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FROM STEEL MILL TO MATHEMATICAL PSYCHOLOGY: EXPLOITING SIGNALING IN EDUCATION

The Case Against Education: Why the Education System Is a Waste of Time and Money

By Bryan Caplan. Princeton, NJ: Princeton University Press, 2018. 395 pp. Hardcover, \$18.60.

1959 was a good year. The economy was flourishing, even in the soon-to-be baptized Rust Belt. American steel was big, and working in the steel mills was an attractive job immediately after graduating high school. My work permitted me to explore the factory and talk to various employees. A so-called roller, who remotely operated a rolling machine to shape the steel, advised me to go to college. My kneejerk reaction was, “Right! You’re knocking down \$15 a hour, and I should go to college?” Of course, it was good advice. I took the college path, and the admired U.S. steel industry soon went into a tailspin, and employment in steel towns decreased significantly during the next decades.

My “success” story is not unusual, but Bryan Caplan’s *The Case Against Education* sees the hole and not the doughnut. As a society, we are overeducated with irrelevant insubstantial content that has little or no lasting value. The author claims, “Typical students burn thousands of hours studying material that neither raises their productivity nor enriches their lives” (pp. 1–2). For Caplan, education “succeeds” because it simply signals employability: intelligence, conscientiousness, and conformity. There might be alternative measures, but years in school and degrees appear to be the gold standard used by employers to judge employability. So yes, on average, more education guarantees a better life. But for Caplan, the employer (and society) is financing an 80/20 proposition where the education delivers 80% signaling and only 20% substance.

Psychologists might not be aware of the signaling model of education, developed by Michael Spence and Kenneth Arrow. Three elements are essential for signaling models. The first, easily documented by both behavioral scientists and laypersons, is that there are different types of people. Second, a person’s type is not easily apparent or obvious. Third, types must noticeably differ on average or, in other words, send a different signal. For decisions about employment, the different types are most conveniently distinguished by education. Given the importance society

places on signaling, it overpays for time in school and degrees. I remember my American history teacher, Dr. Day, bragging about his five degrees, obtained on the GI Bill, which maximized his teacher salary in high school and community college.

Simler and Hanson (2017) reinforce Caplan's thesis by proposing that the main ingredient of education is domestication. To reinforce the signaling aspect of education, we can look to a study they cite that compared unschooled workers from undeveloped parts of the world to schooled rich-world workers at a task of repetitive behavior. We know these rich-world workers will show up for work on time and follow instructions, even if they conflict somewhat with their cultural beliefs, while depositing their unsavory characteristics at home rather than having them disrupt the workplace. None of these "desirable" traits were found in the poor, unschooled people. As stated by Simler and Hanson, "an industrial-era school system prepares us for the modern workplace." In our Western, Educated, Industrialized, Rich, and Democratic (WEIRD; Henrich, Heine, & Norenzayan, 2010) world, we expect children to be docile, attend to boring tasks, and ask permission for any activity such as going to the bathroom. In addition, they learn to accept being continuously evaluated in the form of verbal feedback, grades, and rankings. No wonder we WEIRD people assimilate to the workplace so easily.

Caplan claims that not only are students instructed to learn superfluous material from their required English, history, and foreign language classes, they remember very little of it. There is an anecdote from James V. McConnell, an insightful psychologist and dedicated teacher and writer of a popular introductory psychology textbook. He picked up a student hitchhiking to school one morning, learned that the student had taken introductory psychology, and found an opportunity to inquire about the impact the course had on him. The student thought for a bit and said, "I don't remember much, but here's something: If you ring a bell, a dog will salivate like hell." Poetic indeed, but disheartening nonetheless.

Of course, the author acknowledges that some formal education is valuable, such as numeracy and literacy. But much coursework is considered useless, including English, history, foreign languages, fine arts, and physical education. This reminds me of the Car Talk joke. You go to college to learn how to ask questions. An engineer asks, "How can I build that?" An economist asks, "How much does it cost?" A scientist asks, "How does it work?" A humanities or social science graduate asks, "Would you like fries with that?"

The author favors statistics classes over, say, geometry classes because these are relevant to many decisions the students will encounter in real life. Even statistics classes might not be all that helpful, however, because we know that expert statisticians schooled in the art are susceptible to the same decision and judgment biases that are common among others (Tetlock, 2017; Tversky & Kahneman, 1971). Similarly, I have always been fascinated when experts in one domain, such as physical sciences, are so easily fooled by erroneous assertions in other domains (e.g., the physicists falling for Uri Geller's trickeries).

Teachers lecture to the test and are gratified when their students show some understanding when tested. In my course on psychological literacy, I tested students on a variety of decision making and judgment problems to reveal common fallacies both before and at the end of the course. They struggled to learn and overcome these fallacies, and they improved their final test performance. Rather than feeling pleased about my effective teaching, however, I'm not at all confident that there would have been reasonable savings once set loose in the real world. If I encountered a student who studied the three-door problem, they might reveal something like, "I don't recall why, but if you ever are shown three doors you should switch rather than stick with your first choice" (Monty Hall Problem, 2018).

To make his case against education, Caplan pits the "human capital theory" against "signaling theory." The former is that education imparts skills that readily prepare students for their upcoming vocations. That is, educational curricula are designed to build the muscles necessary to bring intelligence, conscientiousness, conformity, and, most importantly, worker productivity to the marketplace. Signaling theory states that education simply implies or signals high potential productivity in the labor market. That is, years in schooling and graduation degrees signal that this potential employee was both intelligent and conscientious enough to conform to the perhaps arbitrary demands of formal education. This disposition should readily transfer to the workplace. Perhaps signaling rather than education better rationalizes why about 40% of the workforce is stuck in bullshit jobs, which are characterized by being completely unnecessary or pernicious and add nothing of value to society (Graeber, 2018).

Whether we pigeonhole the preschool experience in WEIRD cultures as top-down teaching or not, the children in any type of formal setting such as a day-care or preschool will clearly assimilate to the submissive rule-governed culture awaiting their Western

schooling experience. Irrespective of peer influences, most children will obtain cultural norms mainly from parents, caregivers, teachers, and other authorities. Children in traditional cultures, on the other hand, are freer to roam and assimilate their culture with less direction (Bjorklund, 2016; Lancy, 2015). Notwithstanding the plethora of traditional cultures, teaching serves the purpose of ingraining WEIRD values, which will serve children well in both schooling and the workplace to follow. Teaching is particularly advantageous when society's advanced knowledge is not easily obtained from peers and observation.

Caplan laments the maxim that those who cannot do teach. Just recently, my niece (a teacher herself) was helping her high school student on his American history homework. You won't believe the exercise (unquestioned by both parent and student) I'm about to describe. I didn't believe it either until I searched the Internet to find a plethora of resources for teachers to easily generate so-called word finder puzzles (<https://thewordsearch.com/>). In this tailor-made presidents version, kids in their 11th year of schooling agonized over finding the names of American presidents in a huge table of random letters. Can we blame kids for not bubbling with enthusiasm while straining their eyesight to complete the puzzle? In the real world, informed citizens should know what president was most accountable for the Viet Nam war. This homework provided little preparation for this type of knowledge. "I'm not sure. Oh yeah! Right! Lyndon Johnson. I remember his name was in the third row of our word finder puzzle."

The author continuously entertains with captivating turns of phrases such as "the handsome rewards of useless education" (p. 69) and quotes that capture his soul such as "Whenever you find yourself on the side of the majority, it is time to pause and reflect," by Mark Twain. I also appreciate various factoids given generously throughout the book. Relative factoids are usually more telling than absolute ones. Caplan cites resources that show that total U.S. education spending was actually 50% more than total military spending. I also discovered that total 2018 government spending is more for education than for defense (US Government Spending, 2018).

In defense of current educational opportunities, California Community Colleges offer much more career relevance, if the students haven't already been burned out by dysfunctional classwork for their last 12 years. Career and technical education (CTE) programs offer both academic and career-oriented courses. These programs help prepare students for a wide range of high-wage, high-skill, high-demand

careers. Many also provide students with the chance to gain hands-on experience through work-based learning opportunities or prepare them to transfer to 4-year institutions. Our local Cabrillo College (<https://www.cabrillo.edu/home/programs/>) offers cutting-edge CTE programs in 13 of the 15 industry sectors defined by the California Department of Education.

Notwithstanding the plethora of proposed panaceas for ease of learning, psychologists have learned "time on task" is the singular most effective variable educators have in their teaching arsenal. Yes, other interventions can facilitate learning, such as distributed over massed practice, but these pale in comparison to time spent learning, especially dedicated deliberate time on task (Ericsson & Pool, 2016). Evidence from many domains demonstrates that people can improve their test performance by practice. Schooling professes to teach students how to learn. But regardless of learning experience, it doesn't seem to generalize well to other domains. Although we teachers would like to believe we seek to teach understanding, we ask our students to learn information (much of it soon forgotten). To address a possible exception, Harry Harlow's monkeys were able to learn a win-stay, lose-shift strategy and reveal learning to learn. But they weren't really learning to learn but simply succeeding at the task at hand. Given the gargantuan time spent in schooling from preschool onward, we might question its efficacy. Caplan develops a strong case against schooling as enacted today. He questions the validity of the material being taught, the quality of the teachers and learners, and the paucity of what is learned and remembered.

Outside the basics such as literacy and numeracy, schooling doesn't teach kids what they need when they grow up; it simply delays their entry into the real world. Given the onslaught of technology and the increasing years people are working, holding back our youth might lessen unemployment. However, wasting money on meaningless schooling that could be best spent elsewhere is a poor solution to challenges of impending employment availability.

Education requirements for learning a foreign language are an easy target. Students now have more options than Latin or Greek, so they choose between French, Italian, or German. "Forward looking" schools are now offering Mandarin and Spanish, and these might certainly be useful, if indeed students actually learned and remembered anything. Most don't. Caplan cites survey results revealing that language courses in school do not succeed in making students fluent in the language (p. 49). Sure,

one or two language students will find they have a propensity for learning languages and will productively pursue a course of language studies preparing them for a professional career in language translation and interpretation, or teaching languages. My three semesters of Italian failed me when I arrived in that country and negotiated a lodging question of a room with or without a bath. I applaud my graduate school for accepting Fortran as one of the two language requirements because, like my high school typing class, these skills proved useful in the real world. Interacting with mobile devices might be the extant equivalent of a practical course, although kids appear to learn this without formal instruction.

If our politics and economy are reasonably effective, why does education work? There is no doubt as you obtain more education, income and all its concomitant benefits increase dramatically. Why? Although years of education and degrees only slightly improve most job skills, they reliably signal worker productivity. As the author emphasizes, your employers are paying you not for most of your successful courses but simply for their validation of your motivation, conscientiousness, and general commitment to socially approved goals. Our PhD programs have revealed that graduate student success comes most easily to highly motivated workers rather than those with high IQs.

Why doesn't the immense time spent in school build knowledge muscles? The author is well versed in literature demonstrating that very little knowledge learned in one domain transfers to another domain. This is the law of transfer of practice, by Edward Thorndike and Robert S. Woodworth (1901). They and others asked how people would transfer learning between contexts. The conclusion was that successful transfer between two contexts depended on having identical elements between the two contexts. Learning that a military commander successfully invaded an enemy city by distributing her troops at several invasion sites does not help someone use x-rays to kill a tumor when a whole direct dose of the x-ray would damage the intervening organs of the patient.

This law has not informed today's current educational practice. In the almost 12 decades since this law was proposed, research across a broad set of domains has shown that any positive transfer of learning is critically dependent on the similarity between the learned task and the new transfer task. To use the author's analogy, we can build physical muscles but not mental muscles. Our mental muscles are very domain specific. Not surprisingly, practicing pole vaulting will not help you learn how to play Go. But more impor-

tantly for our education tradition, learning the arts, foreign languages, history, and social studies offers very little, if any, foundation for most of the positions our students will obtain when they move from school to the workplace. Again, from a selfish perspective, students are playing the game correctly because their completion of schooling signals to potential employees that they probably have the stuff to succeed in the workplace (even though the amount of substance they retain from school will matter very little).

Does our scholarship determine our philosophy, economics, and behavioral science, or is it infiltrated too readily by the latter? Bryan Caplan, in addition to his economics faculty position at George Mason University, holds an adjunct scholar at the Cato Institute, a libertarian think tank supported by the Koch Brothers. However, he states, "Autobiographically, my doubts about the social value of education long predated my discovery of political philosophy" (p. 217). Thus, we might easily forgive his off-handed observation that government-funded education is analogous to subsidized wedding rings for the poor (p. 213). He is well aware of social injustices but hasn't been convinced that government intervention has diminished them in a productive manner. He is open to dialog, and I think he would agree to vouchers for primary education as an intermediate remedy to mitigate the current wastefulness of current education policy.

Caplan also dismisses online education as a solution to the problem of expensive and ineffective education. His argument includes the observation that an early form of it existed long before the Internet and education startups in the form of videotaped lectures by the best teachers and automated testing. A significant cultural evolution is necessary before employers accept online educational experience as signaling positive employee credentials. I see an important exception to this reluctance in the increasing specialty workforce. An online credential for mastering C++ might be sufficient to place applicants in the good graces of potential employers. Perhaps Google (now Alphabet) was an important first employer who short-circuited the signaling system with applicant problem-solving exercises and interviews.

Why did an economist rather than a psychologist write this book? Perhaps, contrary to what George Miller advised, we haven't yet given psychology away (meaning apply it to the real world). We know too well the power law of forgetting but haven't necessarily concerned ourselves with the parameter describing how quickly memory vanishes and what this implies for our current educational system, with huge

delays between learning in school and opportunities to use that knowledge in real life.

To return to my success story, it runs parallel to Caplan's. I stuck to the academy and was rewarded with job security, loving what I do, traveling, and finding friends with common interests. My BA from UCLA certainly would have landed me a job in the heady early 1960s, but few of my courses would have prepared me for the workplace. Experimental methods, like Caplan's favorable view of statistics, probably would have given me an edge in many different vocations. But metaphysics and non-Euclidean geometries would probably have been deployed only during Happy Hour.

NOTE

This review benefited from discussions with Bill Rowe on a variety of topics such as the forgotten benefits of learning Fortran.

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A BRILLIANT INTRODUCTION TO THE SCIENCE OF THE BRAIN

Understanding the Brain: From Cells to Behavior to Cognition

By John Dowling. New York, NY: W.W. Norton, 2018. 356 pp. Hardcover, \$26.95; E-book, \$12.99.

John Dowling is the Gordon Llura Gund Research Professor of Neuroscience at Harvard University and one of the best teachers of brain science in the country, as evidenced by the fact that he has taught the introductory course on behavioral neuroscience at Harvard for more than 30 years. In fact, Dowling developed this book, *Understanding the Brain: From Cells to Behavior to Cognition*, in conjunction with the Harvard University freshman seminar titled “The Amazing Brain.” In the book Dowling traces the progress we are making in understanding how the brain functions, with emphasis on vision, perception, language, memory, emotion, and consciousness.

Dowling begins by outlining in general terms how the brain works. In so doing he gives us an initial insight into the organization of the brain. Dowling then goes on to describe specific aspects of brain function: perception, language, memory, emotion, and consciousness. He details how nerve cells differ from the other cells in the body and then describes how nerve cells communicate with one another and how they convey sensory information into the nervous system and motor action out of the nervous system. Dowling then discusses the organization of the nervous system of simple invertebrate animals and considers the more complex organization of the mammalian brain—your brain and mine—and includes discussions of plasticity, emotion, and rationality.

Understanding the Brain: From Cells to Behavior to Cognition is a perfect introduction for anyone who comes to the brain with little background in brain science and who wants to have a meaningful understanding of how the brain works. It is written with enormous clarity and precision. As a result, the book is at once an easy and enjoyable read, while it explains in some detail how the molecular machinery of the brain is responsible for the activities of your mind and