

Motor Task Chunking

by R. Salvador Reyes [Excerpted from “Narrative Complexity: A Consciousness Hypothesis,” Essay #5-Free Will & The Unconscious, pp. 200–203.]

Apologies for the *academic-paper-ish-ness* of our section heading here, but the poet in me (which is, oddly, how I began my brain expedition) could not resist the strange, thick music of the words: *Motor Task Chunking*. And the words do, indeed, describe exactly what we’re going to discuss: the chunking of the consciously-attended-to “grab the mug, bring it to my lips, sip” into the almost-entirely-unconscious *coffee*.

The best place to begin exploring *Motor Task Chunking* (okay, I’ll stop) is way back in those pre-language mammals (like dogs & primates) who use modularly-constructed proto-narratives in the process of recording high-priority experiences & building dynamic cognitive responses. In those early minds, in order for the modular components of this cognitive process to trigger actual actions (which is the whole point) those components would have to link to specific & appropriate motor scripts. (The thalamus’ & basal ganglia’s switchboards aid in transmitting & processing those often-competing cognitive & purely-reflexive motor scripts en route to the motor cortexes that coordinate their execution—something we’ll discuss in more detail later.)

In humans, this cognitive process is overtaken (& powerfully, exponentially enhanced) by complex language. Nonetheless, the same fundamental relationship exists (as it *must*) between those narrative components & motor scripts. Thus, in humans, the words of our internal dialogue can (and often *do*) lead directly to actions. (Although—to give an awfully revealing *sneak preview* of our ultimate verdict on free will—the motor instructions that result from those words are likely triggered by the just-generated dialogue in the micro-moment *before* the dialogue’s appearance within our Dynamic Core allows those words to be *heard* by us.)

In this system, the more complex & elaborate the motor script you can tie to a single word or thought, the more efficiently your consciousness can “off-load” the handling of full, multi-step motor sequences to those motor systems (sequences that our consciousness doesn’t *really* need to be involved with). When we first learn a complex sequence, those full, multi-step motor scripts simply don’t exist yet. Thus, we need to cognitively break that sequence into the smaller components for which motor scripts already exist. ⁴

This means we have to actually *think* the words that trigger those smaller, already-learned components: *grab the mug, bring it to my lips, sip*. This is obviously a fairly inefficient way to drink something—and a pretty criminal misuse of those magnificently creative & robust systems of human consciousness. Our brain is *very* interested in getting a full, multi-step motor sequence in place for this mundane (but still very necessary) action so it can trigger it via that *blink-of-an-eye* “coffee”—and thus, keep its valuable conscious energy focused on more rewarding matters (like the *invaluable* insights coming forth from the *Today* show’s Hoda & Kathy Lee as you drink that morning coffee).

When we’re *hoping* to trigger one of those fluid, multi-step motor scripts (usually one learned through intense practice) but *instead* end up *thinking* ourselves back into those less-fluid un-chunked component scripts, it has a specific & feared name: *choking*. This is why it’s so bad when a Major League second baseman starts to freak out and *think* about the actual physical act of throwing the ball to first base. Suddenly that fluid, multi-step motor script is being interfered with by those cognitively-expressed smaller, component (& less fluid) motor scripts that are now actively *conflicting* with the more fluid one.

In an act as precise as throwing a baseball at the velocity that a Major Leaguer does, any tiny hitch or *oh-so-momentary* conflict in

what muscle is doing what (because you suddenly can’t stop *thinking* about the various aspects of throwing that baseball) can have professionally-disastrous results. This is also exactly why the *anxiety* produced by *worrying* about whether or not you can make the throw leads to the same problem that likely seeded the doubt (*all too often: one bad throw leads to another*).

Back in essay #2, we explained how those pain-based (or *survival*) emotions are designed to make our actions & thinking less fluid in favor of a more “hyper-aware” state. (Essentially, a decrease in focused, fluid attention is the cost of an overall lower-risk & diffusely-attentive state.) When we’re nervous or anxiety-ridden, our brains are predicting a bad result from the upcoming action or event, and thus, want us to *slow down & think about this! And don’t just stare at the problem—look around & see if you can come up with something better!* These are not the ideal neural conditions for throwing out the runner at first.

And this kind of problem is, essentially, a case of our *conscious mind* sticking its nose in where it doesn’t belong—and where it *claimed* to supposedly have no interest, which is why we built the multi-step motor script in the first place. But our consciousness is like the ultimate *helicopter parent*—and as soon as it suspects that you’re about to make a *valuable mistake* (the anxiety tattled on you), it has a tendency to step in and try to assert its ever-guiding

influence over the whole matter. Although this can occasionally lead to some embarrassing scenes in front of your friends (or 50,000 baseball fans)—more often than not, when it really counts, the *hesitation* being counseled by our consciousness is *exactly* what the situation calls for.

When this whole process is working efficiently, however, it can allow someone like an experienced pitcher to calmly survey the batter, devoting all of his conscious mental capacities to the many nuances of this momentary conflict between them. Because he has learned & developed the highly-fluid & elaborate motor scripts necessary to enact widely-varied versions of throwing the ball, he can trigger a series of complicated actions via the tiniest part of a cognitive thought (& some closely-related, suddenly-applicable complex script might even step into the process essentially *unconsciously*—like reflexively zipping the ball to first base when he ever-so-slightly detects the runner leaning a little too heavily toward second).

With his cognitive processes freely devoted to his engagement with the batter, the pitcher can bring all of that additional data to bear on the execution of the complicated, unconscious & fluid motor scripts. Instead of worrying about the actual act of pitching, he's calculating the nuances of the entire pitcher-batter conflict. It's the difference between a Little League pitcher & an experienced hurler. Without all of that

practice in turning smaller component motor scripts into multi-step scripts—the complicated act of throwing different pitches to different batters in different game situations requires so much conscious cognitive work that there's simply *no room at the neural inn* for calculating anything like nuance.

So, besides how the words *sound*, that's what's so great (& occasionally vexing) about *Motor Task Chunking*.

###

FOOTNOTES:

4. Wymbs, Nicholas F., et al. "Differential recruitment of the sensorimotor putamen and frontoparietal cortex during motor chunking in humans." *Neuron* 74.5 (2012): 936-946.