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Recall that individuals, including teenagers, live with meanings that they did not construct—and that once those meanings are [in] place, they cannot easily change them on their own.

Sunstein, 2008, p. 152

Stanley Hall’s (1904) description of adolescence as a time “suggestive of some ancient period of storm and stress when old moorings were broken and a higher level attained” (p. xi) is arguably one of developmental psychology’s most vivid and powerful metaphors. Its relatively insignificant contribution to Hall’s treatise (Arnett, 2006), the early demise of its recapitulation theory underpinnings, and the later opposition of many researchers notwithstanding, it survives a century of academic challenge to remain, in Robert Epstein’s (2010) words, “a life-size, three-dimensional, rock-solid image of Teen in Turmoil” (p. 120). Since the late 1990s this storying of hormonal upheaval has been enthusiastically supplemented by neuroimaging studies indicating maturation of the prefrontal cortex (PFC)—responsible for the so-called “executive functions” of planning, judgment, and impulse control—is

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not normally completed until at least the mid-20s (see, for example, Giedd, 2008; Yurgelun-Todd, 2007). These findings are increasingly cited in support of raised age restrictions with regard to, for example, purchasing alcohol, obtaining a driving license, entry into certain occupations, and even the right to vote. In this journal Mike Males (2009) critiqued this position as “biodeterminist” and generally “antiadolescent”—an argument eliciting the vigorous riposte that this research promotes increased understanding of *both* “the vulnerabilities and tremendous potential of the adolescent brain” (Johnson, Sudhinaraset, & Blum, 2010, p. 5).

In this essay, I consider the concurrent emergence of a new generic metaphor for the adolescent condition and suggest that, given the familiar notions of a poorly controlled (or even totally out-of-control) state of being it invokes, its endorsement by “teen brain” supporters seriously compromises assertions of even-handed promotion of adolescents’ strengths and weaknesses. Of course the riposte to this might be that metaphors matter much less than “hard facts,” and such imagery should be seen merely as helpful (even mildly humorous) conceptual shorthand for complex science. Do a few “mere words,” therefore, truly warrant special attention? Believing they *do*, and that this metaphor constitutes a significantly undesirable contribution to the way Western adults are being persuaded to think and talk about young people, I first offer an eclectic sampling of its use and then consider its potential influence with reference to the general role of metaphor in constructing developmental understandings.

“All Gas and No Brakes!”

Apparent Academic Beginnings

Even the more straightforward language of teen brain neuroscience can seem impenetrable to the uninitiated, and it is unsurprising efforts are made to translate it for professionals, policy makers, and the general public into something more accessible. One particular effort—apparently attractive to neuroscientists and psychologists for use among themselves as well—likens adolescents, or sometimes more specifically their brains, metaphorically to features of motor vehicles and/or the way they are driven. In his keynote address to a major symposium in 2003, Ronald Dahl (2004) acknowledged the Pittsburgh ADAPT Research Network had used the metaphor a great deal, and he and colleague Laurence Steinberg appear (correctly or not) to serve as its most regularly cited sources. Steinberg’s own academic writing typically acknowledges the speculative status of both science and metaphor, as in the following:

To the extent that the changes in arousal and motivation precede the development of regulatory competence—a reasonable speculation, but one that has yet to be confirmed—the developments of early adolescence may well create a situation in which one is starting an engine without yet having a skilled driver behind the wheel. (Steinberg, 2005, p. 70)

The language of interviews and secondary citations, nevertheless, often delivers something less explicitly hypothetical; for example, the previous year a *Time* magazine article stated:

“The parts of the brain responsible for things like sensation seeking are getting turned on in big ways around the time of puberty,” says Temple University psychologist Laurence Steinberg. “But the parts for exercising judgment are still maturing throughout the course of adolescence. So you’ve got this time gap between when things impel kids toward taking risks early in adolescence, and when things that allow people to think before they act come online. It’s like turning on the engine of a car without a skilled driver at the wheel.” (Wallis & Park, 2004, para. 17)

Brakes (underused/faulty/lacking) also feature frequently, as in neuroscientist Charles Nelson’s explanation for *ABC News* linking new brain data with existing notions of hormonal change:

Adolescents are capable of very strong emotions and very strong passions, but their prefrontal cortex hasn’t caught up with them yet. It’s as though they don’t have the brakes that allow them to slow those emotions down. . . . If I walk into a class of kids who are 14 or 15, those kids have a level of brain maturity that just does not map onto the kinds of emotional decision-making that a lot of those kids are being asked to make by teachers and parents. The more teachers and the more parents that understand that there is a biological limitation to the child’s ability to control and regulate emotion, [the more] they might be able to back off a little and be a bit more understanding. (McKenzie, 2003, paras. 13, 16-17)

For those concerned still—declining puberty onset is widening further the gap between timelines for physical/sexual and cognitive/emotional maturity, the metaphor seems to hold particular utility: If hormones are understood as having always provided the gas, “developmental mismatch” now turbocharges the engine. Dahl explained the mental health risks of this growing problem thus:

So we return to the metaphor of turbo-charging the engines of a fully mature “car” belonging to an unskilled driver, whose navigational skills are not yet fully in place. . . . This “disconnect” predicts risk for a broad set of behavioural and emotional problems, and not just through recklessness, risk taking, and sensation seeking, but also in just navigating complex social situations and attempting to master strong emotions. The affective disorders of adolescence are as informed by this model as are more impulsive and externalizing disorders. (Dahl, 2004, p. 18)

Dissemination and Embellishment

The following extracts, collected via an online search using words and phrases associated with this essay’s title, provide an indication of the metaphor’s subsequent penetration of discursive understandings of young people in a variety of genres and contexts. All sources cited were accessible at time of writing (late 2010). In some cases authors continue to refer to specific researchers, as in this U.S. news item making links between poor impulse control and criminal offending:

The teen brain, Laurence Steinberg says, is like a car with a good accelerator but a weak brake. With powerful impulses under poor control, the likely result is a crash. And perhaps a crime. By around 15 or 16, the parts of the brain that arouse a teen emotionally and make him pay attention to peer pressure and the rewards of action—the gas pedal—are probably all set. But the parts relating to controlling impulses, long-term thinking, resistance to peer pressure and planning—the brake, mostly in the frontal lobes—are still developing. “Its not like we go from becoming all accelerator to all brake,” Steinberg said, “It’s that we go from being heavy-foot-on-the-accelerator to being better able to manage the whole car.” (“Expert: Teen Brain,” 2007, paras. 1, 20-21)

Even when not supplying listed references this practice does at least give the critical reader key names to follow up; however, it is equally if not more common to find the metaphor authoritatively employed with reference neither to identifiable sources nor its hypothetical status, suggesting to readers its established validity as a conceptual tool. For example, physician David Walsh, author of a bestselling parenting text, simply explains in an *ABC News* article: “If we were to compare the teenage brain to an automobile, it’s as if the gas pedal is to the floor, and there are no brakes” (Murphy & Allen, 2006, para. 11), and recent guidelines for mentors working with Adventist youth advise:

If teens were cars, they would have excellent acceleration and lousy brakes. They may think of an idea and dive in before thinking of the consequences. If they do consider the consequences before it is too late, they may still have difficulty putting on the brakes. If they know that a well-loved adult leader (hopefully this is you) will be disappointed in their actions, that is sometimes enough to kick in the brakes. (*Adventist Youth Honors Answer Book*, 2009, para. 15)

Such imagery contributes in similar fashion to psychologist Michael Carr-Gregg's account of the mismatch problem for the Australian news media, and U.S. psychologist Doug Gentile's online interview discussing addictive gaming behavior:

As puberty occurs earlier, it's no longer in synchronisation with brain development, so adolescent psychologists are often confronted with a young woman, fully physically developed, complete with hipster jeans, flaunting her rebellion on a pierced navel but with the cognitive capacity of a 13-year-old. A souped-up car with all the extras—but the driver has no licence. (Carr-Gregg, 2004, paras. 10-11)

The right prefrontal-temporal area of the brain is the impulse control area. It's not finished developing until our mid-twenties. This explains teenage behavior. Why do teens do such crazy things? They don't have the brakes, the brakes aren't wired yet. What else do they have? They have the hormones—that's like the gas. They're high on gas, but no brakes. There you go, you now understand teenage behavior. [laughs]. (Pyroph, 2009)

Apparently the metaphor should be especially helpful to educators. In the United States, for example, journalist Richard Monastersky (2007) spread the word to readers of *The Chronicle of Higher Education* that "The teenage brain, in essence, is a turbocharged car with a set of brakes under construction" (p. A14), while teacher educator Pat Wolfe notes in a recent paper on her website:

Our oft-asked question when teens engage in irrational behavior, "What were you thinking?" is difficult for teens to answer because in many cases they weren't thinking reflectively; they were reacting impulsively. . . . Giedd comments that adolescents can be thought of as trucks with no brakes! (Wolfe, 2009, para. 7)

Government information for Australian teachers outlines what to expect when dealing with physically maturing students without PFCs to match: “Young people are more likely to engage in risky behaviours during this time. Ronald E Dahl, from the University of Pittsburgh Medical Centre describes it as being ‘. . . like turbocharging an engine without a skilled driver’” (NSW Department of Education & Training, 2006, para. 12). In advice for teachers, and as consultant for a recent Australian television documentary series, psychologist Andrew Fuller discards Giedd’s oft-repeated mantra of the adolescent brain as a “work in progress” in favor of his own “closed for construction” to explain:

I’m sure many of you know the sensation of being in a room with a group of young people who seem to be a clumsy jumble of elbows, knees, pimples and groins. Just as they haven’t grown into their bodies, they haven’t quite grown into their brains either. It’s almost as if teenagers at this stage have a very powerful, juiced up sports car with great acceleration, terrific lines, great sex appeal but very poor brakes. (Fuller, 2005, p. 19)

The teenager’s brain is really like a juiced-up sports car that’s basically got all the good looks, it’s got sort of great acceleration, but unfortunately it’s got very, very poor brakes. . . . So that means that an idea comes into your head and you think, “Hey, good idea, let’s go for that,” and the frontal lobes aren’t there to say “Hang on, maybe we should think twice about this.” (Fuller, 2009)

And as psychologist Aaron White advised in a Canadian teachers’ journal: “Because the frontal lobes are involved in controlling impulses and making good decisions, adolescents often fail to fully consider the consequences of their actions until it’s too late. They are all gas and no brakes!” (White, 2005, p. 6).

How Should the Role and Influence of Developmental Metaphors Be Considered?

By defining a particular object metaphorically we arouse certain expectations, focus attention on certain features, and thereby indicate certain priorities for practical action. (Danziger, 1990, p. 351)

The Place of Metaphor in Developmental Science

In the mid-1990s, in conjunction with launch of its *Publication Manual* (4th ed.), the American Psychological Association also published a paper in the *American Psychologist* discussing the epistemological objectives of “APA style.” Direct quotation of sources will be unnecessary and use of colorful metaphors rare, the authors explained, in a disciplinary genre that deliberately adopts “an uncomplicated view of the role that language plays in communication” to align its scholarship with the sciences and distance it from the humanities (Madigan, Johnson, & Linton, 1995, p. 433). However, the supposed objective neutrality and “realism” of scientific writing was elsewhere already under serious interrogation (e.g., Gentner, 1982; Gould, 1981), alongside a growing appreciation of the meaning-making power of language—argued perhaps most persuasively in Lakoff and Johnson’s *Metaphors We Live By*, first published in 1980:

The idea that metaphors can create realities goes against most traditional views of metaphor. The reason is that metaphor has been traditionally viewed as a matter of mere language rather than primarily as a means of structuring our conceptual system and the kinds of everyday activities we perform. It is reasonable enough to assume that words alone don’t change reality. But changes in our conceptual system do change what is real for us and affect how we perceive the world and act upon those perceptions. (Lakoff & Johnson, 2003, pp. 145-146)

In this sense, they suggested, metaphors can be self-fulfilling prophecies—and their potential in this regard may in fact be *most* compelling in societies according high status to scientific knowledge (p. 160):

In a culture where the myth of objectivism is very much alive and truth is always absolute truth, the people who get to impose their metaphors on the culture get to define what we consider to be true—absolutely and objectively true.

Even within psychology these matters were already under discussion. Leary (1990) had eloquently argued the importance of recognizing the extent to which culturally salient and popular metaphors had provided much of the “persuasiveness” of 20th-century psychology and that overlooking this reality promoted what he called “hardening of the categories” and “various sorts of myths and cults—such as the myth of objectivity and its associated cult of

empiricism—that have characterized so much of twentieth-century thought” (p. 3). Gergen (1990) had likewise examined the influence of psychological metaphors in legitimating or rationalizing social positioning and social orders, especially when there was ongoing uncertainty in existing public discourse. Both early and more recent analyses acknowledge that “constructing something in terms of something else results in a particular view of the ‘something’ in question, often including specific attitudes and evaluations” (Semino, 2008, p. 32). Seldom impartial, therefore, developmental metaphors have significant real-life consequences:

It may be true that a physical object exists and has properties apart from what people think, but when we come to more “complex” objects like people, families, groups . . . these are not “objects” in the same sense. What people think—and say—about these social objects helps to make them what they are at any given moment . . . language . . . helps *constitute* what these objects become. (Gozzi, 1999, p. 19)

When they come to represent the “commonsense” view of things, especially across a range of authorities and genres, they may soon seem less metaphorical and more “natural” and militate against introduction and acceptance of alternative understandings (Goatly, 2007; Sarbin, 1990; Semino, 2008).

Why We Should Care About Metaphors of Adolescence

For many years now, in all kinds of places and circumstances, I have noticed that most adults around children do not act as people do when they are with people they like, but very much the opposite. . . . There are many good reasons for this resentment and dislike. Until recently, children were much less trouble to bring up . . . if they survived their first years of life, they were soon useful. (Holt, 1974, pp. 52-53)

Recently in the *American Psychologist* Kurt Fischer and colleagues took Laurence Steinberg and colleagues to task for use of “narrow, biased assessments,” which they alleged were producing oversimplified research accounts of adolescents’ cognitive and psychosocial (im)maturity. Steinberg in turn accused Fischer of refusing to address the reality that scientists interested in informing policy discussions have a responsibility to “boil down” developmental complexities into accessible data-informed messages (Fischer, Stein, & Heikkinen, 2009; Steinberg, Cauffman, Woolard, Graham, & Banich, 2009a-b). The prominence accorded this debate in the APA’s flagship journal

is in contrast with lack of concern (so far as I am aware at time of writing) with the oversimplification and overgeneralization characteristic of “all gas no brakes.” Is psychologists’ (apparently discouraged) use of colorful metaphor assumed not to require the same critique? If problems *were* to be identified, would defendants likewise make a case for dismissing them on grounds of the imagery’s apparent utility?

There is arguably a clear parallel between the internally directed gaze that prompted Hall’s metaphor and current preoccupations with brain reconstruction that energized emergence of “all gas no brakes.” His legacy in its new mechanical/vehicular guise invites us once again to look inward for an understanding of youth—precipitously inhabiting physically and sexually mature bodies for a decade or more before their brains “catch up” (Gluckman & Hanson, 2006; Herman-Giddens, 2007)—and their problems. “Broken moorings” are replaced by souped-up engines, accelerator pedals to the floor, and plenty of “gas” representing surfeits of hormones and the overactive or uninhibited influence of “primitive” regions of the brain. There is no (rational/risk-averse) “skilled driver” able to steer this powerful machine and make successful and appropriate (according to adult criteria at least) use of its substantial assets. Upskilling the driver does not present as a possible solution, since poor/weak brakes (the immature PFC)—or no brakes at all—cannot be fixed. Inevitable risk taking and hazardous unpredictability thus constitute the default teenage condition, crashes of one kind or another are unavoidable, and best hopes for safety are pinned on extended denial of a “license” (raising the legal age for a variety of behaviors) or other braking mechanisms supplied by vigilant adults. Of course, some elements of this imagery were already present in most mid- to late-20th-century Western psychological texts on teenagers—Offer and Schonert-Reichl (1992), for example, had claimed research to be already “disabled” by strongly held beliefs that the typical adolescent is “out of control . . . and incapable of rational thought” (p. 1003). But why is it flourishing *now*, as greater celebration of diversity (or intrusive “political correctness,” depending on your point of view) operates to eliminate many other manifestations of prejudicial thinking within developmental discourse?

Decisions to adopt metaphorical concepts to explain human development and behavior are related not merely to the emergence of new “facts” but to the social contexts that granted these facts importance and within which they will be disseminated. In their classic paper examining adolescent studies published during four periods spanning nearly a century, for example, Enright and colleagues demonstrated how discourses of immaturity/instability and competence were differently privileged during times of differing economic

and political conditions (Enright, Levy, Harris, & Lapsley, 1987). If “all gas no brakes” prospers for reasons beyond functioning as scientific shorthand, Enright et al.’s analysis clearly advises that the typical peacetime and economically uncertain conditions currently prevailing in Western countries would (less or more knowingly) strongly encourage *theoretical* emphasis on adolescents’ immaturity and incompetence over their ability to handle “adult” responsibilities. Following Danziger (1990)—and without necessarily intending to imply that certain individuals or groups might not have the best interests of adolescents at heart—there is arguably little question that the main priority for *practical action* the metaphor calls forth is greater adult surveillance and control of adolescent behavior. As Laurence Steinberg (2007) put it, “Some things just take time to develop, and, like it or not, mature judgment is probably one of them.” This means stronger laws and stronger parental control “to protect teens from themselves” (p. 58; Weaver, 2007, para. 6), and, as he further explained for *USA Today*, accepting that many popular and possibly preferred strategies are doomed to fail:

A new review of adolescent brain research suggests that society is wasting billions of dollars on education and intervention programs to dissuade teens from dangerous activities, because their immature brains are not yet capable of avoiding risky behaviors. This analysis, by Temple University psychologist Laurence Steinberg, says stricter laws and policies limiting their behaviors would be more effective than education programs. . . . “We need to rethink our whole approach to preventing teen risk,” says Steinberg . . . “Adolescents are at an age where they do not have full capacity to control themselves,” he says. “As adults, we need to do some of the controlling.” (Jayson, 2007, paras. 1-4)

Vigorously opposing the rationale of protectionism, Robert Epstein has for some years presented an articulate case against this trend to greater regulation of teenagers’ behavior. Arguing that “the more restrictions you place on people who consider themselves to be autonomous and competent, the angrier and less manageable they become” (Epstein, 2010, p. 144), he questions why American teens appear typically subjected to far more behavioral limitations in their daily lives than adults in maximally controlled environments like prisons. Epstein interestingly asserts even Hall himself “knew that treating teens as ‘mere children’ was a grave mistake” and would have disapproved of the lack of dignity accorded adolescents in what he labels the current climate of their “infantilization” (p. 125). More than three decades earlier controversial educator John Holt had not dissimilarly compared modern

childhood to prison confinement; his still-uncomfortable observation on “useless” children, if now extended chronologically, adding another perspective on why “all gas no brakes” apparently provokes little condemnation—namely, that many adults these days do not actually like teenagers very much and (with assistance from the news media) are attracted rather than repelled by the meaning making of marginalizing language (see, for example, Squires, 2008). If storyings of fear and threat win out, Epstein’s admittedly provocative solutions—*radically less* control coupled with “serious doses of real responsibility” (p. 120)—will predictably continue to invite more resistance than support.

Then there is the question of whether human brains *ever* become “capable of avoiding risky behavior.” Arguably, subjecting adults’ practices to the same tireless, in-depth research scrutiny as teenagers’ would soon answer it; in the meantime, we should examine this enthusiasm for adolescent–adult, immature–mature binaries at a time when such distinctions have been increasingly problematized elsewhere in the developmental literature (e.g., Arnett, 2004; Côté, 2000). Perhaps it is these very challenges to established status positionings in the lifespan that attract adults to imagery offering to distinguish and distance them cognitively and emotionally from youth (even as they may desire physical youthfulness). Or perhaps attention should be more urgently directed at the zealous developmentalism of much contemporary expert advice—adamant that “risky” adolescent habits and experiences have irreversible implications for later physical, mental, and social health—that increasingly persuades parents dire outcomes are only avoided by diligent monitoring of both scientific findings and teenage children. Or perhaps, as Mike Males (2010) concludes from his analysis of U.S. debates around sex education, “adults love to call teenagers stupid” (p. 202) because it draws attention away from the inadequacies of *adults’* performance in teenagers’ lives and from the more general failure of research into “adolescent risk taking” to consider the impact of external (especially socioeconomic) factors on behavior and behavioral consequences (Males, 2009).

Although a constructionist perspective on the nature of adolescence should not have total disregard for the role of biological factors in proscribing and shaping individual accomplishments (Sercombe, 2010), it does require any talk of adolescence as a time of storm and stress avoids implying it is a period characterized *only* by turmoil (Arnett, 1999) and it cannot but oppose a reinscribing of “out of control” in language more essentialist than even Hall would likely have approved. If we assume the way we talk about young people helps establish the conditions for how we treat them, and, if Lakoff and Johnson are correct, that metaphors originating from hard science are most

likely to be conferred the authority of absolute truth, then “all gas no brakes” *must* be taken seriously.

This potent metaphor draws strength from more sources than the authority of developmental science, of course. Nevertheless, it is particularly worrying to place its endorsement by teen brain researchers alongside recent rhetoric from these scientists, who are looking forward to “the next decade of progress in understanding this unique and inspiring period of the lifespan” (Luciana, 2010, p. 5). Given the distinctly retrograde rather than progressive language their participants thus far seem to have “inspired,” does this mean we are in for another ten years of revelations and quasihumorous advice about teens’ unique incompetence? It can only be hoped that as the methodological and interpretive sophistication of this research increases its practitioners will choose to embrace the (admittedly formidable) task of producing an alternative metaphorical mindset—one emphasizing, facilitating, and celebrating capability and responsibility rather than requiring adolescents to live with adultist understandings that indiscriminately and unconditionally underestimate and undervalue them.

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Bio

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