Presidential Column: The Eye of the Beholder

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I'm at the 15th percentile in height for U.S. females — a ranking I've held since birth. When I was growing up, there were certain occupations (e.g., flight attendant and firefighter) for which my height rendered me ineligible, and to this day I'm unable to reach the top shelf of most cupboards, grocery store aisles, or overhead luggage bins. If I immigrated to Japan, I'd rise to the 50th percentile, but if I immigrated to Holland I'd fall to the 1st percentile.

Another way to think about my stature is that I'm at the 85th percentile for shortness. I'm pretty facile at getting under limbo poles; I have no qualms riding in the back seat of compact cars; and I'm chipper sitting in coach class on long, transatlantic flights. My six-foot colleagues, who are at the 12th percentile for shortness for U.S. males and below the 1st percentile for U.S. females, are not nearly so sanguine in such situations.

Overhead bins and coach-class airline seats demonstrate the obvious: We differ in height. Indeed, the average difference between males and females in height is one of the very few sex differences on which we all can agree.

Another morphometric sex difference has recently been reported: On average, females have thicker cortices than males — or put an-other way, males have thinner cortices than females (Im et al., 2006; Luders et al., 2006; Preul et al., 2006; Sowell et al., 2006). A typical effect size (across each cortical hemisphere) is .8 of a standard deviation, which increases to 1.4 standard deviations when scaled for total brain size (because females have smaller brains).

What's better, having a thicker cortex or a thinner cortex? It depends on who you ask. Some researchers have claimed that thicker cortices are "an indicator of integrity of cytoarchitecture in the cortex" (Makris et al., 2006; Goghari et al., 2006), "a general sign of cognitively beneficial neuroanatomical characteristics" (Walhovd et al., 2006).

But other researchers have claimed that thicker cortices are "abnormal" (Hardan et al., 2006), due perhaps to a "failure to myelinate" (Thompson et al., 2005) or "exuberant arbourization" (Rauch et al., 2004).

It also depends on who you are.

If you're a typically developing child between the ages of 8 and 20, age-related thinning of the cortex is considered "eliminating ineffi-cient or unnecessary dendritic connections" to allow "more effective, accurate synaptic transmission" (O'Donnell et al., 2005). But if you're a typically developed adult between the ages of 18 and 93, age-related thinning of the cortex is considered "atrophy" (Salat et al., 2004).

If you're a child gaining motor skills over a two-year period, having a thinner cortex is considered good; if you're a child gaining pho-nological processing skills over a two-year period, having a thicker cortex is considered good (Lu et al., 2006). If you're an adult with ex-perience in meditation, having a thicker cortex than an adult without experience in meditation is considered good (Lazar et al., 2005); if you're an adult recovering from a stroke, having a thicker cortex than an adult not recovering from a stroke is considered good (Schaecter et al., 2006).

But if you're autistic,[1] having a thicker cortex than someone who is not autistic is considered bad (Hardan et al., 2006) — and having a thinner cortex than someone who is not autistic is also considered bad (Chung et al., 2005; Hadjikhani et al., 2006a, 2006b). Your thicker cortex might be a function of higher fluid intelligence (Dawson et al., 2006; Fjell et al., 2006); your thinner cortex might be a function of better memory retrieval (Sowell et al., 2001). It doesn't matter: If you're autistic, having either a thicker or thinner cortex is just considered bad.

Indeed, if you've been diagnosed with specific attention deficit, animal phobia, bipolar, Williams Syndrome, or schizophrenia, having a thinner, thicker, thinner, thicker, or thinner cortex, respectively, is considered bad, bad, bad, bad, and bad, respectively (Shaw et al., 2006; Rauch et al., 2004; Lyoo et al., 2006; Thompson et al., 2005; Kuperberg et al., 2003, respectively).

This confluence of results could be due to different measurement algorithms (Fischl & Dale, 2000; Lerch et al., 2005), across a variety of cortical regions, and some studies could be tightened with better between-group matching for factors such as total brain size, measures of cognition, even height(!). But what is striking is that not one of the between-group differences, which have been pathologized, is more pronounced than the difference between "normal" males and "normal" females.

For some differences, their value lies in the eye of the beholder (http://en.wikipedia.org/wiki/The_Eye_of_the_Beholder).

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Morton Ann Gernsbacher is the Vilas Research Professor and Sir Frederic C. Bartlett Professor of Psychology at the University of Wisconsin-Madison. She can be reached via email at mgernsbacher@psychologicalscience.org.

[1] See Sinclair (1999; http://web.syr.edu/~jisincla/person_first.htm) to appreciate my respectful use of the term “autistic” rather than “person with autism.”