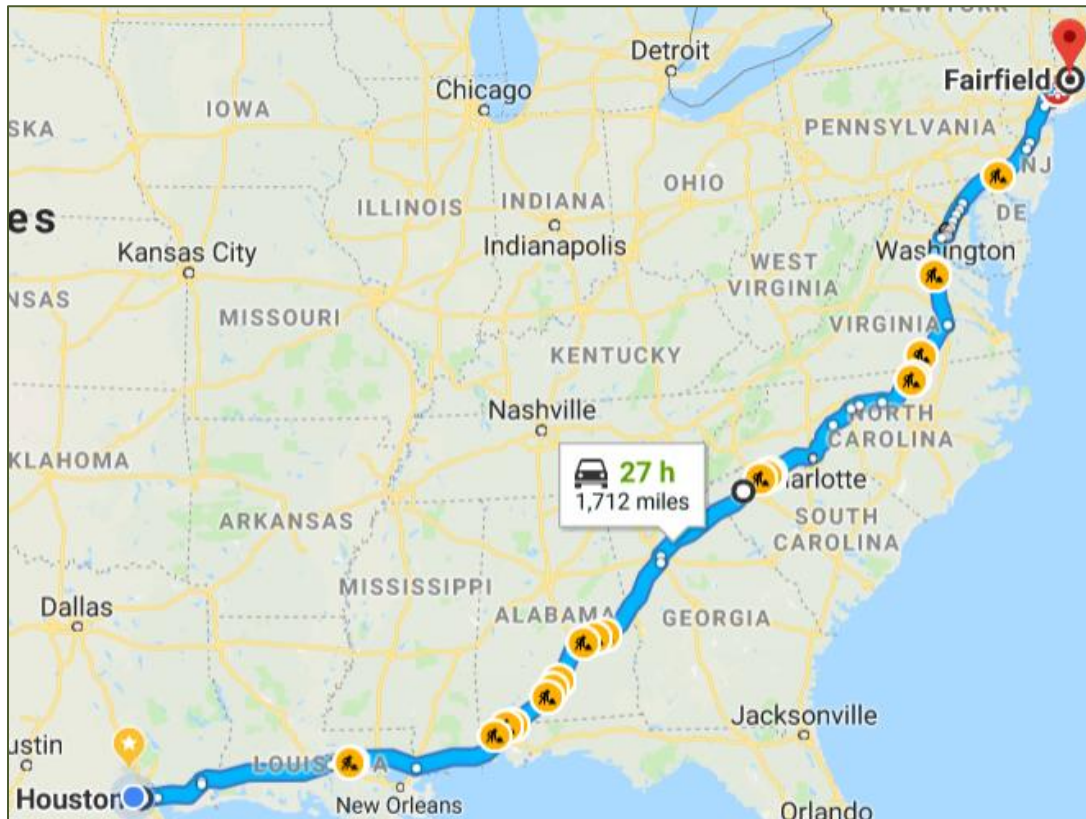




Epsilon Theory

Notes from the Road: Roadkill

September 20, 2018



Most species do their own evolving, making it up as they go along, which is the way Nature intended. And this is all very natural and organic and in tune with mysterious cycles of the cosmos, which believes that there's nothing like millions of years of really frustrating trial and error to give a species moral fiber and, in some cases, backbone.

This is probably fine from the species' point of view, but from the perspective of the actual individuals involved it can be a real pig, or at least a small pink root-eating reptile that might one day evolve into a real pig.

- *Reaper Man* by Terry Pratchett (1991)

This is Part 2 of the multi-part Notes from the Road series, introduced with [Bayes and the Boreen](#). The Series explores how popular, otherwise adaptive methods we use to develop theories about political and financial markets based on priors and lived experience can subject us to unexpected new risks. The series tells the story of a range of journeys in history, sports, the arts and nature to illustrate the sources of those risks.

If, as Ben has written, memes are self-sustaining ideas that live in the human brain, I think there's one that may predate all of the rest: *Only the strong survive!*

It's a dumb meme about how we *think* evolution works that has spread, ironically, because of the way evolution *actually* works. Despite growth in scientific literacy, the popular conception of evolution continues to celebrate the idea that better/stronger/smarter things will prosper, and worse/weaker/dumber things will fail. The reality is much less sexy. Evolution is the process whereby nature necessarily favors traits which improve the ability of an organism to survive until it reproduces. The idea that we are successful because of objectively superior traits – because *only the strong survive!* – is an idea perfectly adapted to the human ego. But on almost no dimension would we have judged our mammal ancestors superior to the dinosaurs they outlasted. But outlast they did, because – by sheer luck – their traits were better adapted to a post-Chicxulub state of the world.

That last observation is an important one. When we consider evolution as it truly is, we still usually focus on the organism, or in an Epsilon Theory context, the idea or the investment strategy in isolation. An individual organism mutates a new trait, which either makes it more or less well-adapted to the current environment. If more, then over time the trait is more likely to propagate. If less, then organisms carrying the trait will probably die along with it. But for all the value that there is in constant improvement of our processes and philosophies in similar ways, the survival of a species or idea isn't just a function of its own changing traits – it's a function of the changing states of the world and the people in it.

For our investment principles and strategies, like any organism, observing that evolution is both a function of the traits of our ideas AND changes in the state of the world reveals two types of risks to our models and frameworks for understanding it:

- **Type 1 – The False Positive:** We think and act like our principles are based on immutable laws of nature. They aren't, and we get a rude shock when the world changes.
- **Type 2 – The False Negative:** We believe that principles others believe are immutable laws are only representative of some temporary state of the world. We try to predict the change in the world, and it never happens. We waste returns, fees and client goodwill in the process.

Evolution is a painful journey for the individual. There's not much solace in our failures becoming Harvard Business School case studies that help the species – or other investors. We must find some kind of middle ground between allowing ourselves to become speedbumps to a change in the state of the world on the one hand, or victims to the coyotes who would tell us "This Time It's Different" about every bit of normal variability in the world on the other. We have to find that middle ground in our non-investing lives, too. Which of our heuristics and principles for evaluating life decisions are objectively true, or are at least *true enough*? Which are adaptations to our past environments and experiences, and will those be relevant to our new situation? When we make big life decisions, are the priors we rely on, well...reliable? In the end, we muddle through, and more often than not, make it up as we go along.

Incidentally, that's exactly what I'm doing. Next week, it'll be 27 hours with a 2- and 3-year old in a blue pickup on the 1,712 miles of Dwight D. Eisenhower's asphalt dream between old home and new. In honor

of this journey, since we're talking about growth, evolution and risk, and since I'm moving up to a part of the country where I won't be able to talk about this sort of thing in polite company any more, I figure it's as good a time as any to write about roadkill. And that's saying something, because it's always a good time to write about roadkill.

Full disclosure. If you've read this far, you've read the word 'roadkill' five times: once in Ben's email, once at the top of this essay, twice in the prior paragraph and once in this sentence. You clicked on it, and I kind of feel like you're already in for at least a penny here. But if you were squeamish about Ben's disgusting tick infestation picture from a couple months ago, this one may not be for you.

Profiles in Roadkill: *Dasypus Novemcinctus*



Now that we've gotten all that out of the way, we can start talking vehicular critterslaughter. Allow me to introduce you to someone special. This handsome fellow on the left is a nine-banded armadillo - one of the three state mammals of Texas, because unlike the boring-ass state you live in, Texas gets THREE state mammals. Take that, James Madison and your exquisitely reasoned [Federalist Paper 62](#). Armadillos are remarkable little creatures who followed an unusual and narrow genetic path that has produced some of the strangest land mammals alive today. In addition to its signature armor plating, the armadillo reproduces from an egg which separates into four parts after fertilization. That means that nearly all litters consist of 4 identical creatures of the same sex. What's more, the implantation of that fertilized egg is typically *delayed* by the mother by several months to better align with the spring season. Very handy, that.

The armadillo can inflate its intestines to float. It can hold its breath for six minutes to submerge. And that armor really is as tough as we think it is. Tough enough to defeat a [.38 revolver](#). Like its closest cousins, the anteater and tree sloth, the

armadillo is a marvel of specialized adaptations. One of evolution's many weird, slimy miracles.

Also, when an armadillo sees headlights, it gets so terrified that it jumps straight up in the air and gets slammed by a car that would otherwise have passed right over it.

Profiles in Roadkill: *Odocoileus virginianus*

The armadillo, however, probably isn't the animal most people (outside of Texas, anyway) think of when they think of victims of automobile-related critter flattenings. In honor of the trek we will take through the beautiful and too-unfairly-maligned state of Mississippi (which is also probably better than your state since it has two state land mammals), it is time we recognize the famousest of roadkill, the white-tailed deer. So common is the sad sight of one of these beautiful creatures along US highways that it causes the otherwise stonehearted, rage-filled American motorist to descend into our country's unique style of gallows humor. Get well soon, gross deer. Get well soon.



Like the armadillo, evolution has gifted the white-tailed deer with extreme traits that are well-adapted to the challenges it faced during its emergence as a species. First, it is a remarkable jumper. While deer fences tend to be around eight feet tall, the average individual can actually jump somewhat higher than that, in some cases as much as 12 or even 15 feet. Somewhat less when it needs to jump forward and not just up.

Second, probably because of the adaptive benefits of a better field of vision for spotting predators, deer's eyes are positioned closer to the sides of their head than the front. That means that deer, like many other prey animals, sacrifice binocular vision and depth perception to, you know, get eaten less by things behind them and to their sides. The downside is that it is more difficult for deer to judge distance and the depth of objects in front of them. Incidentally, in addition to being particularly stupid, this is one of the reasons why white-tails don't always jump over fences they almost certainly could – poor depth perception means that they can't be sure if they're going to clear it.

Third, whether because of the need to manage temperatures and heat, to avoid predators, or other reasons they keep to themselves, thank you very much, white-tailed deer are crepuscular, which means they are most active in the twilight hours of dawn and dusk. That adaptation means that their vision is attuned to modest levels of light.

Like the armadillo, the combination of these natural talents has done wonders for making white-tailed deer one of the most successful and widely distributed mammal species in the world.

It also means that when a deer leaps into a road, it spots your distant car in its remarkable peripheral vision, turns its head, is blinded by your headlights because of the attunement of the rods in its eyes to take in more light, and because of its lousy visual acuity and depth perception, can't make out the closing distance of your vehicle until it's too late, at which time it leans upon its remarkable leaping abilities so that it can take out your windshield because screw you AND your Volvo.

Profiles in Roadkill: *Sciurus carolinensis*

Although the deer is the most iconic roadkill animal, it's not the most common. The most common is the state mammal of one of the most beautiful states in our fair union, but one that admittedly only manages to have a single state mammal, so take my kind words about its trees, mountains and coastlines for the damning faint praise that they are. It's your time to shine, Interstate 85 and North Carolina.

The 1993 data from an ongoing survey of roadkill (weirdly created for schools as a testing ground for teaching the scientific method) reported just over 750 squirrels in its sample. If anyone is curious, there were only 308 raccoons and 4 coyotes. The noble possum comes in second, at 348. Squirrels are the undisputed kings of roadkill, and yes, the extremely disappointing state mammal of the State of North Carolina. By the way, this really IS disappointing, because North Carolina could have selected one of its many legitimately interesting and endangered/threatened species, like the



[Carolina Northern Flying Squirrel](#). The state is also one of the last homes east of the Mississippi for the [Townsend's big-eared bat](#), which adapted a whispered form of echolocation that probably serves as a countermeasure to the active sonar jamming skills of its primary prey – moths.

Now, obviously some of the reason so many squirrels become double-thumps in the road is because – despite my efforts as a kid with a BB-gun – there are a lot of squirrels. But that's kind of the point. There are a lot of squirrels because squirrels are a very successful species. Part of why they are a very successful species is because they are very successful at avoiding predation, mostly by hawks and other birds with a taste for tree-rat. Part of the reason they are so successful at avoiding predation is that they adapted an instinctive tendency to run in seemingly random zig-zag motions that involve unpredictable changes in both speed and direction. Very good defense against a hawk flying at high speed toward a fixed point.

Not so much against a speeding teenager driving his mom's Yukon.

All three of these animals are incredibly successful and still growing their geographic footprint. All three are incredibly well-adapted to the challenges that they faced over the course of their evolution. All three are well-prepared for the challenges they face in most of their daily lives. All three get dead real quick when their evolutionary strengths are transformed into circumstantial weaknesses.

Part of the reason I wrote this, the second note in this series, was to make you look at that hilarious and morbid roadside pizza party deer. That and to pursue some tortured analogy to compare you, dear reader, to roadkill. But there's an important investment lesson here, too: **Survival is the only way we measure the success of an adaptation, and the species that treats past adaptations as timeless and universal – as laws of physics - will go extinct.**

The trick is in knowing what, among all the things we do as investors, reflects timeless and universal principles, and what reflects our adaptation to states of the world which *will* change. It's not always easy to tell the difference.

Timeless and Universal Principles

For my part, I think timeless and universal principles of investing must be either tautologies or generalized reflections of human behavior. Heuristics which are based on states of the world (e.g. I like this asset class because it is cheap, I favor this sector because of its growth characteristics, I'm concerned about this country because of higher-than-usual geopolitical risk) don't really fit. Philosophies which are driven by views on

the superiority of certain constructs (e.g. asset classes, instruments, etc.) are similarly ephemeral. I think there are really four timeless and universal principles, and we've written about each before:

1. **Over very long periods, you will generally be paid based on the risks an average investor (including all of his liquidity sensitivities, his investment horizons, etc.) would be taking if he made that investment¹.**
2. **We must be supremely confident that we have information about the returns on various investments to justify decisions which reduce the diversity of our sources of return.**
3. **Humans have evolved to demonstrate preferences for certain types of investments and returns. Those preferences – and the fact that other humans will shrewdly seek to exploit those preferences – will influence returns.**
4. **Taxes, fees and transaction costs will reduce returns.**

I think it's a good framework. You may not, in which case you should replace it with what *you* think these rules are. Or y'know, by sending me an email telling me how stupid I am. Both are fine. But identifying these rules means acknowledging that **all of our other philosophies are either successful adaptations OR new things we're trying out because we are guessing they will be better suited for some future state of the world.** After all, if we're going to update our Bayesian estimates, we've got to have some kind of experiment.

It isn't hard to identify beliefs and strategies that look well-adapted over the last decade, by which I mean investment strategies whose reputations have *survived*. Structurally owning more assets in U.S. financial markets looks well-adapted during this age of the world. So has owning more stocks in technology companies. Believing that there is no need for an investor to have a financial adviser seems like a very well-adapted trait. Aversion to any strategies which try to pick which securities will outperform. Keeping things simple with a 60/40 portfolio of stocks and bonds. Leveraged strategies. Aversion to, skepticism about and usually derisive attitudes towards hedge funds. Those of us who saw what worked in 2009 and 2010 and stuck with it as the new normal probably have a pretty confident assessment of some of our adaptations. More than a few of us and our clients have adopted some of the above as heuristics – our rules of thumb around which we generalize our investment beliefs into process.

What does treating well-adapted-looking traits like permanent states of the world look like? Here is one innocuous-looking example from social media marketing. I've removed any author's name to protect the innocent.

There are good principles in here. But look at these more closely to see temporarily well-adapted traits creep in. A decade of dominance from US stock markets and low volatility has created a world of

The 5 biggest mistakes investors should avoid:

1. Believing complexity outperforms simplicity
2. Fearing market volatility (from thinking short term)
3. Trading too much
4. Excessive diversification
5. Paying high fees for secretly average portfolios

¹ This is, incidentally, why I am not one of those who thinks that volatility is a terrible ex ante way of thinking about risk. If price sensitivity matters to individual investors – and it does – it matters to how the return investors will demand for taking that risk, even if that perception is completely irrational and they should be thinking about “permanent impairments to capital” or some other phrase that has survived because it sounds clever in marketing materials. My experience with investor behavior also tells me that unrealized returns often become realized when they're big, negative numbers.

investors who now think that saying “keep things simple” and “avoid excessive diversification”, which are smart-sounding dog whistles for “just buy US large cap ETFs”, is timeless and universal advice. It’s not. And it’s going to get a lot of investors hurt.

Unfortunately, the memeability of *common sense!* advice like this is exactly how an adapted trait evolves into a species-defining characteristic. Survival and reproduction. And then extinction.

Identifying the line between timeless principles and adaptations gets even harder over very long periods. 30 years. 50 years. Owning more bonds than our timeless principles might otherwise recommend. Relying on those same bonds to be diversifying against stocks. Knowing that commodities are not really investable, that real assets should just be a personal asset. Trusting that risky assets will always generate positive returns over a long enough horizon. As periods get longer, our confidence that our heuristics are not situational adaptations, but timeless and universal principles, grows.

All of this is Roadkill thinking. Oh, we may not get run over right away. It may **never** happen - during our investment lifetimes, anyway. We may go quietly in our sleep like so many armadillos, convinced that we adapted to survive cars just because we never got run over. **But believing that the strategies we developed are timeless and universal strategies just because they’ve worked for us during our careers so far, or because they have worked for others for what feels like a very long period of time, is Roadkill thinking.**

This first kind of Roadkill thinking is of the Type 1 error variety I mentioned earlier – false positives when identifying timeless and universal truths about markets.

Type 2 errors in Roadkill thinking are usually the more pernicious. It’s easy to think that the solution to our fears that an investment environment may be changing is to be creative, to throw a bunch of ideas at the wall, because that’s what we think adaptation looks like. And it is, in a way. But while adaptation through (mostly) random mutation works at the species level, at the individual level, it is **literally murder**. If our adaptive strategy is trying to time the turn in value or the market top, we will probably fail individually. If our adaptive strategy is to hold a quarter of our portfolio in cryptocurrencies to insulate us against what’s next, we will probably fail individually. If our adaptive strategy is to drain the swamp by...sorry, lost my train of thought, there. And sure, our failures will inform and improve the odds of success of other investors at large. A fat lot of good that does us. There’s a reason why coyotes with no skin in the game are so drawn to fields where they can promise disruption, new ideas, and high risk/high reward opportunities: because they share in all the upside of the aggregate while subjecting us to the risk of individual ruin along the way.

What does matter is that pursuit of these strategies often comes at the explicit or implicit expense of the ideas that really are permanent. We have finite dollars and finite attention, and our attempts to *do something* about environments that confuse us are usually distractions. In the same way that we’re probably all Coyotes from time to time, I think we’ve got a lot of Roadkill in us, too. I certainly do, anyway. There’s no extricating it from our nature, but as with so many things, simply acknowledging it goes a long way toward being mindful of its influence:

Roadkill doesn’t know what its timeless and universal investment principles are.

Roadkill doesn’t discern between temporarily effective adaptations and timeless principles.

Roadkill randomly tries new adaptations even when they violate timeless and universal principles.

If we would not be Roadkill – or worse, food for coyotes – we would do well to subject our priors to constant challenge. What assumptions are we making about our investments, intentionally or unintentionally? What

priors are built into our portfolio construction and investment selection methodologies? Are they always true, or maybe artifacts of an environment or industry convention?

For my part, were I sitting on an investment committee during a period of slowing in population growth, after a sustained long-term rally in multiple types of risk assets, following an extended period of falling interest rates, in the face of historically significant household and government debt, with increasing abstraction sitting between valuations and value, I would hold very loosely to all but my core principles. During every regular review, I would subject my conventions – sectors, style definitions, benchmarks, asset class definitions, risk measurement methodologies, and the like – to scrutiny.

More to the point, when we write about Narrative, we write in part because we believe that Common Knowledge about investment strategies and investable assets is part of what makes them work. This is our theory, and not a fact, **but I think that Narrative analysis can inform earlier, less individually risky attempts at adaptation as environments change.** Big if true. And I think it is.

We had a little fun at North Carolina's expense, but it's a wonderful state and a wonderful place with a lot of people that are hurting – and will be hurting – for a long time. From my experience with Hurricane Harvey in Houston, there are few organizations that do as much good as the United Way. If you can, consider giving now to the [United Way of Coastal Carolina](#). Or if you want to make amends for laughing at the balloon deer, the [Outer Banks SPCA](#) and the Dare County Animal Shelter will be in desperate need of help over the next few weeks.

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