

Positive Development in a Disorderly World

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Adolescents need to develop competencies to navigate an adult world that is complex and disorderly: a world of heterogeneous macro- to microecological systems containing contradictions and catch-22s. This exploratory essay examines adolescents' conscious processes of developing pertinent competencies for pursuing goals (agency) in these kinds of "real-world" settings. It draws on qualitative longitudinal research on youth's experiences working on arts and community projects in which they encounter the irregular dynamics of complex human systems. I describe how youth develop "strategic thinking": executive skills for formulating strategies based on forecasting dynamics in navigating these systems. I also describe how youth learn to manage emotions (in self and others) that arise in these real-world transactions and how they develop motivation that sustains their work toward goals. Even as we learn more about the biological hardware of development, I argue that we must study youth's conscious, proactive processes in developing their own "software" to navigate complex and disorderly human worlds.

The current global recession is a poignant reminder of how disorderly the world is that adolescents must prepare to enter. Over the years exuberant investors and ordinary people accumulated enormous debt, precipitating a chain reaction that cascaded through every sector of the economy and part of the world: foreclosures, bankruptcies, and unemployment—especially among young people. The theories and statistical models of economics—the most math-based social science—were proven drastically wrong (during the crash, some indicators were falling outside predictions by as much as 25 *SD* units per day). The lesson was that economic systems are much less predictable than thought. As John Maynard Keynes had argued, heterogeneous processes are at work; different situations bring forth different dynamics (Skidelsky, 2009).

Other human ecological systems (à la Bronfenbrenner, 1979, or Lerner, 2002) present adolescents with similar unruliness. Political systems, community institutions, families—all exhibit dynamics that

can sometimes be just plain bizarre. We have "Banks too big to fail"; abundant examples of dysfunction across multiple levels of government; structural racism in societies founded on principles of equality; and cultural wars among people from the same culture. Adolescents must be prepared to deal with macro- to microsystems containing contradictions, catch-22s, bureaucracy, and b.s.

Globalization and modernization have not created a more orderly world for youth. Since the European Renaissance, many people have believed the world was evolving toward becoming a rational, just, and well-functioning machine. Yet, in the words of sociologist Anthony Giddens (1990), "living in the modern world is more like being aboard a careening juggernaut than being in a carefully controlled and well-driven motor car" (p. 53).

In this paper, I explore what this disorder means for adolescents' conscious process of development—or positive development. What are the competencies they need to develop for navigating adulthood in a disorderly world? And how do they develop these—what are the processes? To think about these questions, I am going to focus on acquisition of competencies for agency—for working toward goals in real-world contexts. In the heart of the paper, I discuss adolescents' development of competencies in three domains (emotional, motivational, and cognitive ecological) that are important to achieving goals in an unruly world. To examine development within each domain I draw on research on middle adolescents' experiences working on arts and community projects in organized youth programs. At

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the end, I conclude with general points for future theory and research on adolescent positive development. An overarching theme is that our field needs to better understand the challenges that young people face in learning to navigate complexity and disorder.

DEVELOPMENT IN A COMPLEX WORLD

The world is not entirely unpredictable. There is order. But the neat and tidy diagrams we use to depict the human ecology can lull us into thinking there is more order than actually exists. If the analogy is to biological ecosystems, they contain tremendous disarray. In nature, innumerable microbial to macrobiological systems interact in intertwined—but also competitive and chaotic—ways. Similarly, when we are talking about the human ecology—the “real world” that adolescents must learn to deal with—a crucial point is that all of Bronfenbrenner’s different systems are composed of human minds, each with idiosyncratic ways of thinking and acting. No wonder things get bizarre.

The human world that adolescents must learn to navigate is less like the logically ordered world of physics that Leibnitz, Descartes, and other founders of modern science imagined and more like a blooming, buzzing Darwinian jungle. Human systems are “messy systems” (Moss, 2001). The numerous micro- to macrosystems in the human world each partly functions according to its own distinct rules, culture, and history. I am going to use “heterogeneous” regularly to remind us of these multiple dynamics at play within and between systems. What is critical is that these systems are not passive. They are active, sometimes passionately reactive.

So there is order, but it is not tidy, static, and logical. It is pluralistic, dynamic, and “eco-logical.” This complexity shapes the developmental challenges faced by adolescents. I will illustrate this later with the example of a group of youth who were trying to get principals to adhere to a school district’s disciplinary code. To run a successful campaign to achieve this formidable goal, they had to understand the different ways that school board members, principals, teachers, and students think and adapt their actions accordingly. They had to use *ecological reasoning* adapted to the functioning of these different systems.

Adolescents must learn to navigate this complexity. William James suggested that: “We carve out order by leaving the disorderly part out.” This is on the front page of a book *How Doctor’s Think* (Groopman, 2007), and maybe doctors can get away with it. But adolescents cannot. This is especially true

if you are poor or a youth of color. When Frank Furstenberg (2006) spoke at the SRA meeting in San Francisco, he described how being poor is like a game where the dice are loaded against you—each roll adding to the cumulative odds of disadvantage. Margaret Spencer (2006) described how African American male youth are subject to catch-22s across micro- to macroecological systems. But *regardless of class or race*, a young person trying to get a toehold in the adult world needs to develop competencies to navigate disorder and complexity—as best they can. They need to develop competencies for agency in real-world settings.

The Problem of Human Agency in a Disorderly World

Agency is the ability to set goals and organize one’s actions to reach them (Bandura, 2006): to get from Point A to a chosen Point B. This ability is crucial to adulthood in modern societies. The promise since the Enlightenment has been a world in which—as visualized by the Nobel economist, Amartya Sen (1999)—all people are free to realize their capabilities.

But to achieve this, young people need to develop competencies to work toward goals. Adolescents and emerging adults need these competencies to reach the goal of meaningful adult employment. They need skills to navigate a labyrinth to adult work that is increasingly destandardized, complex, and disorderly (du Bois-Reymond & Chisholm, 2006; Meijers, 1998). Then, if you get employment, more and more jobs require skills for dealing with unstructured problems and trying to achieve difficult real-world goals (i.e., creating, developing, implementing). Jobs requiring rote labor are paying less and disappearing (Levy & Murnane, 2004). Young people need these competencies in other domains as well. Abilities to work toward goals (e.g., to change your life circumstances) are also important to adults’ well-being (Cantor, 1990; Little, Snyder, & Wehmeyer, 2006). Furthermore, we especially need a new generation of young people who can use these competencies to address pressing economic, social justice, and ecological problems (Bandura, 2006; Ginwright, 2010). Abilities to exercise agency are important not only to individuals, but to our collective well-being.

To help us think about what is entailed in these competencies for agency, let me provide a definition: *Abilities to organize and regulate actions over time to work toward a long-term goal, as an individual or with others, in complex real-world contexts.* Notice that I am talking about “work.” Notice also that I see agency

as not just individual; it can be collaborative. But part of the “problem of agency” is that reaching goals in real-world contexts is not easy.

To get from A to B in the real world, young people first need *cognitive skills* to navigate ecological complexity. In real-life situations the pathway to a goal is not always clear; you may have to find or create it. You need to figure out and deal with the challenges and obstacles in the way. You need to navigate disorderly ecological systems—and the people who compose them. In sum, part of the problem of agency for adolescents is development of cognitive-ecological skills—ecological reasoning—to navigate the heterogeneity and complexity of the real world.

A Limited and Wayward Organ

But that is only part of the problem of agency. Reaching goals in a disorderly world also depends on a person’s limited human mind—which philosophers for millennia have recognized to be “a flimsy and wayward organ” (Shorto, 2008, p. 20). It contributes its own forms of disorder, its own distinct challenges. To achieve goals in the real world, adolescents need to develop competencies to navigate these.

I am going to discuss two major limits or challenges of the human mind that are central to youth’s development of agency. First, a person’s ability to get to Point B is *subject to human emotions*. The anger, anxiety, and even joy that can arise in trying to reach a real-world goal *can disrupt work, derail effort, and distort thinking*. For adolescents, puberty increases this emotional reactivity (Steinberg, 2007). In three studies, including one in India, we found that adolescents (signaled at random times over a week) reported experiencing wider extremes of emotions than adults providing similar reports. These included both more extreme negative and positive emotions (Larson & Sheeber, 2008). Dahl (2004) suggests the adolescent brain is like a “natural tinderbox” in which strong emotions and drives can “hijack” attention. To develop agency, adolescents need to gain competencies to navigate or manage these emotions.

The other developmental challenge I will discuss is *motivational*. To reach a difficult goal, you must devote sustained effort to it. Plenty of adults have difficulties with motivation and do not complete goals they set for themselves (Gollwitzer, 1999; Steel, 2007). Motivation easily stalls: “I’d better check email before I work on my thesis.” As I will discuss, these motivational issues can be a larger barrier for adolescents. Many teens’ have a limited time perspective

(Nurmi, 2004). So development of competencies to sustain motivation is important to agency.¹

Now it is tempting to see these challenges of the human mind as internal and separate from the disorder of the real world—as issues concerning teens’ development of “self-regulation.” But many emotional and motivational challenges that obstruct agency occur *in response to* interactions with the external world. They arise as part of the process of working toward a goal: frustration with lack of progress, anger at people who are uncooperative, or lapses in motivation due to tasks becoming repetitive and tedious. So even though I will deal with them as distinct competencies, they are interrelated with the complexity of interactions with the world.

In this paper I discuss these three subproblems—or challenges—for adolescents’ development of agency. I will cover the two “human mind” challenges first, because they are more familiar. I start with the emotional challenges to agency and youth’s acquisition of emotional competencies to address them, then the same for motivational development. Third, I discuss the challenges of navigating a disorderly world and acquisition of cognitive-ecological skills for navigating it. For each, I explore the two questions of what develops and how it develops.

POSITIVE DEVELOPMENT

Before doing this, however, I want to briefly review two other topics that have been building blocks of positive development thinking and research.

Adolescents’ Cognitive Potentials

To this point, it may seem like I have a pessimistic view of the human condition—all this talk of disorder and disruptive emotions. But like many positive developmentalists I believe that, despite these obstacles, adolescents have powerful, often unrealized strengths and potentials (Lerner, Phelps, Forman, & Bowers, 2009). This includes the capacity to be conscious, deliberate *producers of their own development* (Lerner, 2002). This optimism comes partly from research suggesting that adolescence is a period for acquisition of higher-order executive functions, including those pertinent to emotional, motivational, and cognitive-ecological competencies.

¹A third important limit or challenge of the human mind—which I will only touch on in passing—is the many cognitive flaws, fallacies, and biases that psychologists are always uncovering. A fuller treatment would consider how youth develop competencies to navigate these.

Brain development. Although we know little about the adolescent brain, evidence suggests that the teenage years are a time when there is considerable development of command and control centers in the prefrontal cortex as well as formation of more neural connections across regions of the brain that potentially provide greater integration including between emotional, volitional, and other functions (Paus, 2009). Now one view of existing evidence is that adolescents' acquisition of executive functions is primarily *driven by* brain maturation and that this maturation must precede acquisition of these functions.² A contrasting view is that adolescents' experiences *drive* the development of these functions (and the corresponding changes in the brain). At the moment, causal evidence is limited (Paus, 2009). But there is substantial evidence from other species and other periods of the human life span indicating that experience can, at least partly, influence neural development (Fox, Levitt, & Nelson, 2010; Paus, 2008).

Steinberg et al. (2006) suggest that we think of adolescence as a *critical period* for brain development related to executive functions. Bunge and Zelazo (2006) suggest there may be a sequence of critical periods. A critical period is a developmental window when specific functions in the brain are open to being shaped by experience. Again, evidence is limited, and caution is needed. The idea that adolescents might be conscious producers of their own brain development remains an enormous leap (and inevitably a gross oversimplification). Yet it is plausible to think of the adolescent brain as progressively ready for experiences that contribute to acquisition of higher levels of executive functions.

Cognitive development. Let me discuss what these higher-order functions are. We have learned from cognitive research that the new reasoning potentials of adolescence are much more varied and diverse than Piaget ever imagined (Kuhn, 2009). Daniel Keating (2004) described the development of an *executive suite* of new capabilities. These include planning, self-governance, goal-directed behavior, values, and principles (Steinberg et al., 2006). They also include capabilities for selective inhibition, inductive reasoning from evidence, and epistemic understanding (Kuhn, 2009; Moshman, 2005). In

sum, this suite includes an eclectic mix of different advanced and "meta" capabilities, which—at least potentially—develop and become integrated with each other over adolescence and beyond.

A characteristic of many of these functions is increased ability to think about *dynamic processes in systems*. This includes thinking about dynamics within and between complex systems (Fischer & Bidell, 2006). For example, adolescents gain capacities for navigating situations in which they need to reconcile competing demands and goals (Kuhn, 2009). This also includes abilities to think about the dynamics of messy human systems (e.g., emotional, motivational, ecological processes). An important line of research shows that adolescents' develop new abilities to think about the dynamic causal processes underlying the ordering of events in a person's life (Chandler, Lalonde, Sokol, & Hallett, 2003; Habermas & Bluck, 2000).

This executive suite and these potentials for dynamic systems thinking are relevant not only to *what* adolescents learn. They are also relevant to *how* they learn it. Kuhn (2009) suggests that adolescents' new potentials provide them analytic tools to be producers of their own development. They become able to consciously reflect on their experiences, draw conclusions, and create rules for navigating different types of situations.

There are significant limitations, however, to our knowledge about adolescents' acquisition of these higher-order functions. First, we do not know much about *what kinds of conscious executive skills, insights, or tools* youth actually develop, especially for navigating a disorderly world. Most of the findings on adolescents' cognitive development come from controlled laboratory studies and research on prestructured problems. This is a plus in that these methods give us more confidence in the findings. But it also means we know little about adolescents' acquisition of executive skills for regulating goal-directed actions in real-world contexts—in which problems are unstructured and heterogeneous processes are at play (Rogoff, Baker-Sennett, & Matusov, 1994).

We know even less about *how* adolescents develop these higher-order functions. Authors writing about adolescents' executive skills stress that they are "potentials"—some youth may develop them but not others. The assumption is that their development depends on having the requisite experiences. But what are these experiences? If youth are producers of their development of executive functions, how does this occur? One of our early steps should surely be interviewing youth about

²In the presidential address, I displayed a public service advertisement with a picture of the "16-year-old brain" that showed a large hole in the prefrontal cortex and referred to it as a "missing part" of the teenage brain (*New York Times*, 2009).

their learning experiences and how they might “produce” these skills.

Youth Programs as Contexts for Developing These Potentials

Organized youth programs are a good place to do this. Positive developmentalists have had a special interest in studying programs (i.e., community-based programs and extracurricular activities) as a natural laboratory for observing development. High-quality programs provide conditions that research suggests facilitate positive socioemotional development—such as being youth centered and supervised by supportive adults (Eccles & Gootman, 2002). In a meta-analysis, Durlak, Weissberg, and Pachan (2010) found that high-quality programs had effect sizes averaging .31 for socioemotional skills. Evidence suggests strongest effects for low-income youth (Mahoney, Vandell, Simpkins, & Zarrett, 2009; McLoyd et al., 2009).

I have argued that organized programs are a particularly good setting for observing adolescents’ acquisition of executive skills, including those for agency (Larson, 2000). Many programs for high-school-aged youth engage them in projects—working toward difficult goals. In the research I will discuss, half the programs were arts or technology programs and youth worked on creating a mural, CD, musical production, or computer graphics. The other half were leadership or activism programs, and youth’s projects included creating a day camp for children, making a video about inequalities in city transit service, and lobbying officials (Wood, Larson, & Brown, 2009). What is important is that youth in high-quality programs typically have significant control over their projects, thus they have opportunities for exercise and, possibly, development of executive competencies. Further, these projects present youth with unstructured problems in complex human systems (Halpern, 2009; Mahoney et al., 2009), and they required that youth deal with the types of emotional and motivational challenges that inevitably arise in such work.

In order to observe these youth’s developmental experiences, we followed them over the natural course of their projects (2–9 months). The 11 programs in the study were mostly small local programs run by an agency. A few were in schools, and one in a church. Six were in working class or poor urban neighborhoods, the rest in rural areas or small cities. We selected 8–12 representative youth at each program (the sample included 36 White, 32 African American, and 32 Latino youth). Then we conducted

periodic interviews with them during their projects (712 total interviews). Our staff also interviewed program leaders and observed program activities across this period, but they are not a main focus here.

Our goal was developing grounded theory about these youth’s conscious developmental processes over time, as they worked on their projects, including processes related to acquiring emotional, motivation, and cognitive-ecological skills.

EMOTIONAL DEVELOPMENT

Emotions present challenging puzzles to adolescents, and solving these puzzles is crucial to their development of agency. The emotions that arise in working toward goals in real-world settings can derail attention and disrupt the work. Immanuel Kant described emotions as “diseases of the mind.”

Yet Darwin and current emotion psychologists view emotions as innate systems that serve important functions in regulating interactions with a disorderly world. First, emotions arouse and direct energy and attention in important ways. Cannon (1932) stressed their role in redirecting attention to basic survival needs (e.g., fight, flight); more recent theorists recognize that emotions can also direct attention to higher-order goals (Gross & Thompson, 2007). Second, emotions can promote and regulate social interactions (Lewis & Haviland-Jones, 2000). Third, the experience of emotions can provide a person with useful information and assist with healthy decision making, although emotions can also mislead (Reyna & Farley, 2006; Schwarz & Clore, 1983).

So, emotions can be disease-like, direct attention away from goals, and be misleading. But they can also serve important functions in regulating interactions with the world, including directing attention toward higher-order goals. Such are the puzzles that adolescents face.³ Further, emotions are abstract; they can be private, repressed, or feigned. Strong emotions have peculiar disorderly dynamics: They can mess with your perception and reasoning.

Figuring out these peculiar dynamics is an important developmental task of adolescence—one I suggest is partly shaped by evolution. In contrast to species with fixed action patterns that dictate an organism’s response to given types of situations, emotions in humans are clearly designed to allow our big brains the opportunity for cognitive

³Emotions are also puzzling to researchers. Ochsner and Gross (2007) describe them as “a riddle wrapped in a mystery inside an enigma” (p. 87).

mediation—to think before we act. Humans have latitude to develop knowledge, skills, and cultural understandings that shape *when* we experience anger or joy. Humans also can potentially learn *how* to respond to complex situations in mature ways consistent with higher-order goals (Gross & Thompson, 2007), although most of us never fully get there. The developmental task is not just learning about emotions, but about *emotional episodes*: learning how different situations elicit emotions and how the subsequent emotional dynamics can then unfold.

Of course much emotional learning occurs in childhood (Saarni, Campos, Camras, & Witherington, 2006). But adolescence provides the opportunity for youth to apply their new executive suite to the complexity of emotions. They can develop advanced skills for mediating—or steering through—the dynamics of emotional episodes. Indeed, learning to manage one's emotions in relation to long-term goals is seen as a central feature of becoming mature (Steinberg et al., 2006).

Adolescent scholars, unfortunately, have not had much to contribute on how this occurs. The recent *Handbook of Emotional Regulation* (Gross, 2007) has five chapters on emotional development, but not one—nor a single citation in the index—on adolescence. Likewise our own *Handbook of Adolescence Psychology* does not have a chapter or citations to emotional development (Lerner & Steinberg, 2009), a reflection of the lack of research. When we discuss adolescents' emotions—and there is good work (e.g., Allen & Sheeber, 2009)—they are typically viewed in relation to mental health problems. But it is important for us to study positive adolescent emotional development. What can adolescents learn, and how do they learn it?

Youth Programs as a Laboratory for Learning About Emotional Episodes

Organized programs are a good context to study this development, because youth's projects elicit emotions and these can influence their work. Youth in our research reported experiencing frequent "hot" emotional episodes. These included episodes of negative emotions, such as⁴:

- anger at others, especially disorderly peers: "I was ready to snap, to flip at somebody";
- anxiety about outcomes: "My nerves got to me, dry mouth";

⁴The categories presented resulted from coding by Philip Hoffman of data from the 11 programs. Passages in italics are representative quotes from each category.

- unhappiness with outcomes: "We did really badly on a dance; we did horribly."

They also included positive emotions:

- Happiness from doing well "that was really exciting because we were going to be able to get it done."

In intensive analysis of a theater program in the research, we found that these repeated negative and positive emotional episodes appeared to provide youth with valuable information for their emotional learning (Larson & Brown, 2007). The program leaders had cultivated a culture in which emotions were accepted, discussed, and dealt with appropriately. As a result, differing emotional episodes tended to play out according to fairly predictable scenarios. Negative emotions—most often anger at peers—were met with support for dealing with them. Positive emotions, often exhilaration from doing well, were reinforced.

We borrowed the idea from attachment theory that these repeated emotional sequences within the program created a predictable "matrix" of emotional experiences, one that provided data for youth's emotional learning. Indeed, across all 11 programs, youth reported much learning about emotions and emotional episodes.

What Youth Learned

They reported emotional learning that fit into two categories: knowledge of emotional episodes and skills for managing these episodes. These two categories approximately match the latter two categories of Salovey and Mayer's (1990) four types of emotional intelligence.

The knowledge of emotional episodes that youth learned dealt with the dynamic sequence of these episodes. They reported learning about what caused or contributed to elicitation of emotions, for example, the role of different personalities, physical states like tiredness, and different types of situations. They also reported learning about how emotional episodes unfold, for example, how emotions can be contagious in a group (e.g., "When one person is angry, other people get angry") and how emotions influence thought and behavior (e.g., how strong positive emotion "wipes away fear and doubt"). This learning included knowledge about the dynamics of emotional episodes in oneself, in other people, and in groups.

The skills youth learned involved strategies for managing emotional episodes. The strategies they

reported gaining for negative emotions resembled familiar categories from coping research: limiting expression to others, perseverance, reframing, social support, and problem-focused coping. Learning to limit expression of and persevere through emotion-eliciting situations were most common. One young man, for example, had learned “how to cooperate and just listen; try to control my emotions without taking it out on others.” The underlying theme was that goals of the work generally took precedence over their feelings of stress, frustration, or anger at a disorderly or undesirable situation. The play must go on! They were learning to control their emotions in relation to long-term goals.

Research with adults shows that unmanaged negative emotions in working groups can create “chains” of emotional contagion that last for weeks and disrupt work (Liu & Perewé, 2005). A number of youth indicated that it was preventing this kind of emotional contagion that had motivated their learning to not express negative emotions.

These teens also reported learning management of positive emotions. This involved not just controlling these emotions, but *using* them. A youth in the theater program had learned that “triumph is a big source of motivation. I carry [it] over to the scenes I’m not quite so comfortable with.” Emotions are not just “diseases” to be quashed. A young woman serving as the stage manager in this program described learning to use the contagiousness of positive emotions to lift the morale and effort of the group.

Some youth’s learning suggested quite sophisticated understanding of emotional dynamics. Consuelo had frequent experiences of anger and frustration during her work on a mural at Art First. Asked what she had learned about negative emotions, she said:

You learn how to take them in and let them go in through one [end] and just out the other. . . . I guess, we just took them in and, like, understood them. They’re something you shouldn’t dwell on because they’re not going to last forever.

Research shows that people tend to think emotions are going to last longer than they actually do and also that dwelling on—or suppressing—negative emotions can prolong and intensify them (Loewenstein, 2007). Consuelo appeared to have learned a strategy for Zen acceptance of these human tendencies: Take it in; understand it; let it go.

In conclusion, youth were learning that emotional episodes involve predictable dynamic processes in the interactions between situations and the self. They

were also developing executive strategies for shaping these episodes in ways that served the goals of their project.

How Youth Learned

What was the developmental process through which this emotional learning occurred? A first finding of our analysis was that most youth described themselves as the agents of this process. Across the 11 programs, there were times when they reported emotional learning from the role modeling provided by adult leaders, for example, when a leader handled a difficult situation with grace and skill. Some reported learning through emotion coaching from a leader. The leaders also appeared to have important roles in youth’s learning that the youth did not mention, such as in cultivating the emotion-friendly culture in the theater program. But these young people most often attributed their learning to their own thought process, using words like, *I saw that . . . , I discovered that . . . , I’ve been working on that*. Sometimes they attributed their learning to the group’s collective thought process: *We realized that . . .*

The process they described was one of learning from *comparison and analysis*. Teens become capable of inductive and deductive reasoning (Kuhn, 2009). Youth reported learning by comparing emotions in one situation to another and between themselves and peers. So they indeed were drawing on their matrix of prior experiences. But unlike in attachment theory’s account of early emotion learning, this was conscious learning through deliberate analysis.

Youth also described learning from evaluating the demands of situations they were in. A young woman explained her process: “You just have to analyze why you’re frustrated and then go on and find a solution.” In addition they learned from *thought experiments* in which they thought through different courses of action, and how they would work. They reported learning, for example, because: “You realize, you do not have a choice” or “I do not want to bring the group down.” It appeared youth were using their new executive skills to analyze the temporal and causal ordering of “hot” emotional episodes.

A View of Adolescents and Emotions

In concluding this section, I want to suggest an alternative to the frequent image of adolescents as being emotionally out of control. These Anglo, Latino, and African American youth *were* experiencing strong emotions. But they were also engaged in learning to mediate these emotions in relationship

to complex real-world situations and project goals. They were solving puzzles and figuring out the peculiar dynamics of emotional episodes.

One youth said: "Once you analyze why you're mad or happy or frustrated and then you listen to yourself, it just seems so surreal. Like, 'Oh my god!' And it's good." Now, I do not want to disregard early childhood and the many diverse factors that shape affective experience: Emotions have deep roots. But adolescence provides an important developmental opportunity for teens to program their "big brains" to mediate the abstract and sometimes surreal person–environment dynamics of emotional episodes. These exploratory findings, of course, need replication and further study.

MOTIVATIONAL DEVELOPMENT

To discuss the motivational component of the problem of human agency, a good place to start is the problem of adolescent boredom. Midadolescence is a peak developmental period for boredom (Larson & Richards, 1991; Schulenberg & Maslowsky, 2010). Research also shows that children's school motivation declines as they move into middle and high school (Eccles & Roeser, 2009; Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006), accompanied by decreased willingness to take on challenging tasks (Eccles & Roeser, 2009).

As far as I know, there is no evolutionary evidence that a "boredom gene" kicks in at this age period. To the contrary, much research and theory suggests that humans of all ages have a built in system of intrinsic motivation that can make learning engaging (Izard & Ackerman, 2000; Ryan & Deci, 2000). My mentor, Mihaly Csikszentmihalyi (1990), found that engage-

ment with challenging activities leads to the state of "flow," which is intrinsically rewarding.

This intrinsic motivation can be powerful, but it also can be fragile. Csikszentmihalyi and others found that this motivation depends on the level of the challenges in an activity being matched to a person's skill level: If the challenges are too high people get overwhelmed and anxious; if too low, bored. You need to be in a "channel" in which challenges and skills are matched. This requirement could make it hard to sustain "flow" trying to achieve goals in disorderly real-world contexts, because the challenges are likely to be diverse and uneven.

A huge developmental question (one that goes back to Plato) is how to get this system of intrinsic motivation turned on and sustained for adolescents—particularly in activities with the kind of challenges they will face navigating real-world tasks as adults. We know a lot about adolescents' motivation, especially in school, but little about the processes of motivational change and development (Wigfield et al., 2006).

Youth programs are a good place to study this change process. Experience sampling studies show this is the only context in teens' lives where they consistently experience high motivation in challenging activities (Larson, 2000; Vandell et al., 2006). By contrast, in school they are challenged but not motivated; with friends, motivated but not challenged (Figure 1). Now research indicates that not all teens join programs with high initial motivation (Perkins et al., 2007). My former student Nickki Pearce Dawes (2008) had the idea of studying youth in our research who experienced upward motivational changes. She identified 39 youth who reported a notable increase, then analyzed their accounts of

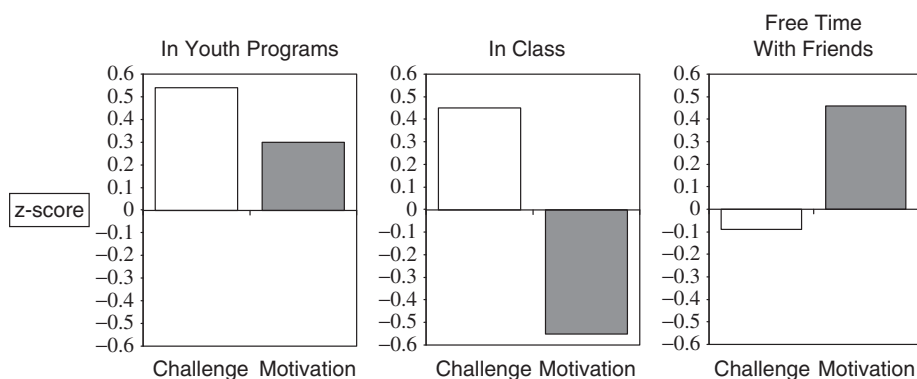


FIGURE 1 Average challenges and motivation reported in three daily contexts. High-school-aged adolescents' provided ratings of their current experience when signaled at random times across the waking hours of the day, using the Experience Sampling Method. Data came from Time 2 of a longitudinal study of 220 youth (Larson, Moneta, Richards, & Wilson, 2002).

what happened. This is an analytic technique of examining “turning points” in experiences (Lofland, Snow, Anderson, & Lofland, 2006). I will provide a very condensed version of the findings (Dawes, 2008; Dawes & Larson, in press).

Many western theories of motivation are based on the assumption that all motivation is rooted in basic individual psychological drives or needs—we tend to believe in the “selfish gene.” Dawes found that the 39 youth had three different explanations for their motivational change, but only one fit this assumption. First, a few attributed their change to experiences of competency, a core need in a number of motivational theories (e.g., Ryan & Deci, 2000). As one said: “I started doing it, I started doing it pretty well, so that got me more motivated.”

Many more youth attributed their motivational change to forming a connection between program activities and their future, often a future career (Dawes, 2008). Marina illustrates this. She had joined an FFA program because many members were male. But she explained:

It’s not just about the guys anymore. . . . I am going to be a teacher. . . . It will give me all the skills, hopefully that I need to be a good teacher; . . . it’s the things I get out of it now

Marina’s experiences in the program helped her both decide she wanted to be a teacher and recognize that the program was helping her develop the requisite knowledge and skills. Quite a number of youth in our research described using the programs to engage in proactive processes of “finding fit” between their evolving career plans and their emerging sense of self (Rickman, 2009). Dawes (2008) called this “forming a personal connection.”

Now, in some theories, motivation driven by future rewards is viewed as extrinsic. It is seen as “secondary motivation,” derived from basic drives and thus less potent. But for these youth, their new motivation was quite internal, authentic, and powerful. It was not easily reducible to individual needs or drives. Planning and preparing for the future is a task of adolescence in our culture. Forming a connection from the program to future goals really got their fires lit.

The idea that motivation depends only on basic individual drives was further challenged by the third explanation for motivational change, most frequent in three activism programs (but which occurred in others as well, including a faith-based program). All three activism programs were in a city in which 40 hours of service were required for high school

graduation, and many youth said they joined the program to get their hours. As a result, they were not very motivated initially. But let me describe what happened in one program (see also Pearce & Larson, 2007).

At Youth Action, a main focus of the work by the African American and Latino members was lobbying the school board to direct the city’s principals to follow the district’s Uniform Disciplinary Code. The principals sometimes suspended students for minor infractions—like being late for class or using a cell phone—that were not sanctioned by this code. The youth’s work at Youth Action included surveying students across the city, and they found that unsanctioned suspensions were frequent, especially in schools that were predominantly African American and Latino. Many Youth Action members had had a bad experience or two with the schools, but they had only seen it as a personal experience. As they heard students’ stories, however, they began to realize that worse things were happening to thousands of students.

This realization gave their work larger and more powerful meaning. They formed a personal connection between their personal experiences, those of other youth, and the goals of their work. This transformed their motivation. Danny from Youth Action recounted how at first: “I wasn’t super-interested . . . [but when] I found out a lot of stuff about the schools, what they were doing, I was like ‘Hey, that’s wrong!’ because that [had] happened to me.” He then described becoming “really into it, really psyched.” Similar transformative experiences were described at other programs (see also Ginwright, 2010). At El Concilio, youth planned activities aimed at keeping teens out of gangs. Jennifer said she joined only to get her service hours, but: “I realized that a lot of kids have been dying because of the gangs, and I want to stop that.”

This third explanation for motivational change fits William Damon’s (2008) concept of acquiring *purpose*. He defines purpose as: “a stable and generalized intention to accomplish something that is at once meaningful to the self and of consequence to the world beyond the self” (Damon, Menon, & Bronk, 2003, p. 121). Notice that this motivation involves the self, but it is not at the center. The connection is to a cause “beyond the self.” Damon rejects the idea that purpose can be reduced to core drives. Indeed, cultural psychologist Joan Miller (2003) describes how in many cultures much of people’s motivation entails subordination of the self to the group, a point also made by Graham and Taylor (2002).

In sum, for youth who gave explanations in the last two categories (for the future and purpose), their process of motivational change was not easily reducible to a core drive or need. I am not saying that basic needs had no role, but the bigger story is how motivation emerged from youth's proactive processes of discovery, finding fit, and meaning making.⁵ The change occurred through their conscious constructive process of forming a personal connection. This process is quite similar to Ryan and Deci's (2000) concept that motivation increases progressively as a person identifies with an activity and then integrates the activity into the self.

Most of these 39 youth also described coming to have flow-like experiences: their work had become "fun," "exciting," and "interesting." They reported that the challenges of the work had become self-rewarding. In other words, the change appeared to have activated the kind of powerful reward system described by theories of intrinsic motivation. The personal connection also appeared to give youth the staying power to persevere through boring activities, hard work, and real-world obstacles—times when challenges were too low or too high. They had developed sustained motivation to achieve the goals of their work.

So these youth seemed to progress from low motivation to personal connection to flow and sustained engagement. I hypothesized a next step in which they transfer skills for creating this kind of motivation from youth programs to other challenging activities (Larson, 2000), but the data on this were inconclusive. Given the possibility of "self-selection effects," we also need to be careful about assuming the change process found for this group can readily occur for all youth. On the other hand, it may be that this kind of motivation can occur for most teens, if only the right personal connection can be found.

An important implication of these results is that adolescents do not need to be motivated when they enter a setting or start a project. Motivation can emerge. And it can become quite powerful, sustaining engagement through the thick and thin of real-world projects. The qualification, however, is that adults cannot push a button to make youth motivated (unless they are indoctrinating them into an ideology or sect that provides meaning; see Patel, 2007). It depends on young people's constructive

process of finding and creating a personal connection. This means adults need to take seriously youth's conscious developing selves.

COGNITIVE-ECOLOGICAL DEVELOPMENT

We have discussed how youth learn to manage, or use, emotions that arise in pursuing difficult goals and how they develop motivation to persevere with these goals. But the world is disorderly. They also need cognitive competencies to navigate complex human ecological systems. How do you organize your work and deal with the challenges to reach your goal? If you are in Youth Action, what do you need to learn to be able to convince the school board to make principals follow the district's disciplinary code? What is the skill set?

This gets us back to our central problem of agency in a disorderly world. The challenge is that to reach goals in the real world there is often no roadmap; problems are unstructured; there are obstacles and hidden rules; heterogeneous systems are involved (e.g., different people and institutions). According to the "Law of Unintended Consequences," you may be trying to get to B, but end up at Z.

In school, young people are not usually taught skills for real-world, ecological reasoning. For example, students in most nations are taught how governments are supposed to work, not how they actually work or how to influence them (Hahn, 1998; Torney-Purta, Lehmann, Oswald, & Schultz, 2001). Following youth's experiences doing projects is a way to examine what adolescents are capable of learning and how they learn it.

What Youth Learned

We found that youth learned both basic and advanced lessons. Most youth across our 11 programs reported learning concrete rules for organizing their work: "start early," "do a little each day," "It depends on effort." These kinds of precepts and axioms may be learnable by younger children. Forty percent of the youth, however, reported learning that appeared to involve the use of higher-order reasoning to plan steps in their projects. This was more common in the leadership and activism programs (Larson & Angus, 2011, in press; Larson & Hansen, 2005).

We called this higher-order learning "strategic thinking." This concept builds on research by Shirley Heath (1998, 1999). Our systematic analysis of youth's reports suggested that the strategic skills they learned had three elements. The core, defining element was learning to *think about dynamic system*

⁵This article inevitably simplifies all the different elements that might potentially be involved in youth's conscious change processes, including getting feedback that changes their self-efficacy beliefs and numerous other thought processes or interactions that influence their expectations, perceptions, affect, and goals (Eccles & Roeser, 2009).

processes. This included dynamics between systems and part/whole dynamics within systems. In arts and technology programs this involved dynamics of unfolding plans for creating a painting, play, or other product. In leadership and activism programs it also involved the dynamics of people they were working with or trying to influence. For instance, Maria at El Concilio described learning to understand the behavior of different groups of adults (security guards, commissioners, homeless people). She reported learning “how [these] people act about being who they are.” Notice that she is not simply referring to their behavior, but their behavior as dictated by “who they are.”

The second element of strategic thinking involved using this dynamic systems thinking to actively *forecast or anticipate possible scenarios in their work*. They described learning to generate predictions (i.e., hypothetical reasoning) about how a plan might unfold. Youth in arts programs described learning to predict how a certain painting technique might work out. In a rural 4-H Leadership program in which youth planned activities for children, Becky described learning to think ahead and “visualize being a kid and what they would like.” Members of Youth Action learned that school board members were impressed by data—like the data they obtained from their survey of students in the city’s schools.

The third element of strategic thinking built on the others. Youth described learning to use this ability to forecast dynamic events to formulate *flexible strategies*. One young artist, Joaquin, described how before, “If I did something wrong, I erased everything and started all over again.” But as a result of experiences in Media Masters he learned to plan a course for his drawings that took into account possible contingencies, and then to monitor how his expectations were working out, adjusting accordingly. Members of Youth Action learned flexible strategies to get students to protest rallies and how to work with (and around) teachers and principals.

These flexible strategies included learning that things in the real world do not always go as planned. Youth reported learning to be prepared for Murphy’s Law (If anything can go wrong it will): *Allow extra time, plan for more, always have a backup plan, and just go overboard with it*. John Maynard Keynes stressed the importance of recognizing uncertainty and incorporating it into your planning. These teens were learning to not disregard disorder, but to plan for it. In sum, youth appeared to be learning to formulate strategies based on forecasting the dynamics and uncertainties in possible steps to reaching their goals.

They were developing executive skills for navigating complex and unruly human ecological systems.

Perhaps the most intriguing finding was that many youth reported transferring these strategic executive skills to other parts of their lives: to their schoolwork, jobs, and later, in follow-up interviews, to navigating the unfamiliar terrain of college and adult jobs. When Elena, from Youth Action, was in college, she said that their experiences lobbying the school board shaped the way she faces problems:

It definitely helped me be like, “Okay, what steps do I need to take to change that or address this issue that I have. . . . It helps you to be more critical and to really understand your situation and be like, ‘Well this can work; this might not.’”

How Youth Learned

What was the process for developing strategic thinking? As with learning about emotions, we could see that leaders had important roles in supporting youth’s learning (Larson & Angus, 2011, in press; Larson & Walker, 2010; see also Kirshner, 2008). But youth most often described themselves—individually or collectively—as the agents of strategic learning.

There were two major themes in youth’s accounts. One theme was that they learned from outcomes of their actions, from how a strategy turned out. Several said it was repeated experiences that helped them learn. One said: “It’s kind of a different experience every time, so I learn a little bit differently.” They were learning from trial and error.

The second theme was surprising. Youth attributed their learning to processes at the front end, before they had executed a strategy: from a process we called “cognitive engagement with tactical challenges.” First, let me explain “tactical challenges.” Here are two examples:

- *Trying to find activities we can do that will interest 3- and 4-year-olds.*
- *It is a self-portrait so you want to render yourself as you are, not so much like, “This is where my nose is,” but, like your character.*

Tactical challenges were problems in their work that they were trying to solve. In a quantitative analysis, we found that youth who learned strategic thinking described significantly more occasions of dealing with tactical challenges in their work (Larson & Angus, in press).

But what was the learning mechanism? Youth described tactical challenge as the impetus for

intensive *thought processes* that helped build their strategic skills. Maria from El Concilio explained how she learned: "Like, in everything that we have planned or every event you plan, you can have, like, an obstacle that you need to find a way around to finally make the event come true." Indeed, Maria had described to us many such obstacles, and part of the strategic learning she reported was to imagine and take into account all the different things that might create them. At Youth Action, Miguel explained his strategic learning by reporting: "With the board of education, when we went to the schools, we had to analyze what was going on." As with Maria, Miguel describes learning through an analytic thought process, in this case focused on how school board members think.

Across programs youth described developing strategic thinking through this process of vigorously thinking (and talking) through demands in situations they faced: (a) analyzing their situation and anticipating different obstacles, (b) thinking how the people in the situation thought and acted, (c) brainstorming different possible courses of actions, (d) generating and evaluating scenarios, and (e) insights about possible dynamics ("I figured out that . . ." "I realized that . . ."). This process of "cognitive engagement with challenges" was distinct from the high motivational engagement described in the prior section, but the two went together. Blumenfeld, Kempler, and Krajcik (2006) speculate that a high level of motivated engagement may be a precondition for "meta-volitional" learning, for example, for learning strategic executive skills.

Let me illustrate this learning process for members of Youth Action. Over the course of their campaign, the youth spent many sessions brainstorming, analyzing, and evaluating different possible steps to influence the school board—drawing on their emerging knowledge. They followed a two-track strategy for influencing the school board that combined private respectful communication with board members (including presenting data from their survey and other sources) with public pressure through rallies and press releases. This strategy was ultimately successful in getting the board to act—and these strategy sessions were a key (Larson & Hansen, 2005). At the same time, these sessions—this cognitive engagement with challenges—also appeared to be critical to youth's learning process. They learned by *thinking through* different scenarios and developing theory about potential dynamics of their evolving situation and how to navigate it—theory that was then confirmed or disconfirmed by outcomes of each step.

You may notice there is circularity in this explanation for youth's learning. Across programs they

appeared to learn strategic thinking by doing it. But the critical point is the role of imagination in building on prior knowledge. Harris (2000) has argued that *reasoned imagination* plays a vital role in cognitive development (cf. Byrne, 2007). At each repetition, youth were using imagination as a tool to hypothesize, guesstimate, and think through the multisided challenges of complex situations, then to generate plausible plans for navigating them to reach their goal. This "front end" thinking was then confirmed or modified by the results.

So the learning process was not random trial and error. It was a process of *reasoned experimentation* with provisional theories about the dynamics of real-world ecological contexts.

Critique

From a scientific viewpoint this is a terrible form of learning. The youth had one or few repetitions, no controls, and the causal variables could easily be confounded or obscured. Real-world experiences are "rife with ambiguity"; interpretation of evidence is readily distorted by recency, saliency, and other biases and fallacies; and people do not seek disconfirmation (Byrnes, 2005). HLM this is not.

But, on the other hand, research shows that learning is most likely to stick and be used later when it involves personal experiences (Bjorklund, 2007). Perhaps this is because what is learned has more meaning; it is related to goals involving Dawes' personal connections. Even experts in applied professions—engineers, military commanders, teachers—often draw on specific episodic memories like this to make decisions (Ross, Shafer, & Klein, 2006).

We also need to consider the skill set: strategic thinking—action-oriented abilities to plan ahead and take into account the real-world dynamics of messy systems. What is learned is not formal principles; it is contextual reasoning, including learning to expect the unexpected. Learning to navigate the real world may require some amount of direct experiential learning (cf. Dewey, 1916). Although flawed, it may be the only way to gain certain core knowledge and skills for agency. More research is needed.

CONCLUSIONS

My objective in this paper has been to suggest hypotheses about the skills youth learn for navigating a disorderly world, skills that are increasingly impor-

tant in the fluid 21st century. I want to conclude by drawing a set of implications for the larger topic of positive adolescent development.

But let me first emphasize limits and qualifications to what I have discussed. To begin with, this is a theory building paper. The findings I presented are subject to the limitations of our methods and sampling (including possible self-selection effects).

I also want to emphasize that competencies for agency—for pursuing goals—are not the whole ball game. This can be explained with one word: Machiavelli. Bandura (2006) wrote that, “Human agency does not come with a built in value system” (p. 177). One can develop emotional management skills, motivation, and strategic thinking, but direct them toward malevolent ends. In addition, let me add a cultural qualification from a Hindu sage: “Beware the black snake of doing” (source unknown). My paper has been about “doing”—about getting from Point A to B. But some cultures recognize that doing can be a trap or illusion. Being is also important.

The point is that positive development has many dimensions: ethical, interpersonal, civic, spiritual, etc. (Eccles & Gootman, 2002; Lerner et al., 2009). We do not want teens to develop one and neglect others. We do not want agency skills without ethics; nor are ethics much good without agency. Indeed, achieving the different dimensions of positive development requires navigating tensions that can arise between them. This heterogeneity of dimensions is yet another form of complexity that youth need to navigate.

I am going to close with six larger points that bridge across different domains of positive development. Some speak to issues with a long history.

Point 1: Even as we learn more about the biological hardware of development, it is essential that we study the conscious “software” that youth develop.

Descartes’ dualism is dead. After 500 years of the mind–body debate, we understand that brain and mind go hand-in-hand. But increased knowledge of brain hardware does not eliminate the importance of the software. As limited and imperfect as it is, the conscious mind is at the center of human knowledge and action (Nagel, 1986).

Adolescence is a period when the potential exists for acquisition of greatly expanded competencies for knowledge and action. The youth in our research (and in research on other forms of positive development) describe new insights, ways of thinking, and motives that they did not previously know were even possible. Many of these involved development of adolescents’ new executive suite. An exciting

horizon for research is how adolescents’ acquisition of advanced cognitive skills is interrelated with brain integration occurring across this age period.

Point 2: We cannot understand adolescents’ development without recognizing disorder any more than you can have physics without recognizing friction and entropy or biology without recognizing diversity and competition.

I am not sure these analogies quite capture it, but hopefully you know what I mean by now. The human world is disorderly and with globalization may be getting more disorderly—certainly more complex (Larson, Wilson, & Rickman, 2009). As adolescents come of age they encounter contradictions at every turn. There is order, but it entails *deep complexity*: nested macro- to micro ecosystems, animated by a multitude of minds, including one’s own. Disorder and deep complexity are intrinsic to the human condition. The “devil in the details” cannot be glossed over; it is part of the human ecology to which youth need to adapt. If as a field we disregard this disorder, we create serious blind spots.

Instead, leading scientists, from Charles Darwin to Herbert Simon, have argued the importance of studying the *problems organisms face in interactions with the environment* as a crucial step to understanding the mind (Todd & Gigerenzer, 2007). To understand development, we need more naturalistic research and interpretive analysis of the variety and structure of challenging situations that youth encounter. We need to study the real-world puzzles, paradoxes, and obstacles in different contexts of their lives—during adolescence and as they attempt to move into adulthood.

Point 3: Positive adolescent development requires knowledge and skills for navigating/dealing with/integrating/balancing heterogeneity and disorder.

Many dimension of positive development—such as maturity, resilience, leadership, and strategic thinking—involve understanding and dealing with complex situations. Maturity involves abilities to weigh short- and long-term costs and benefits (Steinberg et al., 2006). Resiliency entails abilities to adapt to adversity, loss, or conflict. I have described above use of strategic skills that involve balancing. The common thread is abilities to take into account or integrate diverse—sometimes conflicting—pragmatic, ethical, emotional, cultural, and other situational considerations. Practical intelligence entails knowledge and skills to balance (Sternberg, 1998). These different competencies involve capacities to negotiate eclectic considerations, multiple goals, different points of views, and objective–subjective perspectives. In short, they entail navigating heterogeneity and disorder. In sum, the answer to the

challenges posed by a complex world is a complex mind—flexible, differentiated, eclectic, and ecological—and with as much higher-order integration as can be achieved.

Point 4: Adolescents are active “producers of their development.”

This phrase is at risk of becoming an empty slogan unless we devote research to it. I have provided glimpses of adolescents’ proactive processes, which possibly apply to other development domains. These processes include youth using their new executive skills to analyze sequential patterns in “hot” emotional episodes, constructing personal connections that create meaning and motivate their engagement, and learning not just from random trial and error but from deliberate experimentation based on reasoned forecasting of possible scenarios. Collaterally with research on processes of brain development, we should study youth’s active, conscious processes of creating order in a disorderly world with a limited mind.

Point 5: An individual’s positive development is supported by processes across multiple bioecological systems.

I have zeroed in on adolescents’ conscious developmental experiences, but we need to recognize all the proximal and distal bioecological systems that support or influence these experiences. These different systems *are not just obstacles*, as I may have suggested. Richard Lerner (2002) and others describe how many different “living systems” (e.g., families, friendships, and other institutions) potentially contribute to youth’s developmental processes. Other research on positive development focuses on how other people and the community provide supportive conditions (Benson, Mannes, Pittman, & Feber, 2004; Lerner et al., 2009).

To make this clear, let me describe a few of these supportive systems most pertinent to development in youth programs. I have already referred to how youth’s learning often occurs with peers—it can be an intersubjective process. Program leaders are also extremely important. Our research shows that skilled leaders play delicate “balancing acts” whereby they support youth’s experience of ownership and agency while providing *just enough* structure and guidance to keep youth (a) from being blind-sided by the worst hits from the real world, (b) engaged with challenges that are *not too far* from their skills, and (c) on track with their work so they have outcomes to learn from (Larson & Angus, 2011, in press; Larson & Walker, 2006, 2010). Smith, Pearson, Peck, Denault, and Sugar (2009) describe how *the supervisors* of these front line program staff also can play vital roles that help staff sustain conditions for youth’s positive development.

For a more complete view, we need to also understand the relation of adolescents’ experiences in programs to their families, peers, the community, wider society, and the brain.

Point 6: Research on development requires diverse methods to understand all the different parts of the elephant and how they are interrelated.

Since I joined the field of adolescence, quantitative research, especially longitudinal studies, have been a tremendous boon to our knowledge. They are absolutely critical. I cannot say that enough. At the same time, there is much about adolescents’ interactions with a complex world that we do not know how to measure as linear variables—and may never be able to measure. *However, the fact that something cannot be measured as a variable is a poor (even irresponsible) reason to exclude it from study.* Many key elements of adolescents’ development are human constructions—relationships, culture, meaning, ecological systems—and thus are *inevitably polyglots*. Measures of these constructs may provide helpful tools, but for some phenomena they capture just one limited part of a much more complex elephant.

Likewise, statistical analysis and modeling are critical to our field, and one could form an endless list of all that they have helped us to learn, *which could not have been learned without them*. Iatrogenic effects leap to mind as a dramatic example (Dodge, Lansford, & Dishion, 2006). At the same time, competencies or processes that involve balancing, integrating, or reconciling complexity do not lend themselves to being easily modeled with equations—that is, unless you have really good measures of underlying constructs—like economists do, but that is where I started. The point is, we need diverse research tools, including rigorous quantitative, qualitative, experimental, ethnographic, interpretive, and mixed methods research to seek a more complete picture of the different systems and how they interrelate.

To conclude, I have tried to make two central points. First, the developmental challenges of adolescence—of coming of age in a disorderly world—are enormous. These challenges need more recognition and research. Second, despite the numerous limitations of the human mind, adolescents have large potentials. We have an important role in better understanding these potentials and how they develop as well as how to better support their development.

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