LAZY BRAIN

I’m an avid reader of all sorts of books and articles about the workings of the brain (I regularly try to figure my own out). Some good recommended reads include anything by Antonio Damasio, (e.g., *Descartes’ Error* and *Self Comes to Mind*), and Oliver Sacks, (e.g., *The Man Who Mistook His Wife for a Hat* and *The Mind’s Eye*). I recently finished *Thinking, Fast and Slow* by Daniel Kahneman. These are all books that are accessible to us mere mortals. [Note: e-mail me for more painful selections.]

I’m going to focus on *Thinking, Fast and Slow*, which uses the analogy of a two layer system of fast thinking and slow thinking. Fast thinking is called System 1 and is used for routine situations: What is 2 + 2?; sweeping the sidewalk. This is our lazy brain. “All systems normal; no need to allocate resources.”

Slow thinking is called System 2, and is used where there is a clearly recognized problem that demands that we pay attention, where we need to use more intellectual horsepower, or when we need to react to a potential threat: My client is asking me a question. What is 27 X 39? Is that driver going to stop? This is the active, amped up brain that System 1 calls on sparingly.

When you drive through your neighborhood, unless you see a child about to run into the street, hear a siren sound, or anticipate an icy road, you are likely barely conscious of the act of driving. You’ve done it thousands of times before. System 1 is in control, using experiences from the past to make decisions and allowing you to sing with the radio (singing with the radio is impossible when System 2 takes control). When an alert condition evolves, such as the sound of a partially detached tail pipe dragging on the pavement, the job gets kicked upstairs for more detailed analysis and response.

What is important to realize is that the brain is intentionally very lazy. Thinking hard burns a lot of fuel, and engaging System 2 is tedious, tiring and induces tension (there is a reason we say “that makes my head spin” and “that was gut wrenching”).

It is also why System 1 is reluctant to hand over control. Unless there is an immediate danger, such as a rhinoceros bearing down on you at a full gallop, System 1 has a tendency to reacquire control and settle for an answer that is “good enough.” For the rhinoceros situation, the rush of adrenaline is enough to keep System 1 at bay. For 27 X 39, unless you really need an exact answer, you are likely to think 30 X 40 is 1200, so somewhere around 1100 (the answer is actually 1053).

This is not something that we are immune to – this is how our brains are wired. Most of our lives are spent with System 1 in control, and our survival indicates that it serves us very well - most of the time. The System 1/System 2 handoff and the lazy brain’s “good enough” estimating are where things can go awry.

Research has shown that we don’t estimate very well, especially with regards to probabilities. Also, stimuli, behaviors, and emotions dramatically affect outcomes. Oddly, stimuli, emotions, and responses are bidirectional. Sensations affect behaviors and emotion, emotion affects sensations and behaviors, and so on. Sweaty palms can make you feel nervous. If you’ve just discussed money, you will be less likely to be helpful to others, or if you read a paragraph filled with words normally associated with the aged (but not in this case), you will likely get up and walk away a little slower and slightly hunched over.

Many System 1 ‘influenced’ estimates and behaviors are imperfect, so be wary and alert. We all are prone to being deceived because both mental laziness and our physical and emotional state have significant impacts on our intuitive judgments. The punch line is that enhancing awareness of how the brain works can train us to think more reliably when reliability is critical. Clear and calm your mind - emotions obstruct logical thinking, eliminate distractions, zoom your thinking to the level appropriate for the task at hand, pace yourself and raise your self-awareness to be wary of and to catch and recover from System 1 takeover attempts.

If you need to get it right, not just be in the right ballpark, then you need to be highly engaged. Just as great athletes get up for the game, psych yourself into a higher level of focus and get pumped up when performance is not optional.

Our brains cut corners to ease our lives, but sharpen up when faced with knives. Knowing how your brain reacts, improves your rendering of the facts.
WITH A LITTLE HELP FROM OUR FRIENDS

About 35% of Schnabel's services relate to dams. That means we provide a lot of non-dam services, mostly related to the geotechnical arena. On a regular basis, the firm's geostructural designers have been called upon to assist on dam projects where their expertise fits a client's needs: either in addition to other dam engineering activities or as stand-alone services.
Schnabel's specialized services include geotechnical and geostructural engineering, as well as dam and tunnel engineering, environmental and geosciences services, construction monitoring, and resident engineering. Coordinated services are integral to the design and construction team throughout the duration of a project, helping to mitigate risk, manage cost, and facilitate construction.

**Geostructural Design Services Examples:**

**SWINGING BRIDGE RESERVOIR DAM  Forestburgh, New York**
Swinging Bridge Reservoir Dam developed numerous sinkholes, including a large hole that cracked and fractured a penstock pipe. Following the emergency reservoir drawdown behind this hydroelectric dam, Schnabel's geostructural engineers designed a 40-ft deep excavation support at the base of this 120-ft high dam. The excavation allowed placement of protective filters and blanket drains under and around the penstock.

**UPPER DAM  Oxford County, Maine**
Schnabel’s geostructural engineers designed a phased cofferdam and dewatering system to provide work areas for three construction seasons for a dam in northern Maine. The internally braced, single-wall cofferdam retains as much as 55 ft of water and soil for construction of a new spillway. A second, internally tied, double-wall cofferdam functions as protection for the demolition and reconstruction of the main structure, as well as a temporary access road for residents.

**HODENPYL DAM  Wexford County, Michigan**
Our geostructural engineering teammates designed an excavation and soil nail wall to reduce driving stresses on deep clays. A supplemental row of deep tiebacks provides additional restraint to the wall. Post construction monitoring verified that movement of the wall had ceased after remediation and that the wall and abutment remain stable. For more information, technical papers on this project are available at:


**OLD STONY CREEK DAM  Burlington, North Carolina**
Old Stony Creek Dam would overtop by 12 ft for the design flood, destabilizing the mass concrete dam and eroding the abutments. Schnabel's geostructural engineers designed anchors to hold the dam in place, as well as a secant wall to prevent abutment erosion.

**NESBITT DAM  Luzerne County, Pennsylvania**
Rehabilitation of this 101-ft high, 583-ft long dam included anchoring of the stone masonry core. Excavations requiring dewatering were for a 15-ft deep toe drain and for removal of over 40 ft of abutment soil to access the masonry core. Our geostructural engineers designed the excavation dewatering and provided construction engineering services for these elements.
Schnabel was the recipient of this prestigious award (as Principal Designer and Engineer for the new Deep Creek Watershed Dam 5D located in Yadkin County, North Carolina). This award was made possible through joint cooperation and funding made available by the USDA Natural Resources Conservation Service, Yadkin County, and Yadkin County Soil and Water Conservation District. Designing both a large high hazard roller compacted concrete (RCC) gravity dam and zoned earth embankment on a variable foundation presented considerable challenges. Particular attention was needed at the connection between the two dam types where differential settlement and seepage may occur. The Deep Creek project included the first use in the United States of grout enriched roller compacted concrete (GERCC) as the sole upstream barrier.

**Dr. Brian Crookston** was recently invited to join the prestigious Committee on Hydraulic Structures of the International Association for Hydro-Environmental Engineering and Research (IAHR). This group of individuals is comprised of world-renown researchers and professionals who champion subject area research with regards to design, planning, construction, and life maintenance. He will be attending their biannual meeting this September in Chengdu, China.