

# The Value of Undergraduate Training in Psychological Science

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It's that time of the year, the season when students who have toiled through four (or five) years of higher education commence upon the world. Over the next few weeks, across hundreds of commencement exercises, we who wear the hoods will come face-to-face with those who wear the caps and gowns — and those who have footed the bill. Given that only a fraction of psychology majors continue on to graduate school (or take entry-level jobs with names even remotely derivative of the term psychology), how do we, the ones with the hoods, hold high our heads? What do we believe is the value of undergraduate training in psychological science?

My answer to that question has come into relief the past few years not only via contact with psychology degree recipients but also as I've listened to, spoken with, read the words of, and written email to countless parents of autistic children.<sup>1</sup> So permit me to ride my hobby horse into the sunset and enumerate 10 rudiments of psychological science, 10 possessions our majors carry beyond graduation processions, and 10 basic tenets I wish every parent of every autistic child knew (along with every politician who believes he or she is helping those parents and children).

**1. Correlation doesn't equal causality.** Just because the number of churches in a city is highly correlated with the number of taverns, or the number of stork nests in a village is highly correlated with the number of births, doesn't mean that religion drives people to drink or that storks deliver babies.

Are psychology majors the only ones who learn to distinguish correlation from causality? When Cornell economists recently espoused that cable TV caused autism and Yale neurobiologists espoused the same for prenatal ultrasounds, I had to wonder. I've heard non-psychological scientists assert that cell phones, Wi-Fi networks, microwave ovens, genetically modified foods, and latex baby bottle nipples cause autism simply because society's increased use of these modern-day inventions coincides with clinicians' increased use of modern-day diagnostic criteria (and society's increased awareness of, and services for, the autism phenotype; Gernsbacher, Dawson, & Goldsmith, 2005).

**2. Praise the power of N.** One implicit benefit of teaching upper, rather than lower, division classes is hearing fewer and fewer anecdotes ("I knew someone who ..." or "I once heard that

...) and more and more skepticism ("yeah, but that study had a really small N"). Psychology majors learn that an N of 1 can provide a provocative lead-in to a news story, an evocative exhibit at a Congressional hearing, or a vivificative subject of a case study but cannot provide a basis for scientific generalization. If parents, awash in the sea of decisions regarding so-called autism interventions, learned healthy skepticism for anecdote, they'd be considerably less susceptible to the massive morass of quackery that can envelope them.

**3. Sampling ain't simple.** Most psychology undergraduates cut their teeth on the polling debacle of the 1948 Dewey-Truman election, and by the end of their sophomore year, they're poised to ask psychological science's parallel to journalism's Five Ws: Who comprised the sample? How, where, and when was the sample collected? And what biases remain uncontrolled?

**4. Statistical interactions are marvels.** Face it; can you even define a statistical interaction in fewer than 10 words? I can, but only by analogy: "I before E, except after C." The depth of ideas that can be compactly conveyed by saying "there was a two-way interaction," or — be still my heart — a three-way interaction, defy articulation. What an elegant means for quantifying and visualizing contingency we impart to our students when we teach them about statistical interaction.

**5. Development is nonlinear.** Everything from early childhood vocabulary development to adolescent limb growth progresses in starts and fits, spurts, and apparent stagnation. Learning this fundamental principle of development, along with a healthy skepticism of anecdote, would greatly douse the superstitious wildfire caused by most so-called autism treatments.

**6. Development is lifelong.** A few weeks ago when I heard a masters-level librarian coin the term "maturity strife," which he defined as "when family and friends tire" of autistic young adults who "cannot develop," I shook my head in utter disbelief — and turned immediately to hug my kid. I fervently hope my son's life will be filled with people who realize that development doesn't halt at age 21.

**7. Sensation is relative.** The use of the term JND in casual conversation is about as close to a societal handshake as our field could ever come.

**8. Cognition is covert.** Attending, encoding, retrieving, rehearsing, comprehending, planning, thinking, reasoning, and imagining are all invisible processes. If they weren't, the well-worn inquiry "whatcha thinking about?" (and even "whatcha looking at?") could retire from English discourse. Without Thurber's narration of Walter Mitty's secret life and Peanut comic-strip character Snoopy's thought bubbles, we'd fallaciously assume that both "lacked imagination."

**9. Emotion is covert.** See #8.

**10. Interpersonal interaction is a reciprocal function of attitudes, beliefs, and motivation.** When neurologist Ramachandran and the parents of autistic six-year-old Steven publicized their opinion that "Steven, the person, simply isn't there," my autistic colleague, Michelle Dawson, cautioned: "Does it take electro and magnetoencephalography to discover that interacting or conversing with people who see you as not there or not having personhood ... can be difficult, if not impossible?" (Dawson, 2006; see also Gernsbacher, 2006).

All of which brings me to two principles that I wish psychology majors were ensured to have tucked under their mortar boards:

**1. GIGO.** No matter how fancy the technical apparatus, how sexy the research topic, or how exotic the research participants, garbage in produces garbage out.

**2. Effect is not a synonym of affect.** Don't even get me started on it's versus its.

## References

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