Tectonic shift: a scientific account of my young adulthood

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Tectonic Shift:

A Scientific Account

of My Young Adulthood

A Thesis

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Master of Arts

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By

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Foreword

This project began with an early version of “Still on My Brain,” that is unrecognizable compared to what you will find in the following pages. It was supposed to be a part of my thesis at Columbia College Chicago, where I had planned on getting my MFA in creative nonfiction.

But I decided after a year at Columbia that their MFA program was not for me so I transferred to DePaul University's Interdisciplinary Studies (IDS) program, which allowed me more flexibility to take a variety of writing classes across academic departments. When it came time to think about my IDS thesis, the underlying themes of “Still on My Brain” continued to tug at a corner of my mind, so I decided to revise it and go from there.

*Tectonic Shift* evolved from my desire to examine the role that science has played in my life: as a student, a Jewish American, a friend, a daughter, a writer. In a way I also consider this project, which deals mainly with my young adult years, as a sequel to my undergraduate thesis, *Crisis Averted*, which was a memoir of my grade school education. While being misunderstood as an individual was the unifying theme of *Crisis Averted*, my personal search for understanding is what ties together the pieces in *Tectonic Shift*.

In the following pages I explore everything from my views on creative nonfiction to my burgeoning fossil collection, all in the context of my larger quest to understand myself and my place in the world.

The question I set out to answer in the following pages—how have my ADHD diagnosis and my subsequent love affair with science helped to shape the young woman I have become?—is one that has framed much of my thinking in the years since I completed my undergraduate degree. During the *Crisis* years, I did not consider my mind a refuge I could escape into to save myself from the chaos of the world around me. But after my diagnosis I discovered salvation in science.

Then I discovered science writing by some of the great thinkers and writers of this age: Richard Dawkins, Natalie Angier, Daniel Dennett, Steven Pinker, and Bill Bryson, to name just a few. *Tectonic Shift* is my way of sharing what happened next.

“Manifesto of Ros’ Writes” explains the usefulness of the creative nonfiction genre in telling my tale, which I jump right into in “Still on My Brain.” This chapter shows readers what life was like before, during, and after my aha moment—the opening up of my mind to the world around me after
receiving my ADHD diagnosis and beginning to undergo treatment.

“Evolution, ADHD, and Education” illustrates in more detail the significance of my newfound awareness and how it led me to discover my inner love of science—evolution in particular. But the next chapter, “God Forbid,” reveals that this inner awakening to the wonders of science also led to inner conflict about what I had earlier held to be infallible truths about life.

“Scenes from a Curious Young Adulthood” shows how I was able to overcome my existential worries by finding solace once again in the scientific mindset—this time as an amateur fossil and rock collector.

“Inherited Trauma” is my way of coming to terms with my past and also paving the way for a future filled with unlimited wonder and possibility. I end Tectonic Shift with a look forward in “So What Happens Next?” which provides a glimpse into the bright future that I hope lies ahead.
Manifesto of Ros’ Writes

Preface

A specter is haunting readers—the specter of order in creative nonfiction.

Where is the writer in opposition who has not been decried as a defiler of the genre by his or her fellow nonfiction writers?

As a result of this tension, an artificial division has arisen between order and randomness in creative nonfiction, a division that begs to be destroyed.

To this end, I have written the following manifesto, to be put forth for the world to read.

I. Readers, Writers, and Randomness

The history of the relationship between randomness and meaning in nonfiction is a history of struggle, a history that has sometimes left readers in the dark, confusing them.

Is there such a thing as too much order in nonfiction? Too much randomness? I have a feeling that more people would say “yes” to the latter than the former. But I argue that randomness is a good thing because it keeps writers from boring and/or patronizing their readers.

First: When I say “order” I mean narrative structural order, the most common modern-day method of which is to tell a story chronologically. That is, from A we progress to B, from B we move forward to C, C leads into D, and so on.

Telling a story that way makes sense but lacks excitement. Where’s the thrill of the mystery if we start with the murder rather than the moment when the detective arrives on the scene and begins to work his way back through the details of the case?

Second: When I say “order” I also mean a rational, straightforward way of portraying the subject matter in a nonfiction piece. That is, a story about apples discusses the different varieties, how they are grown and where, and perhaps how to eat them as well—the basic facts.

Telling a story that way makes sense but it doesn’t provide the readers with much of an imaginative challenge. Wouldn’t it be much more interesting to talk about all of that fruitiness in the deeper context of famous apples in history—from the temptation of Adam and Eve to Isaac Newton’s great
revelation to Johnny Appleseed’s place in American folklore?

Randomness makes nonfiction so much richer.

II. Making Nonfiction Creative: Form

Creative nonfiction emphasizes creativity of technique.

Tim Bascom wrote a great piece about narrative technique called "Picturing the Personal Essay: A Visual Guide" for Creative Nonfiction magazine’s Summer 2013 issue. While the title implies that the shapes he describes are best fit to essays, I believe that most of the same formal principles can be applied to creative nonfiction works in general.

I employ a number of different formal techniques when writing creative nonfiction—collage, disconnectedness, nonlinearity, synchronicity—but my favorite is segmentation.

As Bascom writes in praise of this method: “Today, many essayists are comfortable simply letting go of the overarching story line...so they can organize disparate scenes in a more segmented fashion, separated by bits of white space. All that remains to unify the parts is an almost imperceptible thread of theme, not narrative.”

The segmented form lends itself especially well to blogging, as with my Crisis Averted pieces posted on Ros Writes. Each post in Crisis is written as a single year in my grade school education, but an underlying theme—that of the role of my childhood experiences as someone living with anxiety induced by undiagnosed ADHD in shaping the way I perceive my past self—ties the pieces together into a unified whole.

III. Making Nonfiction Creative: Language and Tone

But creativity of form is just one technique that is available in a nonfiction writer's toolbox to make their works creative. You can also use creativity in language and tone.

Every writer has been told at some point in their lives to "show, not tell." Creative language is the best way to do that.

For example, there’s this sentence, which I used in an early draft of “Scenes from a Curious Young Adulthood”: “It was really hot on the train.”

And there’s this edited version of the sentence, which I ended up using: “The car's doors closed and
the train departed the station before we realized [that the air conditioning was broken], but the heat was so stifling that neither of us had the energy to get up and move to a different part of the train.” Do you see (and feel) the difference?

Tone is closely tied with language and form as another technique to add creativity to nonfiction.

In the case of this piece, it is clear (I hope!) that I do not intend to be taken 100% seriously, but at the same time I am trying to convey my beliefs about what I consider to be an important issue. In other words, I’m saying “the issue is important but I don’t take myself too seriously in writing about it.”

IV. Keeping it Real without Crossing the TMI Line

As the genre’s name implies, nonfiction is not fiction—it is based on the real deal. But there is such a thing as Too Much Information.

In “The Danger of Disclosure,” Roxane Gay writes of online publishing: “I have things I want to say. I know disclosure can be dangerous, but still I want to speak. I want to share my opinions. I want to provoke conversations. I want to leave my mark. But publishing online, like looking at Medusa, is fraught. You will inevitably get more than you bargained for.”

It’s important to remember that in today’s world, chances are your writing will somehow make it online, though it may start out in print.

So your letter to the editor of the local paper may not stay local for very long. If you say something in your letter that crosses the TMI line, you may find yourself attracting unwanted attention from people who don’t know you from Adam or Eve that have read your piece online and want to let you know how they feel about it.

Let’s face it: there are some crazy people out there. During my undergrad years, I wrote a letter to the editor of the Indy Star about the importance of separation of church and state in American public schools. The day the letter was published, my parents called me to let me know that a drunken man identifying himself as a doctor left a threatening message on their home answering machine.

The “doctor” called me a “Communist Baby Killer” and told me to “go back to [my] own country.” My parents, who were going out of town that weekend, were spooked enough to call the police. After reading the letter that had caused this commotion, the police officer said he agreed with what I had
written. Unfortunately, there was no way of tracking down the drunken doctor, but the officer promised to increase surveillance efforts near my parents’ home just to be safe.

I tell this story not because the letter to the editor in question crossed the TMI line, but rather to illustrate the point that anything you write has the potential to be read (or misread) by anyone out there. As far as the dangers of crossing the TMI line are concerned, it is important to remember that, despite our best efforts, we simply cannot tell all of the ways that people will interpret what we write, so even our most carefully worded statements have the potential to be misconstrued.

This is especially true when publishing online, where providing the right amount of context is key—if your reader comes from a completely different culture than your own, you cannot dictate how your writing will be interpreted by them, but if you deliver your message using clear, succinct, and unambiguous language, you have a much better chance of getting your desired message across.

V. Approaching the TMI Line in Order to Attain Freedom

On the other hand, disclosure can be cathartic, especially when it is done in an online setting. Gay writes: “For me, one of the biggest draws of the Internet has always been how I can be alone and yet find connection with other people...Writing has been part of my life far longer than the Internet. Even before I understood what I was doing, I was writing. When I realized I could share my writing online, it was an interesting convergence.”

While editing Crisis Averted for publication on my blog, I reached out to a few of my childhood school friends to see if they remembered any of the experiences I had written about. To my surprise, most of the events I could recall in vivid color were mere wisps of black and white memory to my friends. They were shocked to find out that I had suffered so much throughout the course of those years. I found the unburdening of my past—for both my friends and anonymous readers alike—to be therapeutic and freeing.

VI. Ros’ Rules for Creative Nonfiction

In order that I may call myself a true writer of creative nonfiction, I have set forth the following rules:

1) Tell it how it is, not like it is. That is, convey the truth without boring your reader to death with insignificant details.

2) On a similar note, if it isn’t emotionally compelling to write, it’s not going to be compelling to
read. Put the *creative* in creative nonfiction using various stylistic techniques.

3) Beware crossing over the TMI line.

4) At the same time, don’t be afraid to be true to yourself.

**Conclusion**

I've almost never been afraid to be true to myself. Not in the way I live my life, not in the way I express myself through writing. Looking at randomness as a way to make meaning in my life has always come naturally to me, though for the first fourteen or so years of my life I didn't know why this was so.

In writing this manifesto I have remained true to my earlier statement that randomness is a good thing. Now it’s time to put my own rules to good use. At the same time, I will break those rules by starting at the beginning—the beginning of my journey to the center of my mind.
Still on My Brain

The beautiful days are long gone

Parkland, Florida is not on anyone’s to visit list. Nestled between West Palm Beach and Fort Lauderdale, and about an hour’s drive north of Miami, it is often described as an affluent city that, until the start of the 21st century, had neither stores nor traffic lights located within city limits.

Ros lived in Parkland from around the time of her fifth birthday in October of 1993 until the day after her freshman year of high school in June of 2004. Life in Ros’ family before her diagnosis was stressful, frustrating, and tense. In other words: not the ideal emotional environment for childhood. But none of this was anyone’s fault. The family wasn’t in dire straits financially. Her parents were as loving and supportive as could be. Ros and her younger brother got along pretty well.

For the most part it appeared that all of her problems were “in her head.” Ros considered herself a pretty smart person, so she couldn’t figure out why she was unable to think her way out of this internal mess. It took fourteen years for her to start to understand the answer to this question.

But throughout those years, Ros found solace in Justin Timberlake. From the boy band *NSYNC’s rise to prominence in America when she was nine years old, through the beginning of Justin’s solo career shortly after her diagnosis, Ros relied on the music to provide her a refuge from the chaos within and without.

It wasn’t the meaning behind the lyrics that comforted her—she was far too young to be thinking about romantic love at the time—nor was it the pre-teen fantasy that one day she and Justin would be together—she wasn’t delusional either. No, it was something else, something that defied explanation that drew Ros to Justin Timberlake all those years ago and continued to keep her hooked more than fifteen years later.

Whatever it was, Ros found herself listening to his music as if it was a meditative Gregorian chant on her portable CD player in the car on the way to school each morning, and in her bedroom on her boom box once she got home in the afternoons. The indefinable something calmed her and reminded her that somehow, somewhere, there was inner peace to be found.

I can’t seem to breathe

The two girls were grooming their horses at the stable when the frantic woman appeared before
them, demanding to see Ros’ aunt, the other girl’s mother. Their fantasy broke and the horses turned back into the bikes that they actually were. Impelled by the desperation in the woman’s voice, Ros and her cousin raced up the driveway in search of the nearest adult.

When her aunt joined them on the driveway, all the woman had to say was, “my daughter is missing” for the calm afternoon in south Florida to turn turbulent. The color drained from her aunt’s face and she ordered the girls to go inside.

Ros watched from her cousin’s bedroom window, heart pounding in panic and head spinning in confusion, as her aunt and some other neighbors headed straight for the lake behind their houses. Years later, she would still remember the moment she realized that they were afraid an alligator had snatched the girl and devoured her in the murky waters. Ros’ stomach dropped out of her abdomen and a wave of nausea made its way up her throat. Her body was covered in a cold sweat that had nothing to do with the humming air conditioner and the overworked ceiling fan rotating above her.

The next half hour or so passed in a blur. While her cousin soon lost interest in the search, Ros’ mind stayed focused on the worst case scenario with laser beam precision. Even when the missing girl was located—alive, hiding under her mother’s bed—it took a while for Ros’ panic to subside. As always, it left her feeling physically and mentally exhausted and unable to easily rejoin her cousin in the idyllic pastures of a child’s imagination.

* * *

Before her diagnosis, Ros was ambivalent towards anything outside of the reach of her immediate consciousness. Therefore having a scientific mindset was the least of her worries. Her scientific knowledge came from her formal schooling; that is, from various science teachers who ran the spectrum from mind-numbingly boring to mind-bogglingly odd, and Bill Nye videos.

It all started with her elementary school science teacher, Mrs. High, who was known for having large breasts and bad teeth, and always wearing ‘80s floral print dresses with lace collars and shoulder pads. (This was the ‘90s and shoulder pads were on their way out, if they weren’t 100% out already.) The only thing Ros remembers learning from Mrs. High is a song about cells:

One small single cell is living
It eats and moves and grows
As it undergoes mitosis
That one cell becomes two
Outside the cell is a membrane
That lets things in
Like food, air, water, and waste
So what you need to realize is:
Cells are cool!

And a ditty about the definition of dew point:

Dew point, dew point:
It's the temperature of the air
At which water condenses.

(There's a reason Ms. High taught science and not music.)

Middle school science wasn't much of an improvement. In eighth grade Ros learned how hard it is to be a single teen parent when she and her classmates had to “raise” hollowed out egg shells they had decorated to look like infants on a set monthly budget picked at random from a hat. With her luck, Ros had to raise twins on the lowest budget in the class.

She didn't (and to this day still sort of doesn't) understand how this was a science project and not a math project or perhaps a home economics project—not that her middle school even offered home ec—but then again, she had a lot of more pressing issues on her mind, like whether or not she would make it through the school day without having a panic attack.

At the time, school was an exercise in physical and mental endurance, not an enriching personal experience during some of her most formative years. A constant state of anxiety was the status quo for Ros. She lived in what she came to refer to as “survival mode.” But no one, herself included, knew why this was.

A typical anxiety attack came on gradually as the source of Ros’ panic neared. (This was usually the case, but occasionally Ros experienced a sneak attack—an unexpected event that led her symptoms to come on all at once.) Triggers included everything from the prospect of going out to a restaurant to eat dinner with her family to attending a school play.

For the first few hours leading up to the trigger, Ros felt an impending sense of doom deep in the pit of her stomach. Soon she could barely eat, overtaken by waves of nausea. Then came the headache, which left her so debilitated that all she could do was lay down on the nearest flat surface and cry. If she still felt threatened by the upcoming event, she might reach the point of vomiting. This usually got her out of having to face whatever it was that her body didn’t want her to face. But this was no
consolation to Ros, who just wanted to be able to enjoy things that everyone else seemed to take for granted.

**Feels like it hasn’t been that long...**

Dr. Jaffe’s was not the first psychologist’s office Ros had ever visited. It was the third. The first psychologist had diagnosed her with a general anxiety disorder back in fifth grade. The second had tried to treat said anxiety disorder a year later, with little success. Now Ros was on the cusp of entering high school and still she was plagued with this constant fear that she was missing some vital piece of information. This was coupled with a sense of foreboding, a state of mind that led to ever-present headaches, nausea, panic attacks, and vomiting, despite being on Zoloft, a medication used in the treatment of depression, obsessive compulsive disorder, and anxiety.

As with the other psychologists, Dr. Jaffe asked Ros and her parents to describe her symptoms. Tired of repeating herself and sure that there was no solution to her problems, that she was bound to suffer forever, Ros looked to her mom to do the talking. Ready for this question, her mom had come prepared with a written list.

“Frequent headaches and stomachaches, fear of trying new things, doesn’t like to be away from her father and I, automatically assumes the worst-case scenario, sensitive to noise...” She recited each item.

“Wait.” Dr. Jaffe held up his hand. Her mom paused and Ros and her parents watched as he stood up, walked across the office, stopped in front of his bookshelf, scanned the items, and plucked a book off of the shelf.

Returning to his chair across from them, he rifled through the pages until he found what he was looking for.

“Tell me, does this sound like Ros?”

Dr. Jaffe proceeded to list off some behavioral and psychological symptoms that sounded eerily familiar: they described Ros all too well. When he finished, Ros’ family waited, wondering where the doctor was going with all of this. They soon found out.

“Those are the diagnostic criteria for ADHD.”

After Dr. Jaffe’s words sunk in, Ros’ initial thought was, “There’s no way I have ADHD. That’s for
hyper kids who get bad grades even though they're really smart sometimes. I always get good grades and I'm not hyper. At least, I don't think I am…"

She did not voice this thought aloud, nor did she believe her own weak self-denial.

Over the next month, Dr. Jaffe put Ros through a series of computer-based and verbal tests. The one that solidified her diagnosis involved staring at a computer and clicking the mouse every time a tiny black dot flashed on the white screen. Ros knew that if she really had ADHD, she would eventually lose focus despite her best efforts and her performance on this attention-based test would drop. As expected, it did.

By the end of July, the official diagnosis was in: ADHD, predominantly inattentive type. Dr. Jaffe recommended that, in addition to his counseling, Ros should see a psychiatrist to discuss medication options. The psychiatrist prescribed Adderall.

Psychiatric medication may not be appropriate for everyone, but it certainly was for Ros. Within 48 hours of taking the first pill, the dark, distracting, stifling clouds that had been in her brain for fourteen years disappeared. As the song goes, she could see clearly now that the rain was gone. With the start of high school fast approaching, she was, for the first time in her entire life, almost eager for August to come to an end and the school year to start.

I can't get you off of my mind

Ros then experienced her aha moment—the explosion of her range of consciousness from the basic concepts she needed to survive to a much wider spectrum of ideas that would enhance her existence. Concepts began to click into place in her mind like Lego blocks, and instead of constructing some haphazard mess of a structure she started to see a clearer picture: it was her mind, focused. And with focus came room for understanding.

Suddenly, everything she had learned in school seemed to make sense on a much deeper level. Even things she learned in Hebrew school, which she had never thought would be applicable anywhere outside of temple, became part of a bigger picture when she studied the Abrahamic religions in public school geography class.

Ros didn’t just know that the word Abrahamic meant a religion whose followers are descendants of Abraham; she also knew that the word implied certain similarities in basic tenets between Judaism, Christianity, and Islam, beliefs that dated back to their common origin with Abraham. Her
newfound ability to apply previously acquired information to new topics exhilarated her.

Whereas prior to her diagnosis she had accepted school as a fact of life, an exercise in the memorization of disparate pieces of information in order to be able to regurgitate these tidbits back onto paper in the event of a test or quiz, Ros now wanted to retain that information and make sense of it. Learning across subjects became interesting and she started to see the purpose behind a formal education.

School was not a test of mental endurance; it was a means of personal enrichment. It got to the point where she liked the idea of school so much that she would become angry at her peers when they showed no such enthusiasm for learning. They seemed to expect that, since they had already reached high school, most of them in the gifted program, they should be allowed to play cards in class instead of discussing *Catcher in the Rye*.

The reality of the public school system that she was in soon came crashing down upon this dreamlike picture Ros had painted of education. She knew that the change she desired would have to come from within when her social studies teacher desperately asked her to write a thank you note to a Holocaust survivor whose presentation she hadn’t even attended because, to use the teacher’s words, “You’re the only student who knows how to write a complete sentence.”

Yes, it was then that Ros realized that if she wanted to immerse herself in the learning process, she would have to take the initiative herself and show her teachers that she wanted to know more. Much to her surprise, the first subject to present her with an opportunity to do so was her least favorite subject after math: science.

It started with a month-long unit on human evolution in her freshman Earth Sciences class. Prior to this unit, Ros had had no knowledge whatsoever of Darwin’s groundbreaking theory. She had heard the word “evolution” before, but had no idea what it meant in a scientific context, or that it had such a controversial political nature to it as well. In hindsight she was able to attribute this utter lack of awareness to her being in “survival mode” for so long. She just didn’t have the mental energy to pay attention to anything that wasn’t required information.

Now that she had a basic understanding of this theory, Ros wanted to know more. Something deep inside her had awoken and was telling her that there were huge worlds of understanding waiting for her discovery. While the unit on evolution barely provided a tiny glimpse at the awesome potential of a scientific understanding of the universe, Ros grasped onto this way of thinking that
would change the way she interacted with the world around her.

_Girl you know me inside out…_

In graduate school Ros began blogging about her memories of grade school for a project in her digital publishing class. In beginning this project—which turned out to be therapeutic—Ros realized that she needed to hear perspectives other than her own in order to fully understand and begin to grapple with her experiences. She asked a few of her friends that she had known since junior high what their perceptions were of their time in school together.

Jenn and Ros were best friends in sixth grade. They were about as opposite as two people could be. Jenn was Korean, adopted into a strict Catholic family, a child model, social and outgoing, with a bit of a rebellious streak in her. Ros was none of these things. And yet the girls bonded in sixth grade shop class and soon became inseparable. Jenn was a firsthand witness to Ros’ regular panic attacks. Here’s what she had to say...

_Ros:_ Was my anxiety ever annoying to you? Or perhaps it was just baffling as to why I was nervous about the things I was nervous about?

_Jenn:_ I think I was mostly puzzled by your quirks. I don’t think it ever annoyed or bothered me, per se. I just didn’t understand. In hindsight, I was very immature and naive to people’s personal issues. Nonetheless, I liked you all the same.

_Ros:_ How would you describe our time in school together?

_Jenn:_ I liked being your friend. Even though I didn’t quite get you all the time, I remember feeling that I thought you were always sure of yourself? I don’t know if that’s quite the phrase I want or not. Like, middle school is such a hard time, and there was always pressure to “fit in.” But I felt that you didn’t care about that, and I think that helped me a lot. I liked having a friend who liked me and didn’t judge me.

To know that her anxiety, while all-encompassing at the time, was not the characteristic of her personality that defined her to her friends, was comforting to Ros in retrospect. She was shocked to find that some of her friends were almost completely unaware of the mental turmoil she was going through. She thought that this aspect of her being was all people would have noticed about her. Like being diagnosed back in 2002, it was almost a relief of sorts to know that she had made a positive impression on people at a time when she was so unsure of herself. Jenn said it best when Ros asked
her this question: *If present-day you could go back to school-aged me and give me a piece of advice, what would it be?*

**Jenn:** *It sounds like you've established a pretty good life, so I guess I would just say to past you "Hey! Keep doing what you're doing; your life turns out the way you want it to be...”*

**But will I win or lose if I go or if I stay?**

Right before winter break during her freshman year of high school, Ros' parents called for a family meeting in their bedroom. Her mom and dad sat at the head of their bed, Ros settled into the couch across the room, and her brother leaned against the dresser. They all appeared relaxed and at ease but her mom’s words sucked the calm vibe from the room like a vacuum.

“How would you like to move away from Florida?” She asked.

“Are we going back to Connecticut!?” Ros exclaimed, thrilled at the prospect of returning to her birthplace, even though she had only lived there for a few years.

Her mom shook her head. “We're going to Indiana.”

* * *

Ros’ family left Parkland, Florida for Carmel, Indiana the day after school let out the following June. Her dad and her brother drove off in the SUV, and she and her mom followed in the van. As they watched the house they had called home for almost eleven years disappear in the rearview mirror, they both started to sob.

Even now Ros could not tell you why she and her mom reacted that way. They were by far the most enthusiastic pair in the family when it came to this move. For one, they would be living near her mom’s parents. For another, Ros was already in love with her new high school, which they had visited a few months earlier.

The car pulled out of the subdivision and turned right, heading for the interstate highway that would take them north toward their new home. After their sobs had turned to sniffles, Ros pushed a button on the van’s CD player and Justin Timberlake put into words what she and her mother were unable to say.

*The beautiful days are long gone*

*I can’t seem to breathe*
Feels like it hasn’t been that long
Since you walked away from me
Now I can try to act real strong
But you and both know I still think of you that way
You should know...

*   *   *

Lyrics

Justin Timberlake: “Still on My Brain”
Evolution, ADHD, and Education

Evolution is my favorite scientific theory to learn about. I find that thinking about the origins of life on Earth, from the simplicity of single-celled organisms to the complexity of the human body over the course of billions of years is far more awe-inspiring than the most poetic entreaty to praise a divine creator for our existence that you could find in any of the world’s holy books. Contrary to what Young Earth Creationists say about things like inexplicable gaps in the fossil record making evolution untenable, I think the beauty of this theory is its ability to explain so much about life on Earth.

1. Evolution

There are some evolutionary concepts that I just cannot comprehend no matter how hard I try. It just so happens that Richard Dawkins writes about one of these ideas in his 2011 book *The Magic of Reality: How We Know What’s Really True*.

Despite Dawkin’s best efforts to spell things out in a way that is easy for the average reader to understand, I still have a hard time grasping these fundamental facts. But this is not a criticism of Dawkins’ explanatory abilities. It means that I have not yet been able to reword the ideas in my mind into terms that I can understand—the burden is on my brain to understand it, not on Dawkins’ words, which are pretty straightforward.

Nor does it mean that, since I can’t understand these ideas, I therefore do not believe their veracity. In fact, I very much believe they are scientific truths. I just feel like I’m missing a small but crucial element necessary for full comprehension.

But I am not frustrated by my confessed lack of understanding. Rather, I am amazed at what my mind can already comprehend, and I see the job of expanding my comprehension as a challenge well worth undertaking. The pleasure comes in meeting the challenge—in the moment when it all clicks and I feel the big picture in my mind get even bigger and clearer.

It could be something as simple as my recent realization that the word “luggage” has at its root the word “lug,” or something far more complicated like coming to terms with what “gradual” means in terms of species evolution. When it comes to this concept, my mind trips up right here:

“...[E]verything is gradual. You are Homo sapiens and your 50,000-greats-grandfather was Homo erectus. But there never was a Homo erectus who suddenly gave birth to a Homo
sapiens baby.

So, the question of who was the first person, and when they lived, doesn't have a precise answer. It's kind of fuzzy, like the answer to the question: When did you stop being a baby and become a toddler? At some point, probably less than a million years ago but more than a hundred thousand years ago, our ancestors were sufficiently different from us that a modern person wouldn't have been able to breed with them if they had met." (Dawkins 41)

At a basic level I understand what Dawkins has written and I accept it as the truth. But I cannot understand at a deeper level how there was not a clear, delineating child or generation of children that scientists could, if their remains were found, identify as the first Homo sapiens.

I wonder: Is there a genetic marker that most humans have that their predecessors did not? I don't know enough about the details of evolutionary genetics to answer this question. I'm sure this is something I could look into at some point, given enough time and access to the right resources.

I also wonder: In modern societies we have a concept known as "the age of majority." In the US, this age is 18 years old. At that point, a person is said to be an adult in the eyes of the legal system—no longer a child. Could an arbitrary date in the past be proposed as the line that separates humans from their predecessors? Perhaps this idea has already been proposed (and rejected?) and I've just never heard of it.

The fact that the modern age is, in the grand scheme of human existence, a mere blip on the radar (and pretty much invisible if you extend your view even further out to the lifespan of the entire universe), is proof to me that evolution is in fact still occurring in human beings. The problem is that human technology has advanced so fast in the last few centuries that it has left our genes behind to play catch up. Our increased awareness of this fact may help explain why conditions such as ADHD are being diagnosed more frequently in recent years.

2. ADHD

As someone with ADHD, this subject interests me because I am used to naysayers pointing to the increased number of diagnoses as proof that it is not a real condition worthy of treatment and accommodation.

Some people suspect that there is an evolutionary explanation for ADHD. The "Hunter in a Farmer's World" metaphor was first proposed by a former psychotherapist specializing in ADHD-turned progressive talk show host named Thom Hartmann in the 1990s.
The Hunter-Farmer hypothesis posits that the symptoms we today recognize as ADHD—distractibility, impulsivity, and restlessness—were an evolutionary advantage to our hunter-gatherer predecessors. But as we evolved into an agricultural society, people with these traits were outnumbered by farmers. Nonetheless, genetic “hunters” persist to the present day, albeit in much smaller numbers.

<table>
<thead>
<tr>
<th>ADHD Trait</th>
<th>This is a hunter advantage because...</th>
<th>But a farmer disadvantage because...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distractibility combined with the ability to hyper-focus</td>
<td>Constantly monitoring their surroundings</td>
<td>Agriculture requires a less distractible nature to remain on schedule</td>
</tr>
<tr>
<td>Impulsivity</td>
<td>Able to take action at a moment’s notice</td>
<td>Unable to maintain a steady effort</td>
</tr>
<tr>
<td></td>
<td>More willing to take risks</td>
<td>Risks won’t pay off if they are constantly erring on the side of caution</td>
</tr>
<tr>
<td>Restlessness</td>
<td>Provides the ability to be flexible and adapt to changes quickly as needed</td>
<td>Farming requires sticking to a long-term strategy in order to yield the biggest harvest</td>
</tr>
</tbody>
</table>

(Adapted from thomhartmann.com)

Recent studies in genetics have given credence to this hypothesis. A June 2008 New Scientist article reported that “a gene mutation tied to attention deficit hyperactive disorder (ADHD)” was found in a number of groups of nomadic and formerly nomadic peoples in Africa and South America.

Some of the groups studied had retained their ancestral nomadic lifestyle, while others adopted a more sedentary lifestyle in the 1960s. Two evolutionary anthropologists from Northwestern University, Ben Campbell and Daniel Eisenberg, suggested that the mutation is beneficial to the nomads because of the impulsivity associated with it, while it is detrimental to the settled groups for the very same reason.

Not everyone finds this idea that human genetics have been influenced in such a relatively short time span—thousands of years is not much on the timeline of human existence—100% credible. But there is something to be said about the differences in analytical decision making skills between
people with and without ADHD. That is, there may be a difference in people with ADHD’s ability to assess a situation and determine a course of action—to either continue focusing on the task at hand or change courses. Applied to Hartmann’s premise, this means that hunter-gatherers might have needed to continuously assess their current situation, thus spending more time on determining a course of action—people with ADHD are notorious for being indecisive—instead of focusing on continuing their current task.

Hartmann also proposes a reason as to why ADHD seems to be more prevalent in today’s culture, particularly here in America, even if in fact it is no more common today than it was a century ago: the shift to standardized testing-centered curriculum.

If you were educated in a one-room schoolhouse, you had to be a self-paced learner because the kid sitting to your right could be a few grade levels behind you and the kid on your left a few years ahead of you. But now we group children by grade level. The fastest learner has to slow himself down to meet the pace of the slowest learner or face endless boredom in the classroom.

At the same time, Hartmann says, the focus today is on content rather than technique. This emphasis on rote memorization, which dates back to the days when apprenticeships were replaced with more formal schooling, is incompatible with the hunter mindset. Needless to say, I was quite surprised when a similar view on the perils of a modern education was espoused by Richard Dawkins.

3. Education

I had the opportunity to hear Dawkins speak at Northwestern University this past October. He was there to promote his memoirs, but he spoke about a variety of topics. I was surprised at how soft-spoken he was, given the bold narrative voice of his writing. He had a slight lisp that, when combined with his English accent, made him sound like he came from an era entirely different from my own. (This, I suppose, is true considering the fact that he is old enough to be my grandfather.)

But the thing that stood out the most in my mind was his philosophy of education, which he formulated in his college years at Oxford, and how similar it is to my own beliefs on schooling. Like me, Dawkins had until his epiphany believed that education was an exercise in memorizing facts for regurgitation on exams. But then he realized that education is not what there is to learn, but rather how to learn.

Hearing this come from Dawkins’ mouth was a conformation for me. It affirmed the importance of
an interdisciplinary education that is not limited by anything other than the human mind’s ability to comprehend. That is, an education that is not limited by religious dogma or any other worldview-narrowing lens.

Which brings me to my next line of thought: When it comes to faith, what do I believe?

**Sources**

Richard Dawkins: *The Magic of Reality: How We Know What’s Really True*

Thom Hartmann: *Beyond ADD: Hunting for Reasons in the Past & Present*

Thom Hartmann: *Thom Hartmann’s Complete Guide to ADHD*
God forbid: an Experiment in (Dis)belief

Part 1: In Which Ros Asks Tough Questions

Ros soon found that Indiana was much different from Florida. While she felt isolated in Florida because of her inner struggles, in Indiana it was the outer tests of endurance that tried her ability to overcome adversity. Moving from very liberal, very Jewish south Florida to very conservative, very Christian central Indiana before her sophomore year of high school—which happened to fall right before the 2004 presidential election—it was no wonder that Ros soon found that she had not left the sense of isolation 1,200 miles southeast of her new home.

It was somewhere around the time that one of her classmates equated non-Christians with raw sewage that Ros began to question the value of a religiously-based moral upbringing. For some time she had felt that the religious practices of Judaism as observed at the temple her family belonged to in Florida were not conducive with ADHD. Services involved standing and chanting the same prayers for extended periods of time—in a language she could read and write, but not comprehend—followed by a sermon which, while delivered in English, was still incomprehensible and boring. This pattern repeated week after week, year after year.

Needless to say, Ros was less-than-enamored of this aspect of Judaism. But now she found herself questioning another side of religion: the moral teachings. She started with a subject that loomed large on her mind: that of suffering and the role of God in all of her travails.

She remembered evenings from her childhood spent trying to relax in the bathtub in an attempt to get rid of what appeared to be ever-present anxiety-induced headaches and stomachaches. Without the knowledge of how to consider her plight from a sophisticated philosophical viewpoint, she nonetheless found herself wondering what, if anything, she might have done to deserve this suffering.

Even though she was unable to put this idea into words at the time, Ros knew that adversity is a relative term. That is, adversity for one person is facing famine and starvation while adversity for another is dealing with chronic depression. While the former is considered a worse situation to be in than the latter, both can cause mental anguish in their sufferers to such an extent that they may find life unbearable. Your experience with suffering is relative to the kind of life you know how to live.
Ros was not a believer in Nietzsche’s adage that what doesn’t kill you only makes you stronger. Nor did she find it all too comforting when someone told her that adversity was God’s way of testing her faith. She thought that if God didn’t have serious faith issues himself, he wouldn’t need to test his creation’s loyalty to him. And what doesn’t kill you in fact physically or emotionally scar you.

She asked: why should we suffer in the first place? Having been raised in the Conservative branch of Judaism, Ros was never taught to believe in the Christian concept of original sin—in the sense that humanity still carries the guilt of Adam and Eve’s transgression in Eden—so she drew the conclusion that there was no reason to punish her for being born corrupted\(^1\). (Of course, this presupposes that such an event actually took place and is not meant to be interpreted allegorically rather than literally.)

Even if Adam and Eve did sin in partaking of the fruit of the Tree of Knowledge, Ros did not understand why, millennia later, she should have to pay for it. Being the moral person that she is, it made no sense in her mind for God to create man and allow him to suffer for no reason unless God just did not care. It’s as if he made human beings and then said, “Well kids, you’re on your own. Feel free to destroy yourselves and everything else I’ve created for you.”

According to Richard Dawkins this belief is in line with that of deism. “The deist God,” he writes in *The God Delusion*, “never intervenes [after the creation of the universe], and certainly has no specific interest in human affairs” (39). But was Ros really a deist?

* * *

Notes

[1] Oliver Leaman tells us in his book *Evil and Suffering in Jewish Philosophy* that this is a topic often discussed in Judaism: “Let us take it that according to the Jewish religion God is omnipotent, omniscient and good. Let us also accept that he has a particular interest in the fate of Jews, both individually and as a group. How is it, then, that so many individual Jews, either as individuals or as members of a group, have suffered in the world although they appear to be innocent of any wrongdoing? This is part of a question which certainly has broader scope, namely, why would a good God allow evil in the world?” (p.2) [Excerpt found via *Google Books*.

People often look to the Book of Job for answers on this issue. Yet the biblical text concludes (in a loose sense of the word) that there are a great many things about God which we cannot comprehend. This does not answer the question put forth; it just deflects it.
Part 2: In Which Ros Conducts an Experiment

If we suspend belief—or disbelief, as the case may be—for a moment and accept that God created man in his image as the Bible says, then The Sims computer and videogame series can best be described as a philosophical experiment in the biblical concept of the deity in reverse: what if God was made in man’s image and not the other way around? What would life be like then? Would it be any better or worse than it is?

Ros found these questions to be rather poignant. She knew that many Sims players create their human-like Sims simply to discover new and creative ways to destroy them, such as drowning a hydrophobic Sim or locking a Sim with no cooking skill in a tiny room with no doors that contains nothing but an oven. When they were younger, she and her brother used to spend hours laughing over their Sims’ demises. By societal standards, such players are not considered psychopaths because Sims are mere computer game characters.

Yet if anyone were to enact these scenarios on actual human beings, they would be labeled as psychopathic. That man is capable in the real world of such acts of evil doesn’t make an omnipotent supernatural life-giver that has the power to create or destroy entire universes look like the benevolent father figure whose existence Ros was told of in Hebrew school.

Some might argue that God gave man free will and man is choosing to destroy himself. This may indeed be true, but it still doesn’t make God look any less guilty in the grand scheme of things, as it appears that free will can enact itself in human beings through destructive means, as the actions of Sims players demonstrates in the virtual world, and terrorists demonstrate in the real one. So, Ros wondered, what would life be like in a world where man is God and he gave his creation complete free will? For the answer, she turned to The Sims 3 computer game.

In the game, the player determines the amount of free will they want their Sims to have: no free will, some free will, or high free will. Free will, no doubt determined by some complex computational algorithm, means “Sims do what they want without the player controlling their actions.”

The Experiment

For her experiment, which she conducted in the fall of 2011 while she was a student in Columbia
College’s nonfiction MFA program, she created herself in Sim form and decided to spend three Sim days experimenting with these different levels of control. Thus, free will was the independent variable, quality of life the dependent variable. Day one was the control, wherein free will was nonexistent.

As she sat on her bed one evening in her tiny studio apartment, laptop open on her lap, planning this all out, Ros thought she had designed a pretty solid experiment.

There were, however, a number of potential drawbacks to using this particular methodology in her quest to determine what life would be like if man were God (her hypothesis), but, short of the most unethical use of real people in such an experiment, or the expensive use of more lifelike artificial intelligence software, she believed it would serve its purpose well enough.

Thus she created her digital alter ego—Roz Sims. Ros assigned Roz the following personality traits: good sense of humor, over-emotional, bookworm, vegetarian, and hopeless romantic. As a virtual version of herself, Roz liked pop music, pancakes, and the color red. Her lifetime wish was to become a professional author.

**Day 1: No Free Will**

Ros spent the first day building some of her Sim’s basic skills. Having turned off free will, Ros determined Roz’s every action. Day 1 was extremely productive. Roz went to bed tired but satisfied, as indicated by her mood meter being full. Her creator (Ros) had been benevolent and made sure she accomplished life-enriching tasks that were both physically and emotionally rewarding.

**Day 2: Complete Free Will**

On Day 2, Ros gave Roz complete free will, meaning the computer decided what her Sim did based on the fulfillment of her basic needs: hunger, bladder, fun, hygiene, energy, and social. These needs are indeed basic—their fulfillment will not necessarily lead to personal growth; rather, it will lead to mere survival and, in the case of the “fun” need, sanity. With that in mind, Ros removed her hand from the computer mouse and followed Roz’s every move.

With no one to guide her, Roz dedicated the entire day to the pursuit of leisure, to the detriment of any personal growth or accomplishments beyond basic needs. If she were to have continued on in this way, she probably would not kill herself on purpose, but, upon her eventual death, her wishes and goals would have gone mostly unfulfilled, unless they happened to coincide with the
pleasurable activities she chose to pursue.

**Day 3: Half Free Will**

On the third day, Roz was allowed some free will; that is, Ros decided what her Sim’s first action would be, her Sim decided the second, and so on. Ros intend to make choices that would lead Roz beyond mere basic survival.

When her creator controlled some aspects of her life, Roz had a much more productive day than when she had complete free will. Yet she still took time to have fun for its own sake.

**Analysis**

Reality should reflect this need for a balance between work and play in an ideal world. Too much of either extreme—excessive pleasure with no productivity or excessive productivity with no pleasure—seems counterintuitive to a person’s wellbeing. However, such is not the case in reality.

When left to our own devices, as Ros believes we are, the majority of humanity tends to opt for the choices that bring the most immediate pleasure with no consideration for the long term consequences. In doing so we destroy ourselves and our world. This destruction may or may not be intentional, but Ros feels it is at the least a sad side effect of human nature. Ros sees some hope, however minute, in the few people who try to make the world a better place by looking at the big picture before acting. She wishes the rest of humanity would take notice of these people and follow their lead.

But then Ros thinks about how the environment has been destroyed for the sake of human convenience, and how some of the most powerful people on the planet are also some of the most hateful and destructive people in existence. These observations only strengthen her convictions about God.

If God indeed created human beings and left us to our own devices, he either forgot to endow everyone with an overall propensity for goodwill or he just didn’t care what happened to his creation, Ros thought. She realized that this sounded contradictory to her discovery that Roz Sims’ life was better when she controlled it (or at least aspects of it), but, whether she intended to or not, Ros had introduced another variable into the equation: benevolence. She played the part of a creator who had a genuine interest in her creation’s wellbeing. Ros did not believe that reality had proven humanity’s God to be quite so benevolent.
Notes

[2] For example, Forbes lists Vladimir Putin as the most powerful person of 2013. As President of Russia, Putin has either turned a blind eye to or participated outright in discrimination towards and violence against the LGBT population in a country where “widespread rejection of homosexuality” (to put it nicely) is common.

It should go without saying that history has yielded a plethora of other individuals and groups we could put in Putin's place to further illustrate this point.

Part 3: In Which Ros Tries to Come to Some Sort of Conclusion

What Ros Believed

Ros' earliest conception of God went all the way back to when she was four or five years old. She envisioned him as an ethereal grandfatherly figure in the clouds who was training his children and grandchildren (junior-Gods, so to speak) to take over the job he had been doing for thousands of years. (At the time she did not have any idea how long "thousands of years" actually is.)

Ros lived in Connecticut and she believed that God's grandson was looking down on New England from above. Like his grandfather, he was rather nebulous in appearance, though he had freckles and a baseball cap instead of a fluffy white beard.

But Ros' family was about to move to the southeast corner of Florida and she wasn't sure who would be looking over her then since it was so far away from Connecticut.

Faith in a Higher Power in the World of the Sims

While she didn't remember who she thought God put in charge of her new home in Florida, Ros found the parallels between how she envisioned the whole God thing to work when she was younger and how it is played out in The Sims to be rather uncanny. In both cases, the omnipotent figure sits at a control panel of sorts and manipulates various buttons and levers to mold the events in a person's life.

Unlike reality, however, Roz Sims had no obvious physical reminders of faith in her world—there were no places of worship in her town. Various holiday-related objects could be purchased in the game (Christmas trees, menorahs, etc.), but they were optional.
Despite the secular nature of her life, Roz seemed to have an awareness of the existence of a divine figure somewhere out beyond her world. When she was starving or about to pee her pants, she looked “through” the computer screen and waved her hands in desperation while yelling in Simlish, as if asking someone to intervene and help her out.

Perhaps humans, too, are born with this sense of awareness and, depending on how they are raised and the particular circumstances of their lives, they come to either believe or disbelieve in a divine presence that has their best interests in mind.

**Religion, God, and Human Nature**

While Richard Dawkins concedes in *The God Delusion* that humans may in fact be “psychologically primed for religion,” this does not lead to the conclusion that belief in a higher power is a useful feature to have. He compares it to a moth’s attraction to light: it was perhaps useful in the past but in a world where most lights that attract moths are artificial and (to them) fatal, such an internal feature turns out to be detrimental, rather than beneficial, to the moths.

So it may be with belief in the divine or supernatural in humans, Dawkins suggests. While once useful (i.e. as a child), human beings may outgrow the need for it in adulthood. And yet billions of people still hold on to their faith in a higher power. Dawkins and other atheists find this mind-boggling.

**What Ros Believes**

So where does Ros stand? Like the 20th century philosopher Bertrand Russell said, Ros “ought to call [herself] an agnostic,” because she doesn’t think it can be proven whether or not God exists, “but, for all practical purposes, [she is] an atheist.”

This may seem to fly in the face of the deist view she expressed earlier. But if she is being honest with herself, she finds Dawkins and others atheists’ arguments against God’s existence to be far too compelling to ignore. She again finds herself going back to the Judaic notion of a benevolent God: if she were to adopt the deist view that God created the universe with indifference and then left it to its own devices, such a view would fly in the face of her Jewish faith’s creator’s so-called benevolence, given mankind’s destructiveness.

So Ros combines personal experience with scientific and statistical facts and concludes that she is Jewish but does not believe in God. She still maintains her cultural Jewish identity, much to the
confusion of many people. They see the two labels—Jewish and non-believer—as being contradictory, but she does not.

Ros chooses not to label herself either atheist or agnostic. If someone asks her, she identifies with either term. While the argument against God’s existence is compelling to her, in her everyday life she lives with the unconscious assumption that a higher power might be out there, though he/she/it may not have any human’s best interests in mind.

**Postscript: A Conversation with When Bad Things Happen to Good People by Rabbi Harold S. Kushner**

*Kushner:* “God has a pattern into which all of our lives fit. His pattern requires that some lives be twisted, knotted, or cut short, while others extend to impressive lengths, not because one thread is more deserving than another, but simply because the pattern requires it. Looked at from underneath, from our vantage point in life, God’s pattern of reward and punishment seems arbitrary and without design, like the underside of a tapestry. But looked at from God’s vantage point, every twist and knot is seen to have its place in a great design that adds up to a work of art” (22).

*Ros:* The problem I find with this explanation—which Rabbi Kushner also sees is a less-than-adequate reason for suffering—is that it eliminates goodwill toward his creation from the trifecta of Godly characteristics (omniscience, omnipotence, and benevolence). People suffer unnecessarily because it makes a pretty picture for God to look at. That may be nice for God, but not for humanity.

*Kushner:* “Maybe God does not cause our suffering. Maybe it happens for some reason other than the will of God” (35).

*Ros:* This argument goes against the notion of God as omnipotent. Nothing should be outside of God’s power.

*Kushner:* “[Natural disasters] do not reflect God’s choices. They happen at random, and randomness is another name for chaos, in those corners of the universe where God’s creative light has not yet penetrated. And chaos is evil; not wrong, not malevolent, but evil nonetheless, because by causing tragedies at random, it prevents people from believing in God’s goodness” (61).

*Ros:* This argument has so many weak points. For one, it again negates the idea that God is all-powerful, because there are aspects of his creation outside of his control. Then there’s the
statement that there are places in the universe where God has not yet reached. Does this not contradict the idea of God as the creator of the universe? And there is the fact that evil and malevolent are synonyms, so saying that chaos is evil but not malevolent makes no sense.

**Kushner:** “No matter what stories we were taught about Daniel or Jonah in Sunday school, God does not reach down to interrupt the workings of laws of nature to protect the righteous from harm” (67).

**Ros:** Wait a minute. How do we know that God takes a hands-off approach if, generation after generation, we are taught to believe otherwise? Also, if what I was taught about God and suffering in Hebrew school was wrong, why was it being taught in the first place? It seems a bit counterintuitive from a formal education standpoint to teach students facts that are not really facts at all—and that can be easily disproved or refuted—and then hope that children are instilled with a love of learning. I guess I should feel grateful that I discovered a passion for learning despite all of this...
As my mom and I drove northwestward away from Florida towards Indiana, I noticed that in some places—particularly after we reached Kentucky—the highway was surrounded on either side by steep walls of rock. These walls had been cleared by dynamite to make room for the interstate, and I could see the layers of time that had been chiseled away so that mankind could commute from point A to point B in a timely manner. I was in awe of this sight. My mom, already tired from driving for most of the day, was less enthusiastic about this discovery. She just wanted us to get to Indiana before sunset.

One of the few things I loved about living in Indiana was the rocks. For the most part Florida has seashells, the majority of which are shell fragments bleached white by the sun, completely indistinguishable from one another. The sheer overabundance of these shells, which I noticed were mixed in with the scorching hot pavement that made up the roads, meant they did not stir much curiosity within me.

Rocks, on the other hand, are different. For one thing, there are so many kinds of rocks to be found outside of the Sunshine State. They come in all kinds of shapes and sizes and, because they are distinguishable from one another, their types and approximate ages can be figured out by even an amateur geologist.

A common question that people who believe in a higher power have for nonbelievers is “How do you explain the magic and beauty of existence without God?” My answer is one word: rocks.

Rocks are evidence of the wonders of the universe. To me, they are the true miracle. Looking at the layers of a sedimentary formation on the side of a Midwestern highway, I am overwhelmed by the fact that I can reach out and touch something that existed long before the first humans had even reached this continent.

So naturally I started collecting rocks after arriving in the Midwest. I soon had a decent collection, enough to fill a basket I had woven in fiber design class at my new high school as well as a few mason jars.

**Part I: In Which I Play in the Mud**

*Fishers, Indiana: circa 2007*

My aunt and uncle, who lived in the next town over from us, had a fire pit dug in their yard. Before it
was completed, when it was still just a deep hole in the ground, I saw tons of rocks sticking out of the mud—the rain had delayed the completion of the fire pit—and asked if I could go in and get them.

My aunt and uncle were confused—this was behavior they would expect from their elementary school aged sons, not a female high school student who ostensibly should be more interested in texting boys from the safety of the couch in their living room than standing shoulder deep in a hole in the ground, digging through brown muck with her bare hands.

Nonetheless, I rolled up my pants, took off my shoes, and jumped in. I got some amazing finds from that dig, including a triangular slate grey rock with a rusty orange vein running through it that had been split smoothly across the top, making a rock sandwich of sorts. The time spent in the mud pit was well worth the thorough scrubbing I had to give myself afterwards to remove the dirt from beneath my fingernails and between my toes.

Part II: In Which I Discover My First Fossil

Carmel, Indiana: circa 2007

When I go out on digs—that is, when I stumble across tons of rocks to choose from and I can’t take them all with me—I base my choices on a few different factors.

1. Size. This depends on what kind of bag I have with me when I’m out collecting rocks. When I went camping in Gatlinburg, Tennessee with two of my friends during spring break of my senior year of college, I had a backpack, but it had to fit all of our stuff for the day in it, so I had to satisfy myself with filling my pockets with a few smaller rocks. Other times I have planned ahead and brought large Ziploc bags with me to store my finds in.
2. Color. I like to go for rocks that have many different colors—even if that just means multiple shades of grayish white.
3. Texture. I love rocks that have been smoothed down by years spent in a streambed.
4. Striation. The reason I look for rocks with lots of horizontal stripes is because these stripes serve as a visual reminder to me of just how old they are. Each layer is a representation of thousands of years of history.
5. Shape. I add rocks of unusual shape to my collection at this point, if for no other reason than to add variety.

Around the same time that I made my exploration of my aunt and uncle’s fire pit, I went on a bike ride along the White River, which ran through my town. As I rounded a corner on a path adjacent to
the river, I noticed a large whitish rock next to the road.

I stopped and got off of my bike to take a closer look. The rock reminded me of the car sized boulder we had in our front yard in Connecticut, where I lived from birth through the start of kindergarten. I remember climbing up that rock and sitting on its surface, which was always cool from the tall trees that shaded it and separated our house from the winding road upslope.

As I kneeled down next to this rock, I noticed something indented in it. I leaned closer and saw that it was an imprint of a tiny spiral shell fossil, maybe an inch and a half wide at most. I wanted so badly to take that rock home with me, but it was too big—the size of a dog at least, and much too heavy for me to lift. There was no way I would be able to carry it home on my bike.

Then I couldn't convince my parents to drive me back to the site of my find later either. To this day I consider it one of my greatest geological discoveries.

Part III: In Which I Find the Rib that Changed My World

Edinburgh, Scotland: July 2009

A world away from Indiana, my friend Jenny was getting impatient. She and I had been in the musty store for far longer than she had anticipated. Mr. Wood's Fossil Shop was not where she wanted to spend her afternoon. In her opinion, Edinburgh had far too many more interesting places to be.

Jenny and I had met during our freshman orientation at Butler University. We lived on the same floor in a dorm that mostly housed sophomores, so we spent a lot of time together adjusting to college life. She soon knew pretty much everything about me and put up with my quirks—one of which happens to be a serious case of indecisiveness.

So I will give Jenny credit. She stuck by me as I walked up and down the length of the shop, passing shelves full of fossils, teeth, and bones, debating whether I should purchase a piece of mammoth rib or a trilobite fossil. Not sharing my enthusiasm for geological relics, she wasn’t much help in making my decision.

Finally, I knew that the mammoth rib was the better choice. I took it to the register and watched as the man who I assumed was Mr. Wood wrapped the almost one hundred thousand year old bone in tissue paper. This was £20 well spent. Both of us were satisfied, so Jenny and I left the shop and continued forward on our Scottish weekend adventure, part of our three week study abroad course based in London that we took during the summer before our junior year.
I went with the rib because I felt it was more unique than the trilobite fossil, which could be purchased at fossil shops and museums around the world. A section of mammoth rib, on the other hand, was more likely to be on display in the museum rather than on sale in the gift shop.

There was another reason behind my purchasing this extinct proboscidean relic, one that I was not at first aware of. The cause of the mammoths’ demise is still up in the archaeological air: Did the global rise in temperatures and subsequent retreat of glaciers some 12,000 years ago do it, or was the arrival of humans in their habitat no mere coincidence? Were mammoths some of the first creatures whose blood stains our hands?

Knowing that I am in possession of a piece of the past that, were it not for my ancestral fellow Homo sapiens, might still roam the earth, made me feel a little less mad about the fact that even today billions of my fellow human beings don’t seem to care about the manmade demise of countless other creatures we share this planet with. I feel as if, by displaying this section of rib on a shelf in my apartment for all visitors to see, I am saying to the mammoth whose beating heart this bone once protected: *I haven’t forgotten about you.*

**Part IV: In Which I Acquire Two More Curiosities from Dave**

*Evanston, Illinois: August 2013*

As if it wasn't already a bajillion degrees outside in this unseasonably warm late summer month, the train car my friend Paul and I stepped into had no air conditioning. The car’s doors closed and the train departed the station before we realized this, but the heat was so stifling that neither of us had the energy to get up and move to a different part of the train.

We endured this unique form of torture all the way to Evanston, where we planned to visit Dave's Down to Earth Rock Shop. An hour or so later we arrived at Dave's, sweaty and somewhat nauseated from the ride in the sauna car.

But none of that mattered when we stepped through the dark wood framed, glass paneled door of Dave's. I didn't bother to stifle my gasp of excitement, no doubt leading Paul to roll his eyes.

“Go ahead and look around without me,” I said. “This is gonna take me a while.”

After about fifteen minutes of strolling from shelf to shelf, reading each item’s description, I hadn’t even covered a fourth of the store’s wares. I knew that Paul would not have the patience for me to continue at this pace, so I decided to expedite the process by asking an associate if they had...
anything mammoth related for sale.

The middle aged woman nodded and brought me to a glass display case that housed little plastic bags with clumps of ginger-colored mammoth hairs in them as well as a few carvings made from mammoth tusk ivory. I debated splurging on the mammoth hair, but that would have been pretty much the only thing I could afford on my $30 budget.

I returned to the front of the store, where the more affordable fossils and rocks were laid out for the tourists and visitors who were there for the wow factor of being in a fossil shop—most of them with overly-exuberant children in tow.

I elbowed my way around a child who felt that it was necessary to announce to the entire store, “DAD! LOOK WHAT I FOUND!” and returned to the shelves that housed smaller treasures, from whale ear bones that fit in the palm of my hand to fossilized ferns.

Meanwhile, Paul had made his purchase—a chunk of bismuth—and toured the museum in the basement. When he returned to my side, I could tell that he was ready to go, and my sensory-induced dislike of small children was signaling that it was time for me to make an exit soon as well. I had no idea how much time had passed, and I was still undecided about what relics of Earth’s wondrousness I wanted to take home with me.

Finally I settled on two treasures: a cave bear tooth—250 thousand years old, Romania—and a small section of pale yellow rock with three black, inch-long trilobite fossils encased in it—600 million years old, Utah.

By the time the sales associate had rung me up on the old fashioned cash register and given me my hand-written receipt, I was sure I had made the right choices. It wasn’t until Paul and I were well on our way back to the city that we both realized that I had forgotten to go downstairs to the museum. That adventure would have to wait for another time.
Inherited Trauma

Those of us who have taken a high school biology course know the central dogma of genetics. We know that DNA makes RNA, RNA makes proteins, proteins assist in cell function, and so on and so forth. We know that we inherit half of our DNA from our mother and half from our father, which explains why we may have our mom’s eyes and our dad’s ability to do mental math quickly.

But there’s more to genetic inheritance than what we find in our DNA. In fact, there’s an entire field of study dedicated to this very concept. It’s called epigenetics.

I was first introduced to epigenetics, the study of outside influences on an individual’s genetics, in a May 2013 article on Discover magazine’s website:

“According to the new insights of behavioral epigenetics, traumatic experiences in our past, or in our recent ancestors’ past, leave molecular scars adhering to our DNA,” Dan Hurley, the piece’s author, wrote. “Jews whose great-grandparents were chased from their Russian shtetls; Chinese whose grandparents lived through the ravages of the Cultural Revolution; young immigrants from Africa whose parents survived massacres; adults of every ethnicity who grew up with alcoholic or abusive parents — all carry with them more than just memories.”

Doesn’t sound possible, does it? Here’s how it works:

Researchers have known since the ’70s that DNA found in every cell needs “something extra” in order to tell the DNA which genes they need to transcribe—such as a kidney cell, a heart cell, a skin cell, etc.

The methyl group is one such extra element. Methyl groups attach to genes, separate from the DNA. (The study of methyl groups is a part of epigenetics. Epi in Greek meaning outer, over, or above—in this case referring to the fact that it is outside of DNA.)

Studies showed that “molecular bric-a-brac” can be added to an adult’s DNA—in other words, it can be added outside of fetal development. Further studies found that “epigenetic change could be passed down from parent to child” and so on.

Molecular biologist and geneticist Moshe Szyf and neurobiologist Michael Meaney hypothesized that reactions to some experiences—being abused, witnessing a traumatic event, etc.—can also be
passed down via the methyl groups. Experiments conducted with mice and rats have thus far proven this theory to be on the right track. So what does this mean for humans?

“It has been lost on no one that epigenetic medications might succeed in treating depression, anxiety and post-traumatic stress disorder where today's psychiatric drugs have failed...

[What] if we could create a pill potent enough to wipe clean the epigenetic slate of all that history wrote? If such a pill could free the genes within your brain of the epigenetic detritus left by all the wars, the rapes, the abandonments and cheated childhoods of your ancestors, would you take it?”

Well, would you?

This question resonates in my mind, echoing as if it has been uttered aloud in a vast, empty cave.

I think about what I know of my parents' lives, and their parents' lives, how these six people's experiences may have affected them at the epigenetic level, and how they may have in turn passed on the results of those experiences to me. The answer to the question of how my life would change if I were to take a pill that could erase these epigenetic marks is unknowable.

On the one hand, their experiences have helped shape who I am, and I feel like I wouldn't be myself anymore if I were to change that. It is important to remember that both the good and the bad that comes with the epigenetic changes I have inherited would be erased were I to take this hypothetical pill. On the other hand, it is exciting to think about how much my life might change. Yet I still hesitate to say whether or not I would take it.

But I'm not only wondering if I would take such a pill myself. I am also interested in the potential benefits of this hypothetical pill on any future offspring I may have. This is interesting because for at least the last decade I have adamantly declared to anyone within listening distance that there will be no such offspring. I don't like babies or young children and the thought of forgoing some or all of my medication long enough to carry a child to term inside me is horrifying, to be honest. I have not, however, eliminated the possibility of adoption.

But—and again, this is a very hypothetical but—if I were to have children of my own, and if they were to inherit the results of my own methyl group add-ons, and if these results were to have negative consequences for my children, then I think I would not hesitate to give them a pill that would “wipe clean [their] epigenetic slate” and free them from “the epigenetic detritus” left over.

I think about my propensity for pessimistic thinking, of my being convinced that I have worse luck
in some areas of life than would be expected of someone with similar demographics. I think of the years of mental anguish this pessimism has caused me, despite mine and numerous therapists’ attempts to free me from my negative thoughts, and I know without a doubt that any children I may produce will have enough external factors to worry about in a future world—energy crises, national debts, climate change, etc.—that adding on the results of my own lifelong emotional baggage seems wrong on a moral level, if not outright cruel.

But perhaps more important than any musings on whether or not I would take a hypothetical pill is a question much closer to reality: Can I change my own epigenetic makeup through conscious effort?

If I can, then the existence of such a pill becomes moot.

I realize that changing my epigenetic makeup—if such a feat can in fact be done—would not change the fact that I have ADHD or that I am prone to depression. These are parts of me based in the neuro-chemical makeup of my brain.

But maybe I can change the way I react to this reality. Over the last decade or so I’ve looked into various mindset-altering techniques without consciously connecting them to epigenetics. Meditation, mindfulness, positive psychology: I’ve read up on and attempted to practice each of these methods of altering the way I think about and experience reality, with mixed results.

In high school I was allowed to go outside for five minutes before the lunch bell rang so that I could do some meditative deep breathing exercises in an attempt to calm myself before returning to the noisy chaos of class. This was somewhat effective in clearing my mind of whatever stress I had built up in the first half of the school day before attempting to conquer the second half.

But I decided to delve deeper. Rather than treating the symptom—my body’s reaction to stress—I looked to treat the condition—the stress itself—by turning to mindfulness techniques.

The aim of mindfulness techniques was to focus my awareness on the here and now rather than on worrying about the past. But this too was only somewhat effective. Consciously focusing my attention on anything that my ADHD mind finds less than stimulating is no easy task. As a natural pessimist, I found it easier—and more compelling—to spend time fretting over past injustices rather than looking in my mind’s eye at the potential for positive experiences in the present.

So my next step was to delve even deeper and try and change my mindset from pessimism to
optimism using the psychology of positive thinking. While I still struggle with fighting my inner urge to assume the worst will happen, I have made some small steps away from this mode of thinking.

I find myself stopping trains of thought that begin with, “Based on what’s happened to me before...” because such lines of thinking lead me down dark roads more often than not. Instead I try to view upcoming events and their predicted outcomes from the point of view of someone who is unfamiliar with my past and therefore less inclined to come up with a negative prediction for the future.

Will I be able to maintain momentum? And if am able to create long-term change, will it be reflected in my epigenetic makeup? The newfound optimistic part of me wants to say yes, the future will be as bright as I perceive it to be. The cycle of inherited trauma can end with me, if I just put my mind to it.
So What Happens Next?

“I like science. I trust it. It makes me feel optimistic. It adds rigor to my life.”

[My friend] asked why I didn’t just become a scientist. I told him I didn’t want to ruin a beautiful affair by getting married. Besides, I wouldn’t be a very good scientist, and I knew it.

So you’ll be a professional dilettante, he said.

Close enough. I became a science writer.”

- Natalie Angier, The Canon

I began *Tectonic Shift* by asking myself a question: how have my ADHD diagnosis and my passion for a scientific understanding of the world helped to shape the person I’ve become? Having (hopefully) answered this question in the preceding pages, I will end by asking and answering one final question: so what happens next?

The short-term answer is: I earn my Master’s degree and enter the working world, just like most of my peers. I already have a job lined up as a writer for a start-up company that creates web content for healthcare organizations. The position was intended to be a 10 week internship beginning last July, but I enjoyed it so much that I asked to continue on. It’s fortunate that I did, because my full-time job search was proving fruitless and frustrating.

This job is ideal for me for a number of reasons. I am open with my boss about my ADHD and the limitations it puts on my ability to work a traditional 9-to-5 desk job. She believes in quality of work, not quantity of hours put in, so she does not balk when I say I need a break because she knows I will get everything done that needs to be accomplished.

I am able to get the work done on time because I enjoy doing it. I get to write about a variety of healthcare related topics, and variety is always a good thing for my ADHD. I wouldn’t enjoy this job half as much if I knew that I would be performing the same repetitive tasks day in and day out.

But the reality of the situation is that, because the company is still getting off the ground, the pay is just enough for me to continue living here in Chicago. I may end up relocating yet again—but where?
That is an answer I do not know, and perhaps I don't have to know just yet. As I have discovered while writing *Tectonic Shift*, sometimes the fun is found in the knowledge and experience you acquire during the process of finding the answers, rather than in the knowing of the answers themselves.
Sources


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