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Neural Diversity

Everyone knows the best way to load cutlery into a dishwasher, right? The tines, bowls, and blades (of the forks, spoons, and knives) should be pointed downward into the cutlery basket so that the handles point up. It's safer that way, and besides, what are the handles for if not for handling the cutlery?

Likewise, we all agree that the optimal way to place a roll of toilet paper on a horizontal holder is with the free end (the flap, if you will) on top. It's prettier that way, even if you don't fold the edges into those neat little triangles that greet you in upscale hotels.

Underwear and socks always live in the top drawer of a bureau, of course, and there's little doubt that when showering, it's most logical to shampoo and rinse your hair before lathering and rinsing your body.

However, there are some people — it's true, I've met them — who place their cutlery into the dishwasher with the tines, bowls, and blades pointing up (they say that ensures that the parts likely to be dirtiest are likely to get cleanest).

Furthermore, I've occasionally visited homes whose inhabitants place their toilet paper with the free end in back (they say it provides optimal torque, increasing the distance between the plane of the paper being pulled and the axle support line).

Shockingly, SurveyCentral.org reports that nearly a fourth of its respondents don't store their underwear and socks in their top bureau drawer, but rather in a lower drawer, leaving the top drawer for trinkets, jewelry, or other precious collectibles. And some bona fide eccentrics lather and rinse their bodies prior to shampooing and rinsing their hair.

I know what a few of you are thinking: What does it matter, if the task gets done? Sure, some modes of accomplishing a task might be more common, but the optimal mode for each individual is the mode that he or she employs best. Behavioral diversity is not to be criticized, but embraced.

Fair enough. But aren't people who load their dishwashers with the cutlery handles pointing up more blood-phobic than people who point the handles down (who must be more germ-phobic)? Doesn't flap-front versus flap-back toilet paper placement illuminate people's inner weighting of form versus function, just as top bureau drawer contents distinguishes sentimental versus utilitarian personalities? As for the primacy of lather-body versus shampoo-hair, isn't that clearly an indicator of bottom-up versus top-down processing?

Numerous brain-imaging studies conclude with similar judgments. For example, Moriguchi et al. (2005) measured task-related brain activity while Japanese and American participants observed fearful facial expressions. The Japanese participants demonstrated more task-related activity in the right inferior frontal gyrus, premotor cortex, and left insula, whereas the American participants demonstrated more task-related activity in the posterior cingulate, supplementary motor cortex, and amygdala. The authors concluded that "Americans respond to fearful faces in a more direct, emotional way, whereas Japanese do not attach an emotional valence to the faces."

Hugdahl et al. (2006) measured task-related activity while male and female participants were performing equally well on a mental rotation task (using Shepard & Metzler, 1971, stimuli). The male participants demonstrated more task-related activity in parietal areas, whereas the female participants demonstrated more task-related activity in inferior frontal regions. The authors concluded that "males may be biased toward a coordinate processing approach, and females biased toward a serial, categorical processing approach."

When mothers viewed photos of their own children, task-related activity in the amygdala and insula was interpreted as "reflecting the intense attachment, vigilant protectiveness, and empathy that characterize normal maternal attachment" (Leibenluft et al., 2004). When boyfriends listened to sentences such as "my girlfriend gave a gorgeous birthday present to her ex-boyfriend," task-related activity in the amygdala and insula was interpreted as identifying the "brain regions involved in sexual/aggressive behavior" (Takahashi et al., 2006).

When college-aged participants successfully retrieved episodic memories, task-related activity in frontal regions was considered a sign of higher-order reasoning; when participants of the modal age of APS members success-

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fully retrieved episodic memories, task-related activity in frontal regions was considered "compensation" (Aine et al., 2006).

From reading such brain-imaging studies, one would think that amateur psychoanalysts, rather than card-carrying neuroscientists, were driving the interpretations. For my own ride, I'd like to have social psychologists in the passenger seat, bringing along their decades of research on the unfortunate effects of stereotyping, bias, and prejudice.

For example, group comparisons in many functional brain-imaging studies illustrate quite vividly Miller et al.'s (1991) thesis, drawn from behavioral and social psychological research: Explanations for differences between prototypic and nonprototypic groups use the former to explain the latter. Thus, in brain-imaging studies, nonprototypic groups are described as demonstrating more versus less task-related activity — where *more* and *less* are always in reference to the prototypic group.

Rather than being appreciated as functional adaptations — as when blind participants activate visual cortex while reading braille (Burton et al., 2002) and Deaf participants activate auditory cortex while perceiving motion (Fine et al., 2005) — levels of activation are often judged in Goldilocks fashion (too much, too little, just right), and regions of activation are often interpreted as if they were Zodiac signs.

As we explore the neural underpinnings of tasks as diverse as grocery shopping (Braeutigam et al., 2004) and tickling (Blakemore et al., 2000), and we recruit participants who are also diverse, let's consider the possibility of diversity in neural structure and function. And let's do so without biased inferences or stereotypic interpretations. ♦

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