever before so the knowledge is accumulating at a very rapid pace making it exceedingly difficult for any single professional or researcher to master everything in the building. This disinclines them from going beyond their walls to explore other buildings, even though they have technology that can facilitate networking among multiple office towers.

In contrast, interdisciplinary explorers tend to be based in a domain building but they like to explore throughout Creative Intelligence City. First, they explore electronically to see what's out there. Then they walk, Uber, or take the bus or subway throughout the city stopping at multiple skyscrapers and wandering into them, riding up the elevators, visiting with some of the theorists, researchers, and practitioners in offices on the various floors, and then moving on to other buildings. They gather theories and research findings from these diverse buildings and attempt to figure out how foreign ideas might be relevant to the work done in their home building and how to synthesize those constructs when possible.

One of these buildings has a big sign over the front door saying "creativity studies." Another neighboring building is labeled "gifted education." Yet another building houses "special education." A cluster of close together but separate buildings on a single block are labeled "cognitive psychology," "neuropsychology," "positive psychology," "psychobiology," and "school psychology," among others. Looking beyond the district encompassing the creativity-giftedness-psychology towers we come across other city blocks with other domain skyscrapers that don't seem directly related to creative intelligence but actually have some intriguing connections with the topic. These include "economics," "sociology," "political science," "anthropology," "law," "biotechnology," "behavioral genetics," "neuroscience," "biochemistry," and even "theoretical physics," among many others.

So, here we have a conundrum. Can we understand everything we need to know about creative intelligence by staying within a single building? Conversely, won't we become overwhelmed with far too many borrowed constructs to make sense of creative intelligence if we wander throughout the city stepping into many diverse buildings?

The limitations of staying within the same domain-specific building without engaging in exploration of other buildings in the city become obvious when we consider some insights that interdisciplinary explorers have brought back to the creativity studies and gifted education skyscrapers. Just a few examples can illustrate what can be gained from that. A special issue of the *Roeper Review* (Kalbfleisch and Ambrose 2008) solicited insights from cognitive neuroscientists and applied them to giftedness and creativity. One of these insights was the discovery that the brain-mind systems of mathematically gifted children are significantly different from their peers (O'Boyle 2008). These differences show up in heightened interhemispheric exchanges of information within the neocortex generating an unusual degree of neural connectivity as well as exceptional strengths in mental imagery. The professionals in both the creativity studies and gifted education office towers can benefit from that borrowed insight.

Another example of an insight borrowed from other skyscrapers in Creative Intelligence City comes from the results of work done by an interdisciplinary team years ago. A group of prominent scholars from four academic disciplines (economics, political science, English studies, analytic philosophy) came together to investigate the structure and dynamics of their disciplines (Bender and Schorske 1997). They eventually determined that two of the fields (economics and analytic philosophy) were unified, insular, and firmly policed. The other two (political science and English studies) were fragmented, porous, and contested. In the first of these patterns, the field is unified around a dominant theory. It is insular because it resists the intrusion of theories and research findings from foreign disciplines. It is firmly policed because the gatekeepers of the field won't publish articles or books that diverge from the orthodoxy. In contrast, a field following the second pattern is fragmented and contested because it is made up of warring theoretical and/or philosophical camps. No single theory comes to dominate and if one does gain some prominence it doesn't rule the majority of minds for very long. The field is porous because it cannot or will not stop invasions of theories and research findings from foreign disciplines.

After coming across these insights about the structure and dynamics of foreign fields I applied them to creativity studies (Ambrose 2006) and engaged with colleagues to inject them into gifted education (Ambrose et al. 2010), determining that both of these fields fit the fragmented, porous, contested pattern at the time of the analyses. It's highly unlikely that these insights would have been applied to creativity studies and gifted education if the interdisciplinary exploration had not turned up these patterns that were hidden away in other skyscrapers in Creative Intelligence City.

13.2   How Interdisciplinary Exploration and Domain-Specificity Can Help Each Other

It seems counterintuitive that these two very different investigative trajectories can support each other but it's quite likely that they can. Domain-specific experts can help interdisciplinary explorers be more cautious as they wander through unfamiliar parts of Creative Intelligence City. Meanwhile, interdisciplinary explorers can bring back foreign ideas and patterns that shed new light on the concepts within a domain-specific skyscraper.

13.2.1   Domain Specific Experts Making Interdisciplinary Explorers More Accurate in Their Work

First, the work on domain-specific expertise in creative intelligence fields can help interdisciplinary explorers be more careful about the work they do. For example, in the first few years of my interdisciplinary excursions I was excitedly tramping

through the terrain of multiple disciplines coming across conceptual gemstones that appeared to be relevant to clarification and extension of theory and research on creativity and giftedness. But then I started interacting with an economist. We communicated frequently and collaborated on the development of some in-depth articles over the course of more than 18 months until he had to withdraw from the project because he was trepidatious about the flack he might get from colleagues in his field. The articles were turning out to be critical of the dominant theoretical framework in economics and that firmly policed field is notorious for coming down hard on dissenters.[1]

My extensive communication with this economist enriched my understanding of the nuances of multiple economic concepts, which I previously thought I understood fully but then realized I didn't. Since then I've been more cautious about importing constructs from foreign disciplines. I still do it but I vet them more carefully by triangulating multiple sources and securing opinions from experts when they are available. In essence, my collaboration with the economist revealed how deep and rich domain-specific expertise really is. Of course, I should have known this from observing researchers and theorists in my own domain skyscraper but that form of awareness seems to be hidden away from academics who tend to forget, to some extent, the depth and complexity of expertise in their domains and how long it takes to develop it. Suffice it to say that interdisciplinary scholars always should strive to escape the dogmatism of excessive certainty so they can appreciate the extensive knowledge bases within each domain-specific skyscraper they visit and the complex nuances that the theories and research findings can have. This enables them to value the worthiness of their domain-specific colleagues.

13.2.2   Interdisciplinary Explorers Enriching the Work of Domain-Specific Experts by Providing Domain-Transcending Patterns and Conceptual Gemstones

High levels of intelligence do not inoculate the minds of individuals and groups from infection by dogmatism (Elder and Paul 2012; Sternberg 2002). This applies to both interdisciplinary and domain-specific scholars. In the prior section I mentioned a form of dogmatism that can infect the minds of interdisciplinary investigators if they are not careful. Domain-specific experts can fall prey to a different form of dogmatism. It is possible for a domain-specific skyscraper to become a dogmatic field and the nature of the dogmatism depends on the structure and dynamics of the field as mentioned earlier–unified, insular, firmly policed or fragmented, porous, contested.

A unified, insular, firmly policed domain skyscraper has thick walls and small, tightly closed windows, forcing the scholars and practitioners within to align with a dominant theory. So a few gatekeepers in the top floor control much of what goes on

---

[1] I'm withholding the name of my colleague and the title of the articles to protect him.

in the floors below. Meanwhile, very few ideas from other skyscrapers can sneak through the small, closed windows so interdisciplinary work is difficult, if it's considered at all. Consequently, the dogmatism that can infect the minds of the professionals in this skyscraper is a form of excessive certainty or unwarranted confidence in the dominant theoretical construct and the findings it generates. Thomas Piketty (2014) is one of a growing number of prominent, rebellious economists who have pushed open some windows in their insular domain. He employed the term *scientific illusion* to signify how economics has avoided dealing with important contextual influences from the sociocultural and political environments. He recommended that his field engage in more interdisciplinary work to escape from this form of insular dogmatism.

The dogmatism Piketty was lamenting derives from the rational actor model of the individual economic decision maker, which is the dominant theoretical framework in mainstream economics. According to this framework, a person participating in the economy is exceptionally rational, operating on the basis of complete information sets, for entirely selfish reasons (Beckert 2002; Stiglitz 2010). The model works nicely as an efficient guide for the empirical work and model building in economics but it doesn't map onto reality very well. Seldom is any individual human entirely rational and the vast majority are at least somewhat altruistic. In addition, very seldom does anyone have access to perfect information sets about complex phenomena, even as they pertain to typical economic decisions. Because of this flawed model rooted in the dogmatism of a unified, insular, firmly policed domain skyscraper the economy has suffered. The biggest twenty first-century disaster based on this form of dogmatism was the 2008 economic collapse, as described by dissenting economists (e.g., Kotz 2015; Madrick 2014; Piketty 2014; Stiglitz 2010; Temin and Vines 2013).

Interdisciplinary explorers can help the excessively sequestered professionals in a unified, insular, firmly policed domain skyscraper by importing fresh ideas that can encourage them to think differently about narrowly confined constructs. For example, Morson and Schapiro (2017) recognized that economics tends to be excessively sanitized of altruism and ethics because it focuses too narrowly on rational self-interest. Consequently, they recommended some interdisciplinary synthesizing based on injecting the study of literature into economics because literature tends to evoke altruistic feelings and ethical awareness due to the visceral experiences readers gain from the plight of literary characters. This recommendation represents an opportunity for a highly creative modification of the work carried out in an enormously influential domain-specific office tower.

A fragmented, porous, contested domain skyscraper generates somewhat different forms of dogmatism. Because it is theoretically and philosophically contested it produces warring camps within it. So there are prominent gatekeepers in various competing offices on the top floor lobbing criticisms at one another and pushing researchers and practitioners to head in competing directions. And because their epistemological windows are open they allow ideas to drift in from other domain buildings causing additional turbulence and occasional chaos. Consequently, the field ends up looking somewhat schizophrenic and plagued by some degree of angst.

13.3   Examples of Transdisciplinary Patterns and Conceptual Gemstones That Can Generate Creativity in Domains

Interdisciplinary exploration can take us into scores of domain-specific towers where thousands of theories and research findings can be borrowed for importation into one's home domain. Here are just a few of these constructs, some of which already have been imported into creativity studies and gifted education, and others that can be imported to promote new forms of creative thinking in these fields.

13.3.1   Patterns from Complexity Science

Interdisciplinary wanderers can help the anxious professionals within a fragmented, porous, contested domain skyscraper by bringing them constructs and insights that can help establish some sense of order or common ground, thus reducing the conflict within the building and generating some excitement about a productive new inquiry path. For example, an easy to grasp pattern from the interdisciplinary field of complexity science can establish some common conceptual ground in a fragmented field by providing a pattern of similarity that applies to many, perhaps most phenomena of interest within that field. The *edge of chaos hypothesis* developed by complexity theorists Langton and Packard (see Kauffman 1995; Langton 1990; Packard 1988; Waldrop 1992), provides the basis for the *chaos-order continuum,* which portrays complex adaptive systems as oscillating along a continuum from excessive order to excessive chaos with productive complexity arising in the middle (Ambrose et al. 2014). Most complex adaptive systems studied within most academic disciplines and professional fields tend to align well with the continuum. Complex adaptive systems include the human brain-mind, groups of human minds (e.g., K-16 classrooms, teams in entrepreneurial organizations), animal populations in ecosystems, economies within and among nations, traffic patterns in major cities, chemical reactions, and many more.

When a complex adaptive system moves too far toward the order end of the continuum it becomes rigid, locked into a particular structural or behavioral pattern. When it moves too far toward the chaos end of the continuum it becomes frenetic and unstable. At either of these ends of the continuum the behavior is not complex because there is no systematic, complex pattern in the structure or dynamics of the system. But when the system finds the *edge of chaos* in the middle of the continuum where chaos and order are in exquisite dynamic tension, its structure and/or behavior becomes intricately complex. For example, a schizophrenic human mind is fragmented and chaotic as it pushes too far toward the chaos end of the continuum. In contrast, a dogmatic human mind engages in rigid, narrow, superficial, thought because it is firmly locked into an unyielding idea framework. But when a creative human mind is deeply engaged in a challenging, complex problem it can find the edge of chaos in the middle of the continuum and generate enormously complex,

highly productive theoretical, philosophical, or practical work. It does this because it benefits from the dynamic tension between the chaos-generating ambiguity of the complex problem and its order-generating constraints.

Arguably, interdisciplinary travelers moving throughout Creative Intelligence City can deliver the chaos-order continuum construct into a wide range of high-rises, including the following (explained in detail in Ambrose 2014b).

- *Economics.* The centralized planning of the Soviet Union in the twentieth century was excessively ordered; consequently, it didn't develop sufficient complexity to produce the goods and services needed by a large population. In contrast, the excessive deregulation of the global economy due to neoclassical economic theory, and its ideological cousin neoliberalism, generated economic chaos that produced the 2008 economic collapse. A vibrant economy requires dynamic tension between the chaos of free-market dynamics and the order of prudent regulation. Creative, entrepreneurial economic action can be guided by more awareness of the dynamic tension between chaos and order.
- *Political science.* Totalitarian governments establish exceedingly firm control over the policymaking apparatus, legal institutions, and the media in a nation, thus producing counterproductive, excessive order that severely limits the freedom of the population. In contrast, when a nation falls into anarchy it lacks the political authority to establish and maintain the rule of law so the political system falls into excessive chaos. But when a nation finds the exquisite balance between individual freedom and communal solidarity it develops a healthy democratic governance system, which allows for optimal levels of creative self-actualization among its citizens along with social justice through the effective provision of public goods.
- *The structure and dynamics of academic disciplines.* The aforementioned analyses of academic disciplines and professional fields, which portrayed them as unified, insular, and firmly policed or fragmented, porous, and contested, fit neatly onto the chaos-order continuum. When a field is extremely unified, insular, and firmly policed it can fall prey to excessive order because the dominant theory firmly locks the minds of theorists, researchers, and practitioners into a single conceptual framework. When a field is extremely fragmented, porous, and contested its lack of adherence to an agreed-upon conceptual framework can make it excessively chaotic. From the viewpoint of the chaos-order continuum, academic disciplines and professional fields could establish bases for stronger theory development, research, and practical work if they avoid either extreme. This likely would require more nuanced judgment on the part of all involved. Nuanced judgment is a form of critical thinking that enables participants to avoid conceptual polarization by searching for shades of gray between opposing, either-or positions (Elder and Paul 2012; Resnick 1987). Such judgment could encourage a field to hold an influential theory lightly, using it as a lamp that enables searching through darkened corners of the conceptual terrain while avoiding the temptation to securely lodge that lamp in a particular location in the landscape, pointing it in a single direction. This could make more

room for creative inquiry by preventing a field from locking itself too firmly into a single theoretical perspective. Theoretical entrenchment seems to be an ongoing problem throughout the history of science as evidenced by the periodic emergence of starkly contrasting scientific paradigms (Kuhn 1962).

- *The dynamics of teaching and learning.* Veteran teachers tend to resonate with the chaos-order model because they recognize processes from curriculum and instruction that fit along the continuum. Here are just a few examples:

  - Classroom management: the authoritarian teacher vigorously presses toward excessive order. Laissez-faire teachers allow excessive chaos. Student-centered teachers employing problem-based learning enable their students to manage themselves through complex, intrinsic motivation.
  - Assessment: Excessive reliance on standardized testing pushes school systems to the excessive order end of the continuum due to overemphases on the pseudo-quantitative precision of easily measured, superficial learning. The impulsive assessment used by teachers who do not engage in sufficient planning generates instructional chaos. Authentic assessment generates productive complexity arising from intriguing, deep immersion in real-world problems and the focus on complex thought processes.
  - The science and art of teaching: Teachers adhering too rigidly to proven methodologies (the science of teaching) can lock themselves into excessive order. Those who rely too heavily on their intuitive impressions of how things are going (the art of teaching) can fall prey to excessive chaos. But blending the science and art of teaching can lead to highly complex constructivist learning processes.

13.3.2   Benefiting from Diverse Minds Within and Between Domains

Another borrowed insight comes from a leading scholar who has done some of his own interdisciplinary exploration through several skyscrapers in Creative Intelligence City. Scott Page (2007, 2010, 2017) synthesized research from economics and the interdisciplinary field of complexity science to portray the value of cognitive diversity in the performance of work groups throughout a variety of governmental and corporate organizations. Cognitively diverse work teams encompass diverse backgrounds, theories and philosophical perspectives, problem-solving heuristics, and belief systems. Such teams consistently outperform cognitively homogenous teams even when the latter teams are superior in measured intelligence.

These findings have some interesting implications when it comes to the work done within and among the various domain-specific office towers in Creative Intelligence City. First, it becomes important to ensure that the professionals and researchers within a domain-specific tower come from varying professional and cultural backgrounds. But such diversity is difficult to achieve in a unified-insular-

firmly policed domain that is dominated by a particular theoretical perspective. The professionals and academics in that domain are very likely to think along very similar lines about difficult, complex problems. Even if they are extremely strong in measured intelligence and domain-specific expertise their collective homogeneity probably will drag down their group performance.

Consequently, the somewhat greater diversity encompassed by the collective minds of professionals and academics in fragmented-porous-contested domain-specific towers could be an advantage when dealing with complex problems. Nevertheless, the wars over theoretical constructs and methodological tools that commonly take place in a fragmented domain likely suppress problem-solving performance within that domain. In view of this, it would be wise if researchers in the creativity studies and gifted education office towers were to devote more attention to the dynamics of cognitive diversity when they carry out their research.

13.4 An Interdisciplinary Economic Framework for Analyzing Inequality and Fairness

Venkatasubramanian (2017) produced a mathematical framework for analyzing the extent to which fairness is considered in income distributions throughout a society. The framework; which is derived from an interdisciplinary synthesis of constructs from economics, political science, information theory, game theory, systems engineering, and statistical mechanics; addresses the lack of attention mainstream economics pays to economic fairness. Venkatasubramanian went on to use the framework to analyze some of the world's economies. In one example the framework shows that Scandinavian nations have close to ideal fairness while the United States is extremely unfair. This innovative, interdisciplinary framework analyzing an important dimension of economics can be applied readily to work on dark creativity in the field of creativity studies (see Cropley et al. 2010; Gutworth et al. 2016; Majid al-Rifaie et al. 2016). For example, influential players in national and global economic systems can be revealed as engaging in dark creativity when they pull economic and political levers to keep those systems pushing toward even more severe inequalities. The previously mentioned 2008 economic collapse, largely caused by highly creative, unethical manipulation of the world's financial system, is a specific example of this form of dark creativity.

13.4.1 Cutting Holes in Veneer Theory

Another topic mostly investigated beyond the walls of the creativity studies and gifted education office towers is the extent to which altruism is rooted in our biology and evolutionary processes or, conversely, tends to be applied as a thin layer over

our baser, brutish natures. Sociobiology and its neighboring fields tend to magnify the biological and evolutionary bases for human nature, including some aspects of moral-ethical behavior (see Dawkins 2006; Wilson 1975, 1978). A few insights from sociobiology have made their way through the partially open windows of the creativity studies office tower (e.g., McLaren 2003). But most of the work in this field remains in other buildings in Creative Intelligence City.

For example, primatologist Frans De Waal (2006) argued that our conceptions of morality have been distorted by scholarship from the past in evolutionary biology and philosophy. Some of the past research in evolutionary biology portrayed human nature as extremely selfish (Trivers 1971; Wilson 1978). When we go back centuries to the work of the eminent philosopher Thomas Hobbes (1651/1985), deep in the cobwebbed recesses of the philosophy building, we are confronted with his portrayal of human nature as innately asocial or antisocial and brutish. De Waal argued that *veneer theory* arises from these distortions of human nature essentially portraying humans as much less worthy and ethical than they typically are. Veneer theory suggests that morality is a thin veneer that covers the core of human nature, which is immoral, or at best amoral. Supposedly, in normal circumstances the veneer prevents us from abusing and exploiting one another; however, when crises such as resource shortages or tragedies scratch the veneer, our harmful core dispositions escape and enable us to engage in evil behavior.

De Waal pointed out that evil does tend to emerge in these conditions but that veneer theory overemphasizes it while hiding the altruism that also comes forth in desperate circumstances. To counter veneer theory, De Waal (2006) provided a more optimistic portrayal of human nature, which is based on decades of observing the behavior of primates. His findings show that altruism actually is common among primates, emerging from their visceral emotional responses to the suffering of others. He also argued that the emergence of altruism is evolutionarily adaptive because it promotes group cohesion and groups in which the members look out for one another survive much better than do loosely affiliated groups and selfish, atomistic individuals. Finally, he specified that this form of altruism goes much deeper than reciprocal altruism in which the generous person is expecting some kind of payback from the beneficiary. Of course, reciprocal altruism does exist but it doesn't dominate human behavior because it is not nearly as powerful as genuine altruism.

De Waal's magnification of genuine altruism and criticism of veneer theory could inject some helpful ideas into the creativity studies and gifted education towers in Creative Intelligence City. First, it could encourage more attention to generosity and kindness in creative work while illustrating how misguided, or at least limited, selfish conceptions of human nature can be when it comes to creativity. This could be an important dimension of continued work on dark creativity. Second, it could become a focal point for work on group creativity because De Waal's work in primatology shows that the group cohesion resulting from genuine altruism is evolutionarily adaptive. All kinds of groups from entrepreneurial startups, to corporations, to NGOs, to educational institutions could benefit from more attention to genuine altruistic behavior.

13.4.2   *A Continuum of Global Relations*

If we want to encourage big-picture thinking in creativity studies and gifted education we should borrow from disciplines that explore large-scale contextual influences on human thought and action. Political theorist Michael Walzer (2001) provided a helpful framework for this kind of thinking about creative intelligence. He created a continuum illustrating a variety of political arrangements that can take shape in international society. Seven possible international arrangements fit along the continuum from a highly centralized global system to an extremely decentralized, somewhat anarchic system. The following is a brief portrayal of these positions on the continuum:

1. A global state. A tightly centralized world government exerts considerable control over the thoughts and actions of global citizens, all of whom possess similar obligations and rights.
2. Imperial hegemony. A single dominant nation controls a global empire and establishes some differentiation between itself and all other nations. This is a small step away from the tightly controlled centralization in position 1. Here, there is sufficient centralized control to prevent conflict while still allowing for some cultural independence; however, the outlier states don't enjoy secure freedom because their fate rests in the hands of the dominant state, which could exert considerable control over them at any time. Also, citizens in the dominant state have more rights than those in other nations.
3. Federation of nation states. This system is analogous to a United States of the world. An influential central political entity has significant power, which is ceded to it by member nations that are somewhat independent. There is a guaranteed separation of powers and rights are protected by an effective judicial system. However, there is the potential for drift toward oligarchy because some member nations likely will enjoy more power than others.
4. Independent nations strongly influenced by non-state agents. According to Walzer, this system provides the most potential for the creation of peace, individual rights, justice, and cultural diversity. It provides insulation against the emergence of tyranny because it includes a strong United Nations peacekeeping force and international regulation of capital, labor, and environmental standards.
5. Borderless, international civic associations pressuring nation states to cooperate. These volunteer associations would be stronger than our current international organizations but they would have difficulty preventing abuses produced by powerful multinational corporations that find it easy to dodge accountability in a highly decentralized world.
6. Largely independent states blended with weak global organizations. In this arrangement no single state possesses sovereignty over the others. Nations engage in some limited cooperation through weak international organizations such as the World Bank, the World Court, and the United Nations. There is some pressure to prevent international conflict but wars and atrocities still emerge

periodically and socioeconomic inequality is rampant. According to Walzer, this point on the continuum closely approximated the global situation at the time he generated the framework. Arguably, the globalized socioeconomic system in the year 2018 still fits this position on the continuum.

7. Completely independent sovereign nations. There is no global authority and no stable organizations of states. Temporary agreements and treaties may emerge between some nations but these are unstable because they are not enforceable by third parties.

According to Walzer (2001) the worst forms of international relations would emerge at the extremes of the continuum because they are conducive to insecurity, inequality, and human rights abuses.

If theorists and researchers studying creativity and giftedness employed Walzer's continuum as an analytic framework they could clarify some of the contextual influences on creative intelligence. For example, position 7, completely independent sovereign nations, would require visionary, creative leadership similar to Sternberg's (2003, 2005, 2009) WICS model (wisdom, intelligence, and creativity synthesized) in order to prevent severe international conflicts and human rights abuses. WICS leadership also would be important in the highly centralized global state at position 1 on the continuum because a world government exerting control over global citizens would have to be guided by ethics to maintain the optimal balance of rights and obligations in the citizenry. Walzer's continuum also magnifies the importance of paying more attention to the dynamics of the dark side of creativity.

13.5 Encouraging Domain-Specific and Interdisciplinary Professionals to Collaborate

As mentioned at the outset, the inclinations and interests of domain-specific and interdisciplinary professionals can diverge considerably; however, their work can and should be complementary. But professionals can be locked dogmatically into established mindsets (see Ambrose and Sternberg 2012; Ambrose et al. 2012). In order to diminish the chances that counterproductive dogmatism will prevent potential, rich syntheses of domain-specific and interdisciplinary work we can make the potential of collaboration more visible. One way to do this is to employ the jurisprudential synthesis creative and critical thinking strategy (see, Arends and Kilcher 2010; Joyce and Weil 1992). This strategy, which isn't well known, enables groups and individuals to identify opposing, polarized positions on a complex, controversial issue and then build a compromise position between the two. First, participants explore the controversial issue and then establish the opposing positions, putting one of them in column A of a 3 column table and the other in column C. Then they find arguments and evidence for each of these two opposing positions putting them under the title of each position in the two outside columns. The step requiring the most creative and critical thinking involves the establishment of a compromise

Table 13.1 A jurisprudential table synthesizing the work of domain-specific and interdisciplinary professionals in Creative Intelligence City

Position A: Domain-specific work is best	Position C: Domain-specific and Interdisciplinary professionals work together	Position B: Interdisciplinary exploration is best
Working inside our domain-specific office towers provides the most important insights about creative intelligence by far. Wandering outside in the streets is a waste of time and generates confusion.	Both domain-specific knowledge generators and interdisciplinary explorers do important work. Moreover, their work is complementary because each provides insights about complex phenomena that are inaccessible to the other.	Traveling throughout creative intelligence city establishes clarity about creative intelligence by revealing patterns that appear from one city block to another. Hiding inside a single domain-specific tower can make you myopic.
(Participants load arguments and evidence supporting position A into this column)	(Participants load arguments and evidence supporting their synthesizing, compromise position in this column)	(Participants load arguments and evidence supporting position B into this column)

position that goes in the middle column. After naming the compromise position, participants find arguments and evidence for it and complete the middle column. The compromise can lean somewhat toward position A or B but cannot grossly violate either one.

The beginning of a proposed jurisprudential synthesis for domain-specific and interdisciplinary work shows up in Table 13.1. Domain-specific expertise is position A, interdisciplinary exploration is position B, and synthesizing domain-specific and interdisciplinary work is position C. Hopefully, those who favor one or the other opposing position will come to appreciate the points in the compromise position C, which shows how collaboration with those in the other "camp" can enrich the work of all. I would have benefited from this when I was somewhat narrow-minded about my favoritism of interdisciplinary work over domain-specific discovery.

13.6 Concluding Thoughts

There certainly are daunting barriers that make interdisciplinary work difficult within a domain. Imported constructs can seem strange because they can emerge from very different epistemological and even ontological frameworks. The knowledge base within a domain can be very complex and adding foreign constructs will add to this complexity. Moreover, the foreign origins of these constructs make it likely that they will generate communication difficulties because they won't fit into the dominant terminology of the field. Some have seen these communication difficulties as analogous to the conditions that give rise to pidginization of language during communication between representatives of different cultures (Baer 2012b; Galison 2001). Given these barriers, it's much easier to ignore constructs from foreign domains and focus on building more solid and expansive domain-specific knowledge bases using the constructs generated within a domain.

But these barriers shouldn't dissuade adventurous investigators from attempting to enrich their fields with foreign constructs that can shed new light on puzzling domain-specific phenomena. The primary argument here is that creative intelligence fields such as creativity studies and gifted education should engage in more interdisciplinary exploration; however, these fields are fragmented, porous, and contested (Ambrose 2006; Ambrose et al. 2010). Porous fields already have constructs from various disciplines wafting in through their open windows so they need interdisciplinary borrowing less than the unified, insular, firmly policed domain-specific towers. Nevertheless, even fragmented, porous, contested fields can benefit from more systematic interdisciplinary borrowing, especially in the context of twenty first-century globalization, which encourages the strengthening of cognitive diversity (Page 2007, 2010, 2017) and international, interdisciplinary scientific networking (Nielsen 2011; Suresh 2013). Importing more theories and research findings from diverse disciplines can ensure that more cognitive diversity emerges in teams of professionals in a domain-specific field, and in the individual minds of theorists, researchers, and practitioners.

Of course, these recommendations should be guided by the previous warnings about the forms of dogmatism that can arise in freewheeling, somewhat careless interdisciplinary exploration and excessively closed domain-specific work. If those who wander through the streets of Creative Intelligence City borrowing constructs from various office towers and those who labor within domain-specific towers truly appreciate the value in these different very different kinds of work they will be able to invigorate research and theory development in creative intelligence fields.

References

Ambrose, D. (1996). Unifying theories of creativity: Metaphorical thought and the unification process. *New Ideas in Psychology, 14*, 257–267.

Ambrose, D. (1998). A model for clarification and expansion of conceptual foundations. *Gifted Child Quarterly, 42*, 77–86.

Ambrose, D. (2003). Barriers to aspiration development and self-fulfillment: Interdisciplinary insights for talent discovery. *Gifted Child Quarterly, 47*, 282–294.

Ambrose, D. (2005a). Aspiration growth, talent development, and self-fulfillment in a context of democratic erosion. *Roeper Review, 28*, 11–19.

Ambrose, D. (2005b). Interdisciplinary expansion of conceptual foundations: Insights from beyond our field. *Roeper Review, 27*, 137–143.

Ambrose, D. (2006). Large-scale contextual influences on creativity: Evolving academic disciplines and global value systems. *Creativity Research Journal, 18*, 75–85. https://doi.org/10.1207/s15326934crj1801_9.

Ambrose, D. (2009). *Expanding visions of creative intelligence: An interdisciplinary exploration*. Cresskill: Hampton Press.

Ambrose, D. (2014a). Invigorating innovation and combating dogmatism through creative, metaphorical business leadership. In F. K. Reisman (Ed.), *Creativity in business* (pp. 52–66). London: KIE Conference Book Series.

Ambrose, D. (2014b). The ubiquity of the chaos-order continuum: Insights from diverse academic disciplines. In D. Ambrose, B. Sriraman, & K. M. Pierce (Eds.), *A critique of creativity and complexity: Deconstructing clichés* (pp. 67–86). Rotterdam: Sense.

Ambrose, D. (2016). Borrowing insights from other disciplines to strengthen the conceptual foundations for gifted education. *International Journal for Talent Development and Creativity, 3*(2), 33–57.

Ambrose, D. (2017a). Interdisciplinary exploration supports Sternberg's expansion of giftedness. *Roeper Review, 39*, 178–182.

Ambrose, D. (2017b). Interdisciplinary invigoration of creativity studies. *Journal of Creative Behavior, 51*, 348–351. https://doi.org/10.1002/jocb.205.

Ambrose, D., & Cross, T. L. (Eds.). (2009). *Morality, ethics, and gifted minds*. New York: Springer Science.

Ambrose, D., & Sternberg, R. J. (Eds.). (2012). *How dogmatic beliefs harm creativity and higher-level thinking*. New York: Routledge.

Ambrose, D., & Sternberg, R. J. (Eds.). (2016a). *Creative intelligence in the 21st century: Grappling with enormous problems and huge opportunities*. Rotterdam: Sense.

Ambrose, D., & Sternberg, R. J. (Eds.). (2016b). *Giftedness and talent in the 21st century: Adapting to the turbulence of globalization*. Rotterdam: Sense.

Ambrose, D., Cohen, L. M., & Tannenbaum, A. J. (Eds.). (2003). *Creative intelligence: Toward theoretic integration*. Cresskill: Hampton Press.

Ambrose, D., VanTassel-Baska, J., Coleman, L. J., & Cross, T. L. (2010). Unified, insular, firmly policed or fractured, porous, contested, gifted education? *Journal for the Education of the Gifted, 33*, 453–478.

Ambrose, D., Sternberg, R. J., & Sriraman, B. (Eds.). (2012). *Confronting dogmatism in gifted education*. New York: Routledge.

Ambrose, D., Sriraman, B., & Pierce, K. M. (Eds.). (2014). *A critique of creativity and complexity: Deconstructing clichés*. Rotterdam: Sense.

Arends, D., & Kilcher, A. (2010). *Teaching for student learning: Becoming an accomplished teacher*. New York: Routledge.

Baer, J. (1998). The case for domain specificity of creativity. *Creativity Research Journal, 11*, 173–177.

Baer, J. (1999). Domains of creativity. In M. A. Runco & S. R. Pritzker (Eds.), *Encyclopedia of creativity* (pp. 591–596). New York: Academic.

Baer, J. (2010). Is creativity domain specific? In J. C. Kaufman & R. J. Sternberg (Eds.), *The Cambridge handbook of creativity* (pp. 321–341). New York: Cambridge University Press.

Baer, J. (2012a). Domain specificity and the limits of creativity theory. *The Journal of Creative Behavior, 46*, 16–29.

Baer, J. (2012b). Unintentional dogmatism when thinking big: How grand theories and interdisciplinary thinking can sometimes limit our vision. In D. Ambrose & R. J. Sternberg (Eds.), *How dogmatic beliefs harm creativity and a higher-level thinking* (pp. 157–170). New York: Routledge.

Baer, J. (2013). Teaching for creativity: Domains and divergent thinking, intrinsic motivation, and evaluation. In M. B. Gregerson, H. T. Snyder, & J. C. Kaufman (Eds.), *Teaching creatively and teaching creativity* (pp. 175–181). New York: Springer.

Baer, J. (2015). The importance of domain-specific expertise in creativity. *Roeper Review, 37*, 165–178.

Baer, J. (2016a). Creativity and the common core need each other. In D. Ambrose & R. J. Sternberg (Eds.), *Creative intelligence in the 21st century: Grappling with enormous problems and huge opportunities* (pp. 175–190). Rotterdam: Sense.

Baer, J. (2016b). *Domain specificity of creativity*. San Diego: Academic.

Baer, J., & Kaufman, J. C. (2015). Bridging generality and specificity: The amusement park theoretical (APT) model of creativity. Roeper Review, 27, 158–163.

Beckert, J. (2002). *Beyond the market: The social foundations of economic efficiency*. Princeton: Princeton University Press.

Beghetto, R. A., Kaufman, J. C., & Baer, J. (2015). *Teaching for creativity in the Common Core classroom*. New York: Teachers College Press.

Bender, T., & Schorske, C. E. (Eds.). (1997). *American academic culture in transformation: Fifty years, four disciplines*. Princeton: Princeton University Press.

Cropley, D. H., Cropley, A. J., Kaufman, J. C., & Runco, M. A. (Eds.). (2010). *The dark side of creativity*. New York: Cambridge University Press.

Dawkins, R. (2006). *The selfish gene* (3rd ed.). New York: Oxford University Press.

De Waal, F. B. M. (2006). *Primates and philosophers: How morality evolved*. Princeton: Princeton University Press.

Elder, L., & Paul, R. (2012). Dogmatism, creativity, and critical thought: The reality of human minds and the possibility of critical societies. In D. Ambrose & R. J. Sternberg (Eds.), *How dogmatic beliefs harm creativity and higher-level thinking* (pp. 37–49). New York: Routledge.

Galison, P. (2001). Material culture, theoretical culture, and delocalization. In J. W. Scott & D. Keates (Eds.), *Schools of thought: Twenty-five years of interpretive social science* (pp. 179–193). Princeton: Princeton University Press.

Gardner, H. (1988). Creativity: An interdisciplinary perspective. *Creativity Research Journal, 1*, 8–26.

Gardner, H. (2006). *Five minds for the future*. Boston: Harvard Business School Press.

Gruber, H. E., & Bödeker, K. (Eds.). (2005). *Creativity, psychology and the history of science*. New York: Springer.

Gutworth, M. B., Cushenbery, L., & Hunter, S. T. (2016). Creativity for deliberate harm: Malevolent creativity and social information processing theory. *Journal of Creative Behavior.* https://doi.org/10.1002/jocb.155.

Hobbes, T. (1985). *Leviathan*. New York: Penguin (Original work published 1651).

Joyce, B., & Weil, M. (1992). *Models of teaching* (4th ed.). Needham Heights: Allyn & Bacon.

Kalbfleisch, L., & Ambrose, D. (2008). The cognitive neuroscience of giftedness [special issue]. *Roeper Review, 30*(3 & 4).

Kauffman, S. (1995). *At home in the universe: The search for the laws of self-organization and complexity*. New York: Oxford University Press.

Kaufman, J. C., Glăveanu, V. P., & Baer, J. (Eds.). (2017). *The Cambridge handbook of creativity across domains*. New York: Cambridge University Press.

Kotz, D. M. (2015). *The rise and fall of neoliberal capitalism*. Cambridge, MA: Harvard University Press.

Kuhn, T. (1962). *The structure of scientific revolutions*. Chicago: University of Chicago Press.

Langton, C. G. (1990). Communication at the edge of chaos: Phase transitions and emergent computation. *Physica D, 42*, 12–37.

Lindauer, M. S. (1998). Interdisciplinarity, the psychology of art and creativity: An introduction. *Creativity Research Journal, 11*, 1–10.

Madrick, J. (2014). *How mainstream economists have damaged America and the world*. New York: Alfred A. Knopf.

Majid al-Rifaie, M., Cropley, A., Cropley, D., & Bishop, M. (2016). On evil and computational creativity. *Connection Science, 28*(2), 171–193. https://doi.org/10.1080/09540091.2016.1151862.

McLaren, R. B. (2003). Tackling the intractable: An interdisciplinary exploration of the moral proclivity. *Creativity Research Journal, 15*, 15–24.

Morson, G. S., & Schapiro, M. (2017). *Cents and sensibility: What economics can learn from the humanities*. Princeton: Princeton University Press.

Nielsen, M. (2011). *Reinventing discovery: The new era of networked science*. Princeton: Princeton University Press.

O'Boyle, M. W. (2008). Mathematically gifted children: Developmental brain characteristics than their prognosis for well-being. *Roeper Review, 30*, 181–186.

Olszewski-Kubilius, P., Subotnik, R. F., & Worrell, F. C. (2017). The role of domains in the conceptualization of talent. *Roeper Review, 39*, 59–69.

Packard, N. H. (1988). Adaptation toward the edge of chaos. In J. A. S. Kelso, A. J. Mandell, & M. F. Shlesinger (Eds.), *Dynamic patterns in complex systems* (pp. 293–301). Singapore: World Scientific.

Page, S. E. (2007). *The difference: How the power of diversity creates better groups, firms, schools, and societies*. Princeton: Princeton University Press.

Page, S. E. (2010). *Diversity and complexity*. Princeton: Princeton University Press.

Page, S. E. (2017). *The diversity bonus: How great teams pay off in the knowledge economy*. Princeton: Princeton University Press.

Piketty, T. (2014). *Capital in the twenty-first century*. Cambridge, MA: Harvard University Press.

Resnick, L. B. (1987). *Education and learning to think*. Washington, DC: National Academy Press.

Root-Bernstein, R. (2001). Music, creativity, and scientific thinking. *Leonardo, 34*(1), 63–68. https://doi.org/10.1162/002409401300052532.

Root-Bernstein, R. (2003). The art of innovation: Polymaths and universality of the creative process. In L. V. Shavignina (Ed.), *The international handbook on innovation* (pp. 267–278). Oxford: Elsevier Science.

Root-Bernstein, M. (2014). *Inventing imaginary worlds: From childhood play to adult creativity across the arts and sciences*. Lanham: Rowman & Littlefield.

Sawyer, R. K. (1998). The interdisciplinary study of creativity in performance. *Creativity Research Journal, 11*, 11–19. https://doi.org/10.1207/s15326934crj1101_2.

Shiu, E. (Ed.). (2014). *Creativity research: An inter-disciplinary and multi-disciplinary research handbook*. New York: Routledge.

Silvia, P. J., Kaufman, J. C., & Pretz, J. E. (2009). Is creativity domain-specific? Latent class models of creative accomplishments and creative self-descriptions. *Psychology of Aesthetics, Creativity, and the Arts, 3*(3), 139–148.

Simonton, D. K. (2009). Varieties of (scientific) creativity: A hierarchical model of domain-specific disposition, development, and achievement. *Perspectives on Psychological Science, 4*(5), 441–452.

Sriraman, B., & Dahl, B. (2009). On bringing interdisciplinary ideas to gifted education. In L. V. Shavignina (Ed.), *International handbook on giftedness* (pp. 1235–1256). New York: Springer Science.

Sternberg, R. J. (2002). Effecting organizational change: A "mineralogical theory" of organizational modifiability. *Consulting Psychology Journal: Practice and Research, 54*, 147–156. https://doi.org/10.1037/1061-4087.54.3.147.

Sternberg, R. J. (2003). WICS as a model of giftedness. *High Ability Studies, 14*, 109–137. https://doi.org/10.1080/1359813032000163807.

Sternberg, R. J. (2005). WICS: A model of giftedness in leadership. *Roeper Review, 28*, 37–44.

Sternberg, R. J. (2009). Reflections on ethical leadership. In D. Ambrose & T. L. Cross (Eds.), *Morality, ethics, and gifted minds* (pp. 19–28). New York: Springer Science.

Stiglitz, J. E. (2010). *Free fall: America, free markets, and the sinking of the world economy*. New York: W. W. Norton.

Subotnik, R. F., Olszewski-Kubilius, P., & Worrell, F. C. (2011). Rethinking giftedness and gifted education: A proposed direction forward based on psychological science. *Psychological Science in the Public Interest, 12*(1), 3–54.

Suresh, S. (2013, October). To tap the world's vast and growing potential for new ideas, we need new rules. *Scientific American, 309*(4), 60.

Temin, P., & Vines, D. (2013). *The leaderless economy: Why the world economic system fell apart and how to fix it*. Princeton: Princeton University Press.

Thiessen, B. L. (1998). Shedding the stagnant slough syndrome: Interdisciplinary integration. *Creativity Research Journal, 11*, 47–53.

Trivers, R. (1971). The evolution of reciprocal altruism. *Quarterly Review of Biology, 46*, 35–57.

VanTassel-Baska, J., & Stambaugh, T. (2006). *Comprehensive curriculum for gifted learners* (3rd ed.). Boston: Allyn & Bacon.

Venkatasubramanian, V. (2017). *How much inequality is there? Mathematical principles of a moral, optimal, and stable capitalist society*. New York: Columbia University Press.

Waldrop, M. M. (1992). *Complexity: The emerging science at the edge of order and chaos*. New York: Touchstone.

Walzer, M. (2001). International society: What is the best that we can do? In J. W. Scott & D. Keates (Eds.), *Schools of thought: Twenty-five years of interpretive social science* (pp. 388–401). Princeton: Princeton University Press.

Wilson, E. O. (1975). *Sociobiology: The new synthesis*. Cambridge, MA: Harvard University Press.

Wilson, E. O. (1978). *On human nature*. Cambridge, MA: Harvard University Press.