

# Monkey Feel, Monkey Do (And Vice Versa)

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## Star Trek's Big Lie

Emotion. The muse of the volatile and irrational. The enemy of reason. The Yin to Logic's Yang. *Or so our culture says.* To wit, this dichotomy is a primary theme of possibly the greatest (& most ponderous) cultural artifact of our era, the *Shakespeare* of the late 20th century: Gene Roddenberry's *Star Trek* (in all its incarnations). Vulcans, androids, cyborgs, holograms—each is a science-fictionalized projection of a core modern human belief: that submitting fully to logic is synonymous with abandoning emotion, and vice versa. I'm here to tell you: *they've got it all wrong.*

In many ways, emotion is *pure* logic. Or, more accurately, it's pure logic cut with a dose of gambling. But to understand why that's true, we need to begin with the original purpose of emotions. In the simplest terms, brains first used emotions to tag basic pattern data (essentially, things

& events) as helpful or harmful. Over time, evolving neural structures have allowed our feelings to reflect more complex judgements, but at their core they're all still designed to trigger the same binary response: inhibit or encourage an action/behavior. *Ouch! That red glowing stuff is hot. Mmmm! This stuff I'm eating is yummy.*

Pain. Pleasure. The ancestral root & ultimate result of all feelings. Forget the false *Star Trek* dichotomy of logic & emotion—whose purposes are nearly identical—the real Yin & Yang of our minds is Pain & Pleasure. Without them, the human brain would almost be *incapable* of exercising logic. Think of it this way: when we say we want to make a decision *logically*, we're essentially saying that we want to make that decision strictly by weighing our choices' most-believable cost/benefit ratios. More conversationally: logic is all about reducing decisions to *the cold, hard facts of the matter.*

But in our brain's predictive and decision-making equations (those interweaving narratives in our mind) our emotions are the cold, hard facts—the fixed values that our brain uses to calculate each choice's cost/benefit ratio.

### **The Logic of Emotions**

Imagine that we accidentally dropped that aforementioned *yummy stuff* into that *hot red glowing stuff*—our brain has a choice to make: *do we tell this clumsy idiot to reach into the fire for his last piece of newly-discovered yummy or do we make him cry over its loss?* To make this choice the brain quickly tells itself at least two stories, and each story is one of those predictive, decision-making (and *emotional*) equations that our mind is perpetually calculating. Those stories might go something like this:

1 - *Idiot reaches into fire, burns hand briefly but harmlessly (small value loss), retrieves yummy & consumes (medium value gain), and feels pleasure. (Narrative pattern is tagged with this pleasure—whose future purpose is to encourage reaching into small fires for medium value assets.)*

2 - *Idiot watches yummy burn (medium value loss) and cries, feels pain. (Pattern tagged with pain—unlike story #1, this event is probably not categorized as its own narrative. Instead, it's seen as the final plot twist in the story "being careless while eating something excitedly over a*

*fire" and thus, this pain's future purpose is to inhibit such situational carelessness. Additionally, I believe that the "lightly experienced" emotion generated simply by running this predictive scenario in your mind after dropping the yummy encodes the actual memory data with enough pain to mildly discourage future situational carelessness, even if you choose to retrieve the yummy and never experience the pain of actual loss).*

After quickly comparing these two predictive narratives, the brain is most likely to lead the idiot to retrieve the yummy and achieve pleasure. In order to foresee that pleasure, the brain needed to calculate the net result of the predicted value loss & predicted value gain. These *values* are partly derived by the intensity & type of *emotion* (pain or pleasure) experienced when the data was first tagged *Ouch!* or *Mmmm!* Thus, the "emotional equation" of story #1 is something like: burn pain (-1 value, partly derived from *Ouch!*) + yummy consumption pleasure (+3 value, partly derived from *Mmmm!*) = net pleasure (+2 value).

Note, however, that I said these values are only *partly* derived by the strength of the original pleasure/pain tag. That's because this value is actually likely the result of a "sub-calculation" that combines *three* basic judgements of a narrative event or element: importance, relevance, and novelty. (For

more on these 3 categories, read about the Narrative Prioritizer Test in my Story Theory essay.) In story #1 the importance of consuming the yummy is determined by that original pain/pleasure tag (really tasty & satisfying *Mmmm!* signals greater gain and equals higher importance).

The *relevance* is determined by the fact that it is the idiot's yummy, therefore highly relevant. If he intended to share the yummy with, say, a random wanderer who just dropped by, the gain is essentially half as relevant (but if the sharer is, instead, part of his family, the gain might still retain high relevance).

The *novelty* is determined by several things here: it was the idiot's last piece, it was the first time he'd ever found this yummy, and he does not believe these specific yummys are in local abundance. This all gives it high novelty, further increasing the yummy consumption's total pleasure value.

This sub-calculation not only determines the full value of that specific narrative event (idiot consumes yummy=+3 value) but ultimately helps determine the value/intensity of the net pleasure generated (both predicted and actual) as a result of the full narrative (idiot reaches into fire, burns hand, retrieves yummy & consumes=+2 pleasure). So, take *that* logic, you *need*

emotions—without those little fellas, you ain't nothin'.

### **Mitigating Factors & Complex Emotions**

Of course, our endangered-yummy scenario only depicts the most basic of emotions: pain & pleasure. This is mostly because I conveniently kept our scenario free of any real *mitigating factors*. In other words, our scenario involved very simple causal elements (our own accidental carelessness led to a potential loss, quick action resulted in a gain) and highly predictable results (fire will burn me briefly & harmlessly, eating the yummy will give me pleasure). But life is usually *full* of mitigating factors. *I was going to give half to my starving child. I already lost one hand in a fire. I think I saw the wanderer poop in the campfire earlier.* These mitigating factors can make us feel *all sorts* of things.

In essence, each mitigating factor becomes an additional variable in the overall narrative's emotional equation. And these variables—which lead to more complex emotions—are primarily the results of three basic types of narrative judgements: judgements that measure the *validity* (reliability and/or likelihood) of a value loss/gain prediction, *potential* loss/gain, and judgements that measure *other individuals'* roles in a value loss/gain. Which is a mouthful. So before you go back to reread that, let's move quickly to an example...

Since we're going to further torture our poor idiot, let's at least give him a name; we'll call him Rodney (since that's what the R. in R. Salvador stands for, no sense in offending other name-holders). In our new endangered-yummy example, let's say Rodney was joined by the wanderer before dropping his yummy into the fire. In addition (because I can't help myself) *Rodney thinks he saw the wanderer poop in the campfire earlier.* Thus, a mitigating factor has just been added to his "reach into the fire" narrative. In essence, the *validity* (or *likelihood*) of our story #1's happy ending has been undercut by the possibility that the yummy has been contaminated by poop. (For the sake of simplicity here, we'll ignore extra narrative branches that might involve Rodney trying to ascertain more clearly whether or not there is actually poop in the fire, and assume he only has his brief distant view of a squatting wanderer as proof. Adding these branches would make the equation more complex, but not illustrate any additional mechanics.)

When compared against the happy-ending narrative, this new poop-yummy narrative branch seems equally possible. Rodney *wants* the gain of recovering his yummy, but no longer has full confidence in his happy-ending narrative. The result is a different kind of pain-related emotion: *anxiety*. This anxiety is a negative validity judgement. It says *this thing we're about to do or thinking*

*about likely doing because it has a big potential gain, we now doubt to some degree the validity (or likelihood) of that prediction being correct.* And this emotion has a purpose: it wants us to hesitate. It wants to give our brain a few more moments to run new prediction subroutines and determine more possible solutions. It wants a little more time to work its looping thought-iteration magic in hopes of discovering a preferred high-validity happy-ending narrative.

The specific level of anxiety is determined by the phrase we used earlier: *we now doubt to some degree.* The degree of doubt you have is equivalent to the level of anxiety produced—high doubt (low validity/likelihood) means high anxiety (more intense anxiety-related pain). And although anxiety is the product of a more complex judgement, its ultimate result is still to contribute to that core binary emotional response: inhibit or encourage. *Because Rodney was worried that his yummy might be poopy, he felt nervous and hesitated before reaching into the fire.*

### **The Fear of Losing Yummy**

The thing about complex emotions is that they are...*complex*. And in the case of anxiety, it's usually accompanied by another pain-related emotion—one that contributes to the ultimate level of inhibition or hesitation generated when you're worried that your yummy might be poopy. That

emotion: *fear*. Although it involves prediction, fear (unlike anxiety) isn't primarily about validity, it's about value—specifically, a value loss. More specifically, it's about a *potential* value loss.

When your brain begins to have anxiety about a desired prediction failing, it's interested in what that failure is going to cost. *If I retrieve a pooppy yummy, what's the loss?* In Rodney's case, he's calculating a few potential loss scenarios. If he doesn't reach in, he loses the yummy. If he reaches in and the yummy is pooppy, he loses the yummy and he loses a little skin from the burn. If he reaches in and the yummy is okay, he only loses a little skin. In reality, he only has two choices: reach in or don't. Both predictive narratives produce some fear over potential losses, but because one of the choices (reaching in) offers a 50/50 big loss potential and the other (not reaching) a 100% big loss potential, the latter choice produces more fear.

This fear of the 100% loss pushes Rodney toward reaching in (he is *afraid* not to, thus inhibiting the “act” of not reaching). And yet, as he reaches, the anxiety from the uncertainty over the yummy's cleanliness still makes him hesitate momentarily, and possibly experience with it a little more fear over the 50/50 potential loss posed by possible poopiness. These emotions serve the same purpose: to slow Rodney down,

just a little, just in case that time can provide him with a unique and preferable solution. But the clock is always ticking. And possibilities like the yummy getting burnt and the wanderer snagging it for himself place a deadline on our calculations. In this case, even after the fear- & anxiety-produced hesitation, when that deadline comes, Rodney's brain is likely to roll the dice and gamble that it's better to reach than not to reach, poop be damned.

And this is what I meant when I said that emotions are pure logic cut with a dose of gambling. We set up a narrative's emotional equations, add all of the mitigating factors, fill in all of the value- and validity-based variables (determined by previous emotional tags, narrative judgements, and prediction pattern comparison), and then create a final emotional mix intended to guide us toward taking a chance on the choice that seems most likely to achieve the largest gain and/or avoid the largest loss. In Rodney's case, in addition to seeking the largest gain, he's also risking the largest loss: a pooppy yummy, plus a little burnt skin & maybe even a poop-contaminated hand. Pure logic with a dose of gambling.

But wait...there's more! Complex emotions are not only complex, they're everywhere. And there are still a few emotional complexities to iron out in our *Rodney drops a yummy into a possibly pooppy fire* scenario.

Earlier, I'd said that there were primarily three basic types of narrative judgements that lead to complex emotions: those that measure prediction validity (anxiety/confidence), those that measure potential loss/gain (fear/excitement) and those that measure *other individuals' roles in a value loss/gain*. My shorthand for these types of individuals: Agents of Value (gain or loss). A teacher, who can potentially confer knowledge value, might be seen as an Agent of Gain. A thief, who can potentially cause you asset damage, might be seen as an Agent of Loss.

When we see someone as a *known* Agent of Gain or Loss (based on a specific experienced or studied act/behavior) or a *potential* Agent of Gain or Loss (based on patterns predicting future acts/behavior) we have different specific feelings toward them. In response to a known Agent of Gain, we feel *gratitude*. *Rodney offered the wanderer half his yummy, and the wanderer felt a good feeling toward Rodney that he could only describe as gratitude*. This pleasure associates that Agent of Gain with memory data that has been tagged as positive. As we've pointed out, every emotion is a Yin & Yang spectrum. And gratitude's Yang is *anger*—the response to the thief, the known Agent of Loss. *When Rodney retrieved his yummy and saw it was poopy, he felt angry toward the wanderer because he'd cost him the chance to save his yummy*.

## **The Power of Love & Hate**

Gratitude and anger are primarily value propositions. The larger the gain or loss, the greater the gratitude or anger toward the Agent of Value. In more complicated scenarios, level of culpability and/or certainty over culpability can affect the level of emotion generated, but even in these cases, gratitude & anger are still used mainly to reflect value. If the wanderer was starving (increasing the yummy's value) he might've felt more powerful gratitude toward Rodney for sharing. If Rodney was starving, he might've punched the stranger for pooping in his fire.

In contrast to this, *potential* Agents of Gain/Loss are judged using both value *and* validity criteria, because it's about predicting the likelihood that this person will be a *future* Agent of Value. Thus, the emotions produced are slightly different. A potential Agent of Gain triggers *affection*, an emotion so powerful that at its highest level it is basically love. Potential Agents of Loss evoke *animosity*, which can grow into viciously-powerful hate.

One of the things that makes these emotions so powerful is the way they combine a value judgement with a prediction assessment. Consider that the likelihood of potential future losses caused by someone is increased by the number of actual or perceived losses caused by them in

the past. So by the time we have predictive confidence in someone's potential to cause future losses, we've possibly already accumulated a good store of strongly imprinted ill-will toward them—which is only increased by the losses we predict they will cause. In this way, it seems that both animosity & affection can grow in a compound fashion.

And yet, because animosity & affection are about *potential* loss/gain, we don't need any *actual* past loss/gain experiences with an individual (or entity) to feel either of these emotions. We just need to believe the individual/entity is capable & likely to cause us future losses or gains. *After your 2-minute conversation with your daughter's arrogant, dumb & clearly-reckless brand-new boyfriend, you despise him. You can feel it in your bones, and you didn't even know he existed 3 minutes ago.* There's still a value judgement here: because the potential harm involves your daughter (very high value) the animosity is more intense than if the guy was just your neighbor's kid's friend. But that value judgement is not based on any previous losses caused by the new boyfriend, demonstrating that these emotions are about *potential* events—and that love & hate can quickly grow from nothing.

The difference between anger/gratitude (*known* Agents) & animosity/affection (*potential* Agents) becomes clearer when we

realize than we can both feel gratitude toward someone and still have continued animosity toward them. (Or feel anger, yet continued affection.) Imagine that a homeless person is handed a free meal. They feel momentary gratitude toward the *known* Agent of Gain—this occurs almost no matter who the Agent is (as long as they suspect no malicious intent in the act).

Now imagine that a homeless person has been given a free meal by a well-intended congressman who has led the charge against—and will likely continue to oppose—robust homeless services (and this is understood by the homeless person). The homeless person might still experience some momentary gratitude for the specific act, but they could maintain a general animosity toward the congressman because he is a *potential* Agent of Loss. Conversely, when your spouse crashes the car for the third time and sends your insurance skyrocketing, you may feel some very certain anger toward them in the moment, but nearly simultaneously—or close on that anger's heels—you should (hopefully) be able to look into their eyes and still feel a good measure of affection because of their future potential as a high value Agent of Gain (which is, I know, an *awfully* romantic way to view love).

Here again, we see specific emotions that are the result of complex judgements, but

whose ultimate purpose is to generate that core binary response: encourage or inhibit. Affection draws us to people who can provide us good things in the future (emotional, financial, or parenting support, motivation, knowledge, anything that an individual values) and animosity makes us wary of those who might bring us some sort of harm. Each emotion reflects our judgement of an Agent of Value and guides our behavior toward them. And every time we gain more value from someone whom we already have great affection for, it reinforces that view of them as a future Agent of Gain, strengthening the affection. This same mechanic is at work with animosity, which is why people often despise an initially disliked President *even more* by the time he's left office. *You thought you hated him when he got elected, but after piling on four additional years of painful, highly-important, highly-relevant, anger-inducing experiences, you can barely stand the guy.*

This *known vs. potential* mechanic also helps explain the roots of the dysfunction that can result in something like an abused spouse continuing to show affection for their abuser. When our brains make predictions about what value we can potentially gain from an individual, many factors are involved. One of the most significant factors is our beliefs (which we'll explore in detail a bit later). If, for example, through a lifetime of dysfunctionally-

arrive-at evidence, I have grown to believe that I am difficult to love, and then (through my limited options) I view this individual as one of my few opportunities to achieve that love, I may be prone to angrily submit to multiple loss-inducing events while still seemingly illogically continuing to exhibit genuine affection toward this individual—because I believe they are a novel potential source for something I desperately seek. (I also believe that this kind of prolonged emotional dysfunction eventually "rewires" our emotional responses in a way that we typically perceive as "abnormal" behavior like staying with an abuser.)

One other thing to keep in mind here: under more "normal" circumstances, there are essentially two ways that past experience can help you accumulate enough evidence to result in strong affection or animosity. You can have a high number of small or medium gain experiences that cumulatively provide enough evidence for the brain to judge the individual as a strong potential Agent of Value. Or you can have a smaller number of high gain experiences that provide the necessary evidence. So, even though your neighbor does plenty of nice little things for you month after month, year after year, you still might have less total affection for them than someone whom you only interacted with a few times, but one of those times they saved your life.

## The Essence of a Moment

When we mix these judgements gauging matters such as known & potential gain/loss, prediction validity, and known & potential Agents of Gain/Loss, we begin to see the complex chemistry of emotions that define each moment of experience.

Consider that all of the scenarios we've dissected thus far are relatively basic narratives. In reality, our constantly-shifting attention, data-rich environment & complicated lives generate a rapid, steady stream of complex interweaving, interchanging narratives. And in any moment we might be surrounded by a diverse collection of individuals about whom we feel a variety of ways. (And, via *empathy*, we might even feel an echo of some other individual's *own* emotions. Empathy also contributes to the emotions evoked by literature & art—the subject of my Story Theory essay.)

Every day is an endless stream of encounters & narratives running the loop through our consciousness, perpetually evoking & generating their own unique emotional results. In addition, the emotional tableau of any moment is likely enhanced by non-narrative emotions that are caused by quick-hit, environmentally-triggered memory pings that evoke associated feelings. *You see a blue uniball pen leaking ink from the cap; it's exactly like the leaking pen your girlfriend handed you after she*

*dumped you.* Here—because the emotions have been encoded into the memory data that has been pinged—the sight of the pen briefly triggers an echo of the pain from that first pen moment.

There are also purely physically-evoked feelings—produced artificially via drugs, or purposefully through injury or activities like sex & exercise, or mistakenly due to brain or nerve dysfunction, etc. Another source of these more reflexive, non-narrative emotions are the primal, pre-programmed genetic responses to specific environmental stimuli: fear caused by the sight of creepy-crawlies, disgust evoked by the taste of rotten food or foul scents, attraction to symmetry in patterns & faces, etc. Like memory-triggered emotions, these reflexive emotions can all make a similar kind of non-narrative contribution to the feeling of a moment. (And although the feelings they generate are used in emotional equations—contributing to narrative choices like drug-seeking behavior or Rodney's decision to risk a small burn—they are not essentially a *product* of our consciousness' narrative mechanisms, so we won't discuss them in detail here.)

This wash of widely-varied emotions—each felt in differing intensity, and each derived from different past, present or potential sources—this tableau (combined with those other more reflexive sources) is the essential

*feeling* of any given moment of existence. While our consciousness is drawing our attention to data in our environment and running related internal dialogue narratives, these combined mechanics are also helping to generate the accompanying emotions of the moment, which contribute to the overall purpose of our consciousness: to predict results and make decisions, lots of them, every second of every day.

This mix of feelings composing the experience of a moment is roughly equivalent to what philosophers have long referred to as *qualia*—a word that seems to exist only because we had no more precise terminology. But now we have more precise terminology, so let us never speak of that oft-debated, oft-misrepresented term *qualia* ever again!

When we consider the likely complexity of the "emotional fingerprint" created by any moment's mix of varying emotions at varying intensities, we can see why our experiences and memories are capable of evoking such "moment-specific" feelings—which can be both very intense, and in a way indescribable. How *could* we truly describe the mix of feelings that composes a moment? Usually, we pick out the most prominent note among the cacophony of emotions and define the moment that way, reducing it to one of the more basic tags. *I*

*was so...happy. It felt, I don't know, just...depressing. All I can tell you is...I was scared.*

If we were being accurate, we might say something more like: *Well, I was mildly nervous about the upcoming interview, but fairly confident and excited about my date afterward, very annoyed by the bugs in my face, a little scared when I saw that guy who I thought was Joe, and thrilled that the check I was opening was twice what I was expecting!* And keep in mind: that description only included the net emotional results of the different narrative threads mentioned. To arrive at those results, our brain had to provide that other set of sub-calculated emotional values & judgements to be plugged into the main emotional equation.

In light of all this, it's not hard to believe that the feeling of each moment—its emotional essence—is like those mythical no-two-are-ever-alike snowflakes. It's the most torturous quality of nostalgia: that we seek to recreate the emotional essence of a moment or experience, but in reality, that is nearly impossible.

### **The Spectrum: Perform or Survive**

Maybe the *coolest* thing about the human brain is its capacity to achieve this kind of extraordinary complexity through a system that is, in its own way, extraordinary in its simplicity, its *elegance*. And emotion's ability to create this complexity out of

simplicity is akin to the way a wide array of colors can be achieved through different combinations of the 3 primary colors in varying intensity. But instead of having merely 3 colors, our brain's emotional palette has at least 26 "primary colors" at its disposal (13 Yin & Yang pairings)—all of which can be mixed in at anywhere from 1% to 100% intensity.

Now, I know that since I just offered up the number 26, you want to know what they all are—and I promise we'll get to that, but before we do, let's lay out a few more things about our *magical 26*. First, this encourage/inhibit instruction does more than simply tell us to act or not act, it seems to calibrate an entire set of responses—both physical and mental—that better prepare us to confront whatever challenge we face.

Before (or as) our brain urges us toward an *action*, it seeks to calibrate our *behavior* prior to that action in a way that gives us the best chance to achieve a desired result.

Therefore, when our brain is flooded with encouraging or inhibiting emotions, the emotions are *preparing us to act* in addition to telling us to act. In the case of encouragement, the positive emotions help to create a "performance mode" in our minds and bodies. This might also be thought of as an "open" state in which we are free to act with more fluidity and greater focus on the task at hand.

Basically, the brain is saying *we can be in performance mode here, which requires a devotion of our primary physical & mental resources to this task*. The brain arrives at this decision through emotional equations that determine: 1) this task is worth it, and 2) we can safely devote our resources to this task without exposing ourselves to unnecessary risk by ignoring other needs temporarily (we're also prone to devote these resources even if it isn't actually safe, but the action is of such high priority that we're willing to take that risk—which we've probably convinced ourselves is avoidable).

The opposite occurs when our brain is flooded with inhibiting emotions. As opposed to performance mode, our brain and body go into "survival mode." This kind of behavior is reflected in the hesitation caused by fear and anxiety. Instead of creating an "open" (higher performance/higher risk) state, the negative emotions create a "guarded" state that sacrifices fluidity & total focus in favor of caution & protection. We are hyper-aware of & ready-to-defend against any possibly danger-predicting data in our environment *in addition* to focusing on the perceived potential loss.

To understand this mechanic, it is most useful to look at it in its extremes. Ultimate performance mode is reflected by athletes who are "in the zone" and perform with

such fluid physical & decision-making precision that it seems almost inhuman. In this case, all of the positive emotions—pleasure from the accumulating success, growing confidence from their belief in their skills to achieve their goals, pride from the social status gained by their performance—this flood of positivity merges with their actual skill & ability to create a nearly-ideal performance state in which everything else drops away from their consciousness and all resources are freely devoted to their athletic task. They have become the perfect machine for this particular moment.

At the other end of the spectrum is paralyzing fear—those moments in which all choices seemingly lead to great loss or harm, making you so afraid that you are literally frozen, unable to act at all. And in your frozen state you feel almost *animalistic*: nearly wordless, cowering, trembling, eyes darting frantically between each rustle of sight & sound, ready to protect ourselves, to lash out violently if provoked. This an extreme response to the same impulse that made Rodney hesitate before reaching into the fire for his possibly-pooppy yummy. In the case of paralyzing fear or anxiety, your brain is begging you to wait until you can find some solution that doesn't involve a major loss. *Don't move. At all. But stay alert! And if you notice anything—protect yourself! Let's see if we can figure something out before*

*you do this thing that is very likely to end very badly.*

Performance & Survival. Open & Guarded. Encourage & Inhibit. Pleasure & Pain. Yin & Yang. This is the spectrum upon which all emotions are measured & expressed. In the end, we're simple creatures—it just takes a whole lot of calculating to get there.

### **The Purposes: Imprint & Signal**

Yes, I know, *what about the magical 26?*

Getting closer...*promise*. But there's a distinction within our emotions—one we've already acknowledged—that I want to bring to the forefront before revealing the 26. It's the distinction between our emotions' two basic purposes: *imprinting & signaling*. Some emotions serve both purposes, some just one.

"Imprinting" is the encoding of data with a particular value at the time of incident ("*Ouch! That red glowing stuff is hot*" or "*Mmm! This stuff I'm eating is yummy*"). There is also likely a secondary kind of imprinting or "tagging" process that is used when we make judgements about other entities (individuals, groups). In this secondary imprinting, the emotion does not encode the entity itself with a value, rather, the emotion helps create/strengthen a connection between the entity and other data that has been encoded with a value (i.e., a gain/loss event). This is the mechanic

that allows us to associate anger-generated, negative-value data with someone whom we actually have affection for—*without* changing our overall perception of them as an Agent of Gain. (Unless that data is the piece that broke the camel’s back, tipping the data pile toward predicting more likely future losses than gains.)

Our emotions’ other purpose is “signaling” or prompting, which is the primary emotional mechanic we have been discussing thus far—guiding our actions & behavior toward a desirable result. Although most of the signaling examples I’ve provided have been fairly straight-forward (i.e., *fear* signals behavior that helps mitigate a potential loss), our full matrix of emotions will also detail some of the more complex behaviors that our emotions can signal. These are the most sophisticated of our primary emotional pairs, and likely the most recent to evolve (which we’ll discuss more later).

Imprinting & signaling both play a vital role in calculating the brain’s emotional equations. Imprinting allows memory-based data to have actual values when plugged into those equations, and signaling ensures that the results of the equations guide our behavior in useful ways based on the known data. Part of what makes this system plausible is the fact that all decisions & emotions are data-based. Not

only data-based, but data-based in a way that is ultimately binary, which is the way our brain primarily functions. In the end, everything in the brain essentially comes down to an unimaginably vast array of on/off switches. Emotions make maximum use of those switches. *Complexity from elegance*. If you could use only three words to describe how the human brain functions, those would be the three words.

### **The Secrets of Beliefs**

So, yes, we’ve *almost* arrived at that part. The part where we reveal *The Mothership of Emotions*. But there’s just *one little concept* that I need to slip into your brain before we visit *The Mothership*. Actually, it’s a pretty big concept, one that might be the most powerful force in shaping our most important decisions: *beliefs*.

There are special emotional pairs that are specifically designed to use our beliefs to generate feelings. And these beliefs provide the foundation for a vast number of the decisions we make. *You believe in God. You believe in the principles of conservatism or liberalism. You believe that love is always good and violence is always bad. You believe violence is a necessary evil.*

If you were to catalog them, your list of personal beliefs might seem nearly endless. Yet, the list would still have a hierarchy. And if a decision pits two opposing beliefs

against each other, the stronger belief is very likely to win out. So what does that mean, for a belief to be *stronger* than another? To answer that question, we first need to answer a more fundamental one: *what is a belief?*

In the view of Narrative Complexity, a belief is, in essence, a high-value, high-validity prediction trope. It expresses a basic, but important, deeply-applicable and overarching prediction that has achieved very high validity through the accumulated experience or study of actual or perceived-to-be-true events. *I believe forgiveness is always better than revenge.* Or more purely: *I believe in forgiveness.* Translated: in any choice that can be reduced to an act of forgiveness or revenge, choosing forgiveness is highly-likely to achieve a more desirable ultimate result.

The higher a belief's related value (i.e., *your soul's eternal survival = extremely high value*) and the higher its validity (*being taught something from the moment your memory began, by people you implicitly trust = very high validity*) the higher a belief rises in the hierarchy (*Above all else, I believe in God*). These top-level tropes are decision-making gladiators—taking on all contradictory ideas or choices and slaying them with the power of their "truth." Who are these gladiators really? Purely-reduced & powerful prediction models that represent something

we both assess be a highly-valid prediction in almost all circumstances & settings, and one that relates to many high-value goals.

*Cheating is bad. All success requires hard work.* These are superseding predictors, the express lane of decision-making, because if can we find a way to apply this predictive pattern—even without examining related data in detail—we think there is a strong likelihood of goal-success. Which does not make a belief true, it just means you "successfully" applied it or "know" it has been successfully applied enough from your perceived personal experience or your study of "reliable" sources to make it rise to the level of a belief.

And this mechanic reveals the source of many seemingly illogical behaviors and beliefs, which are actually based on very logical choices by our brain—unfortunately, in these cases, our brain has arrived at this logic through bad data or data that has been misinterpreted (often through the application of other powerful, but false beliefs). For example, long ago ship captains behaved in all kinds of illogical ways because they believed sailing too far would send them off the edge of the world. This belief was founded on the superseding belief that the world was flat. *This belief was arrived at through a lifetime of misinterpreted evidence (it looks flat, all the time) and bad data sources (everybody says*

it's flat). It was almost impossible for those sailors to imagine that the sea wasn't a purely flat and likely finite entity, because they had no "valid" pattern evidence to build a different belief on.

Thus, we have *confirmation bias*—because when we judge contradictory data for validity we often can't even imagine it as true, which makes us more likely to seek out & choose to trust data that reinforces what we already believe.

[DUDE FROM THE FUTURE SPEAKING TO THE 13TH CENTURY SHIP CAPTAIN.]

DUDE: *Look, trust me, the world is round. That's why you can't see forever along its surface, because the surface is curved!*

CAPTAIN: *Right. I can't see forever because it's too far away. And on the other side of this "round" world, I suppose they're upside down and still sticking to the ground? Don't think so.*

DUDE: *Gravity man. Heavier objects attract smaller, and the earth is huge!*

You can see this conversation isn't going anywhere. To the Captain's brain, what the Dude is saying is inherently *not true* and thus, nearly impossible to tag as a valid. This also makes it nearly impossible for the Dude's true, but unconvincing evidence to change the Captain's belief. One way to

avoid this trap is to make "*Doubting your instinct to believe in something*" one of your highest level beliefs, which is a way to "short circuit" confirmation bias. This belief does that by making doubt supersede certainty, which provides your brain with a logical, high-validity reason to give contradictory data a second look. And this allows your brain to accept this data as valid *despite* the fact that it contradicts what you "know" to be true. It's an awfully tricky trick—which is why most of us are total suckers for confirmation bias. But the use of this trick is why the scientific method, over time, has been able to initiate major changes in human beliefs: because it is built on *skepticism*—that belief that doubt supersedes certainty. This has helped science-based endeavors to accumulate enough valid evidence and repeatedly produce enough confirming data to slowly change many of our beliefs.

Despite all this, to our brain, confirmation bias is not a flaw. Most humans do not have the luxury of being able to treat all evidence as possibly equal without further, detailed examination. It's much more efficient to build beliefs on accumulated past evidence and trust those assessments, otherwise we might be frozen by the possibilities of what might be the *real* best decision. In fact, using the evidence that we've already gathered is essentially the *only* way we can create our beliefs. Our whole system of

consciousness is founded on trusting our original value tags & validity judgements and building upon those. Yes, this means that humanity can get mired in ultimately false beliefs for a long time, but in a way many of these beliefs are *functionally* true. This means that the application of these beliefs still works within the framework of what is *actually* true well-enough to aid in our survival.

In other words, yes, there were great benefits to be had by understanding that the world is, indeed, round. But the belief that it was flat still embodied enough *actual* truths about the world to make it functional. *If we move consistently in one direction, we will arrive at a different place. When we encounter a valley or mountain, it will not continue in perpetual incline or decline, but be surmountable at some point, etc.* These might seem to be uselessly obvious premises to us, but to ancient man these truths were *functionally* more important than the belief that the earth is round, and therefore highly-useful despite contributing to a false belief.

And this appearance of functional truths within an ultimately false belief is not an accident. This occurs exactly *because* our brain is using that time-tested experiential-data-based method to build the belief. *Some*

of that belief-building data has been interpreted in valid ways, and is therefore specifically useful even though we've gotten the big picture wrong (which leads to other problems, but nobody's perfect). Thus, confirmation bias has survived, because even though it can divert us to the wrong track, that track can still get us to where we need to go at that moment.

Which is all good & well, but what exactly do these beliefs have to do with emotion? We'll allow *The Mothership* to reveal the nitty-gritty details, but suffice to say: our brains *do not* like it when we let the lure of big pleasure or big gains usurp the supremacy of our beloved beliefs in the decision-making process. *Sure, this seems awesome right now man, but think BIG PICTURE. All the good you can get from this ain't gonna make up for all the bad that's likely right on its heels.* Remember: every time your brain is making you feel terrible, it's just looking out for you. Your brain really *is* in your corner, even when it feels like it isn't.

### **The Mothership of Emotions**

Okay, no more stalling. Following is our EMOTION MATRIX containing the magical 26—the 13 base pairs of Yins & Yangs. For each performance/survival pairing, our matrix details its narrative triggers and primary purposes. You are now invited to board...*The Mothership*.

The Mothership of Emotions [Emotion Matrix]

<i>The Spectrum</i> →	<i>Performance (Open)</i>	<i>Survival (Guarded)</i>	<b>Primary Purposes</b>
	<b>Emotional Pairs</b>		
<b>Narrative Triggers</b>			
<b><i>Specific Known Value Gain/Loss</i></b>	Pleasure	Pain	<ul style="list-style-type: none"> <li>• Encode data as helpful <i>or</i> harmful</li> <li>• Signal behavior that perpetuates gain <i>or</i> stops loss</li> </ul>
<b><i>Specific Potential Value Gain/Loss</i></b>	Excitement	Fear	<ul style="list-style-type: none"> <li>• Encode data as helpful <i>or</i> harmful</li> <li>• Signal behavior that helps ensure gain <i>or</i> mitigate loss</li> </ul>
<b><i>Global Value (Known &amp; Potential) Gains/Losses</i></b>	Happiness	Sadness	<ul style="list-style-type: none"> <li>• Signal behavior that prepares us to:                             <ul style="list-style-type: none"> <li>- expend/risk resources in times of perceived abundance, <i>or</i></li> <li>- conserve/protect resources in times of perceived scarcity</li> </ul> </li> </ul>
<b><i>Known Prediction Success/Failure</i></b>	Affirmation	Surprise	<ul style="list-style-type: none"> <li>• Encode prediction data as reliable <i>or</i> unreliable</li> <li>• Signal behavior continuance <i>or</i> cessation</li> </ul>
<b><i>Potential Prediction Success/Failure</i></b>	Confidence	Anxiety	<ul style="list-style-type: none"> <li>• Signal behavior that helps ensure prediction success <i>or</i> mitigate prediction failure</li> </ul>
<b><i>Known Agent of Value Gain/Loss</i></b>	Gratitude	Anger	<ul style="list-style-type: none"> <li>• Signal behavior toward entity that either:                             <ul style="list-style-type: none"> <li>- reflects openness and strengthens bond, <i>or</i></li> <li>- protects against and seeks "restitution" for loss</li> </ul> </li> <li>• Associate entity with gain <i>or</i> loss data</li> </ul>
<b><i>Potential Agent of Value Gain/Loss</i></b>	Affection	Animosity	<ul style="list-style-type: none"> <li>• Signal behavior toward entity that either:                             <ul style="list-style-type: none"> <li>- reflects openness and strengthens bond, <i>or</i></li> <li>- protects against and seeks "restitution" for any previous outstanding losses</li> </ul> </li> <li>• Encode entity as helpful <i>or</i> harmful</li> </ul>

The Mothership of Emotions [Emotion Matrix]

<i>The Spectrum</i> →	<i>Performance (Open)</i>	<i>Survival (Guarded)</i>	<b>Primary Purposes</b>
	<b>Emotional Pairs</b>		
<b>Narrative Triggers</b>			
<b>Social Status Gain/Loss</b>	Pride (In Self)	Embarrassment	<ul style="list-style-type: none"> <li>• Encode data as "socially" helpful <i>or</i> harmful (in terms of prestige in specific community)</li> <li>• Signal behavior that perpetuates gain <i>or</i> stops loss</li> </ul>
<b>Known Belief Compliance/Violation (by Other Entity)</b>	Pride (In Other)  [Root of Covetousness]	Disgust  [Root of Jealousy]	<ul style="list-style-type: none"> <li>• Associate entity with "model" <i>or</i> "avoid" behavioral data</li> <li>• Signal supportive <i>or</i> antagonistic behavior toward entity</li> </ul>
<b>Potential Belief Compliance/Violation (by Other Entity)</b>	Admiration  [Root of Envy]	Disdain  [Root of Resentment]	<ul style="list-style-type: none"> <li>• Encode entity as "model" <i>or</i> "avoid"</li> <li>• Signal supportive <i>or</i> antagonistic behavior toward entity</li> </ul>
<b>Known &amp; Potential Belief Compliance/Violation (by Self)</b>	Satisfaction	Guilt	<ul style="list-style-type: none"> <li>• Encourage belief-compliant behavior <i>or</i> inhibit belief-violating behavior</li> </ul>
<b>Known Need of Agent of Value Gain/Loss</b>	Generousness	Selfishness	<ul style="list-style-type: none"> <li>• Encourage specific act of sharing with Agent of Gain <i>or</i> inhibit specific act of sharing with Agent of Loss</li> </ul>
<b>Potential Need of Agent of Value Gain/Loss</b>	Magnanimity	Greed	<ul style="list-style-type: none"> <li>• Encourage behavior that prepares us to share with Agent of Gain <i>or</i> to protect resources from Agent of Loss</li> </ul>

[ I chose not to include *Engagement/Boredom* because they seem to be a general mental response to the *presence* (engagement) or *absence* (boredom) of useful or novel data in our environment or within whatever we are specifically evaluating. Instead of producing actual pain or pleasure on their own, these "mental states" seem to reflect whether or not there is any possible emotion-producing data present. Thus, *engagement* opens the door to all emotions (which are actually what produce the pain & pleasure, and *keep us* engaged) and *boredom* leads to almost no emotion, a state which makes us want to move on and find something to feel. ]

## The Mothership's Alien Language

I know, *I know*—you have questions. And complaints. Before you toured *The Mothership*, you were thrilled it had finally arrived (anticipating that value gain). But now that you're aboard, you're perturbed. *Where is my favorite emotion?! How can you claim this is complete? Magnanimity!? Affirmation?? What the hell!?*

I understand. And don't worry, your favorite emotions haven't gone anywhere. Think of it this way: you're looking at red, blue & yellow, and begging to know why *fuchsia* isn't there. *It's in there*. But we need to work a little alchemy in order to show it to you. And there's something else: *what exactly does fuchsia mean to you?* Sure, we can all eventually agree on what's generally red, blue & yellow—even green, purple & orange. But when we start to get into those *subtle shades* of color & emotion, we also get into that *malleable words* area. Here we begin to see some of the drawbacks of a language that allows for imprecision—a system in which certain words represent less frequently encountered ideas, and are therefore more reliant on specific personal experience for description, as opposed to more cumulatively developed & more culturally reinforced fundamental ideas (*fuchsia* vs. red).

Nonetheless, before there's a mutiny, let's work a little alchemy and try to make some

*fuchsia*. *Disappointment*. Here we have a combination of surprise (*we thought we were going to ace that test*) and the simple pain of loss (*our failure cost us an "A" in the course*). Conversely, the surprise of an unexpected "A" (prediction failure + value gain) instead creates a feeling we might describe as *delight* (which helps give a positive tag to a gain event that otherwise might've been seen merely as a prediction failure).

But let's return to the disappointed student (because he's more fun to mess with). The student's disappointment might be augmented by other factors. *I should've studied harder* produces *guilt* (he violated his belief: *Success requires hard work*). And when he imagines telling his parents, he begins to experience the inevitable *embarrassment* from public failure (loss of social status). *And* because of his strong affection for his parents (which makes him want, among other things, to be admired by them) this failure registers as an even higher value loss, amping up the pain of his embarrassment & guilt to the level of *shame*.

Now imagine that in the back of that student's mind, he suddenly realizes that this failure might have the eventual bonus of lowering his parents' expectations, allowing him to imagine future gains in affection achieved at a lower cost (less studying & other success-related effort). Here his brain pumps out a bit of *excitement*

over these potential future gains. In reality, the shame of the moment is probably powerful enough to quell any real feeling of excitement, but its small pleasure still registers—most likely in a way that he perceives as "momentary relief."

*When the student saw the unexpected "F" on his test, and realized he'd just lost his "A" in the course, and thought about telling his parents, he was filled with disappointment & shame. Then, for a moment, he imagined a new future in which his parents stopped expecting so much, and felt a small respite from the pain.*

Of course, that still might not be *exactly* your description of fuchsia, but we can probably at least agree on which paint matches the curtains now. Keep in mind: it's not so much about the words as it is the judgements they represent, and then tying those judgements to specific pain or pleasure behavioral responses—some of which are more universally recognizable than others.

The less recognizable primary emotions & their sources are, in a way, "camouflaged" because they are rarely felt in total, focused isolation. Consequently, we aren't as compelled or likely to determine their specific narrative triggers (unless, of course, you spend a lot of time in therapy). This means there are some basic emotions that we never really think to distinguish on

their own. For example, let's examine that simple (& almost *overly-familiar*) feeling of *affirmation* that you get from positive feedback when playing out a successful predictive pattern. At first glimpse this seems like a pretty flimsy emotion, especially compared to its pair: *surprise*, which is easily (& often powerfully) quantifiable to all of us. But the emotional juice from affirmation is what, for example, video game designers and mystery writers are doling out along the way to get you to the ends of their creations. Every hint revealed along the story's path (confirming the narrative that we are predicting) and every glowing, animated star that pops up en route to the end of a game level (confirming your ongoing success in solving the puzzle)—all of this pleasure says to your brain: *yes, keep going, keep thinking this way.*

And if we look more closely at "unbalanced" pairs like surprise & affirmation—where one half feels more powerful & identifiable—we can see where evolution is likely at work. Surprise *needs* to be more powerful. It's often trying to stop you cold: *woah, that's not what we expected, hold up!* But its pair, affirmation, would probably prefer we stay in the flow of whatever we are (successfully) doing. It just wants to make sure we're positively noting our success along the way. (Here again, our "Guarded vs. Open" mechanic is at work.) Thus, we can

see how, over time, these differently weighted usages resulted in differently evolved characteristics within some emotional pairs.

We can also see this kind of evolution in *guilt & satisfaction* (belief violation & belief compliance). Consider that beliefs are, by definition, already associated with high value & high validity. This makes us generally more likely to comply than not to comply. Thus, *satisfaction* doesn't need to work very hard to reinforce our belief-compliant behavior—our behavior is naturally belief compliant. Satisfaction, like affirmation, is just produced to help keep us going: *excellent, you're doing the right thing man, keep it up*.

This lack of emotional juice when we act belief-compliant is likely one of the reasons why we usually want to tell other people about events such as our own acts of kindness. Even though we feel some genuine *self-satisfaction* from, say, saving a dog who was hit by a car (*I believe in aiding all creatures in need*), our satisfaction still might not be as strong as our desire to tell other people—which provides that juicier, more powerful social status reward of pride (something that requires an audience).

Contrary to satisfaction, *guilt* is triggered when a belief's innate power is *not* doing its job—when a belief is being undercut by

something like the potential for strong pleasure or big gains (or the desire to avoid a big loss). Thus, guilt has to have some serious juice—because in many cases, it's our last line of defense against a very bad decision. This kind of role likely led our brain to accede to guilt-heavy mutations over the course of evolution.

In this way, we can see how the evolution of emotional pairs is similar to the evolution of more concrete features, like our limbs. Once upon a time, the fins & paws that became limbs were fairly balanced in composition & effect, but as the needs of each end of the mammal grew more specific, the limbs adapted differently (while still remaining fundamentally similar & clearly part of the same original mechanism).

Now, we could continue to scour the emotional spectrum in hopes of eventually hitting everyone's favorite & thus-far-unnamed emotional combo color—but, y'know, *that'd be nuts*. There are way too many hues hidden in the rainbow. However, the colors are all there to mix for yourself. And while you're trying to locate your favorite emotions, keep in mind that some of them are essentially a word that describes a primary emotion in differing intensity: powerful guilt (strong associated loss or violation of a strong belief) is often deemed *remorse*, whereas less powerful guilt might

be expressed as simple *regret*. Similarly, *annoyance* is basically a description of very minor *pain* (those bugs in your face cause tiny, but frustrating losses in resources like mental focus). But we're starting to scour the rainbow now, so—*scouring officially ceased*.

### **Deep Inside The Mothership**

Instead of exploring more emotional blends & hues, let's look more closely at a couple of the primary emotional pairs—the ones that seem to need the greatest clarification: *generousness/selfishness* & *magnanimity/greed*. The former pair is easy enough to conceive, but the latter seems almost unnecessary in light of the first. Here again, language complicates matters. In practical terms, humans haven't had much reason to distinguish something like "selfishness" from "greed"—basically, we consider those words to be synonyms. In both cases the result is the same: *we're keeping it!*

But our evaluation of another entity's need as *known* (current) or *potential* (future) is necessary to affect the proper kind of behavioral response in each case. If the *yammering homeless guy* on the corner wants money as you walk by him, your momentary *selfishness* might keep you from handing him a buck. But what if you're worried that the government is going to come around *next year* asking for a big income tax hike to help feed *those worthless*

*indigents*? In that case (because you're a greedy jackass who sees the government & homeless people as Agents of Loss) you might actually hide your money in some Swiss bank accounts—so when the Feds come asking, it's protected. *Greed rears its ugly head*.

Conversely, if your kid needs money to buy dinner right now, you have to be able to distinguish that need from their need to pay for college someday, which requires an entirely different set of actions, behaviors & long-term evaluations—as opposed to one simple act of fulfillment that is primarily dependent on your current resource status. And these emotions work much like their cousins *anger/gratitude* & *animosity/affection*: you can be motivated to feel situation-specific generousness toward an entity that you otherwise generally behave greedily toward (i.e., you donate specific disaster relief to a nation that you otherwise support a general embargo against). That's because, as similar as these feelings are, they are still the results of slightly different narrative judgements. And this distinction allows your decisions to take into account relevant current & predicted resource status when planning how to most efficiently & beneficially share or protect your resources when necessary.

Which just leaves us with one more subsystem to examine aboard our Mothership:

covetousness/jealousy & envy/resentment—whose roots are, respectively, *pride(in other)/disgust & admiration/disdain*. Since we consider their root pairs to be Complex Emotions, we might think of these other branches as *Very Complex Emotions*. In a way, many of our "fuchsias" (like disappointment/delight) are *Very Complex Emotions*. Which is to say, at first glance they appear to be complex, but primary emotions—until you look a little closer, and realize that all of their component narrative judgements and desired behavioral results can be arrived at through some combination & application of our other *magical* 26.

I've specifically noted jealousy, et al, on our emotion matrix (even though they aren't a primary pair) because these are actually among the most powerfully identifiable emotions, and their pairings so mimic the other complex Yins & Yangs that they truly *look* like primary pairs. But jealousy/covetousness & resentment/envy are *very complex* because they involve: judging another entity's belief compliance (*pride/disgust*), *and* judging a value gain by that entity—a gain that you view somehow as a personal loss, which triggers a combo of pain, generousness/selfishness, and possibly anger or disappointment. (Keep in mind, this "personal loss" doesn't require that you ever really had a chance of having it—to our brains, it's enough to simply want it for yourself & not get it.)

*My lazy co-worker (Belief alert! "Success requires hard work") just got the promotion I wanted. I'm pissed. And, frankly, I'm jealous.*

*Well, Anne got the promotion I wanted. But the truth is she works so hard around here, she deserves it. Still, I'm disappointed. And I really covet her new office—which is terrible, isn't it? I should be happy for her.*

It's difficult to be happy for other people (especially when their gain looks like our loss) but when their gain actually reinforces our beliefs, our brain still wants to make sure we find a way to tag the experience positively (thus, covetousness). This is because those actions & behaviors have value to us as an *effective model* of how our beliefs can help us to achieve what we want. Conversely, when someone else's delicious gain is achieved through behavior that violates of our beliefs, our brain wants to make sure that we still tag this behavior as negative, despite the fact that it provides a model for achieving something we might want. So even though you also want that big sailboat your neighbor owns, you don't want to be tempted to set up a Ponzi scheme like he did in order to buy the boat. (Assuming your beliefs predict that the temporary gains from such behavior will likely be followed by dire results.) Thus, jealousy gives us the permission to feel negatively about his gain in order to help reinforce future belief compliance

(particularly in the face of desired gains like a big sailboat).

Culturally, we tend to view jealousy and covetousness in the same negative light, but this is one of those illogical behaviors based on a learned false belief (one that had logical origins). The roots of the word "to covet" were related to inappropriate sexual desires (this is buried in the word's etymology). But long ago we discovered that the *emotion* of coveting applies to our desire for anything of value—even symbolic items, like a job title—which led us to appropriately expand the word's usage. Nonetheless, its original negative association remained, creating the foundation for a false belief: *Coveting is bad*.

The "taboo" of covetousness (taught in ancient religious texts) was originally created by our culture for a good reason. It helped us to avoid a powerful, primal & non-narrative urge: *your neighbor's wife* (whom you might succumb to coveting hands-on, even if you really respect your neighbor, *and your own wife*). But, as we observed, the idea of coveting has long been applied to that entire universe of other value gains—gains that we are (usually) much better at controlling our desires for (or at least we're more likely to be deterred by the penalties in place, which *your neighbor's wife* is also good at overriding). And these non-sexual gains are the ones that our brain *wants* us to covet—because it

knows it can use this data to help us to achieve our own future gains via belief compliance.

When we're jealous, the "ickiness" of the feeling toward the other person comes from our disgust over the belief violation that is at the heart of their value gain. Conversely, your desire to fight your own loss pain in order to "be happy" for the coveted gains of someone you respect—that positive impulse is rooted in your pride in their belief-compliant behavior. So go ahead—*covet* all you like. It's good for you. Just keep your envious eyes (and your hungry hands) off your neighbor's wife.

### **A Final Filmstrip: Emotion's Evolution**

Alas, the time has come to disembark *The Mothership*, and leave behind all its high-tech, evolutionarily-fancified brain mechanisms. Your own brain, I'm sure, would be happy to take a respite from all those wacky, mind-bending emotional equations. So we will. *Consider the chalkboard cleared*.

But before you go, let me pull the screen down over the board, switch off the lights, and roll out one of those old filmstrip projectors (kids, imagine an ancient PowerPoint presentation with *way better* ambience). And don't put your head down on your desk—you're gonna wanna see this.

Because our speculation about emotional equations has been based on very familiar experiences & an almost-mathematic (or at least *algebraic*) approach, its conclusions are in some ways quantifiable. The speculation in our filmstrip, however, is more... *speculative*. Which is, frankly, what one would expect from a story about the evolution of emotion. Nonetheless, the tale is a compelling one. And at the very least, we know that modern human emotions had to come from *somewhere*. And that somewhere is *exactly* where our filmstrip begins...

*It is 700 million years before humans ambled onto the evolutionary stage.* A little roundworm with an unfortunate first name—*Caenorhabditis elegans*—is squiggling along in the muck. And little *C. elegans* has something in common with us: he likes to eat. Not only does he like to eat, he *expresses* this desire using clever devices that we also make heavy use of in the expression of our desires: *neurotransmitters*. In particular, *C. elegans* is using serotonin and dopamine, which play significant roles in our own brain mechanics. When Mr. Roundworm encounters positive stimuli, like food or a mate, serotonin is released. And when his worminess rubs up against yummy bacteria, dopamine is released. The dopamine slows the creature down, allowing him to spend more time in the presence of the food. And if he's really hungry, more serotonin is

released, slowing him down even further, ensuring he eats every last bacterial bite.

I know what you're thinking: *this C. elegans guy sounds like an uncle of mine*. And, yes, from a broad universal perspective, we're not all that different from our wormy planet-mate. But 700 million years is a long time. And our use of these neurotransmitters is so much more diverse & complex than *C. elegans'* that it's like comparing an abacus with an iPad. Sure, they both calculate stuff with similarly clever efficiency, but an iPad can calculate *a whole lot more stuff*. And, not to make *C. elegans* feel worse about himself, but plenty of tinier & earlier creatures were using neurotransmitters to affect behavior (even lowly paramecium use serotonin when swimming). Nonetheless, in *C. elegans* scientists have found some of the specific kinds of serotonin receptors that humans use today. And in his simple existence we can see the early sparks of those relationships between resources, "feeling" & behavior that are at the root of our own complex emotions.

As we said, 700 million years is a long time. And in the epochs between roundworms & humans, those simple neurotransmitter-fueled commands "*stay here & eat*" and "*stay here & reproduce*" evolved into more complexly regulated—but still very basic—resources, feeling & behavior relationships. (Thanks to more robust & diverse neural structures & neurotransmitter mechanisms.)

The result was likely a system of primitive *proto-emotional* pairs that helped manage: *hunger(thirst)/satiation, lust/repulsion & strength/fatigue*. Those would cover all of an early creature's basic needs (and probably composed an average evening in the cave: eat, drink, screw, sleep). *C. elegans* politely raises his tail: "Hey, I basically do all of that stuff too!" Which is true, but post-roundworm creatures began to require resource-acquisition strategies more complicated than *squiggle until I randomly squirm across some bacteria*. Thus, the neurotransmitter-fueled behavior signaled by hunger & lust also grew more complicated.

Now, in the blink of a celestial eye, 700 million years have passed (cue Terence Malick's "*Tree of Life*"). Here, humans have gotten the long end of the stick. Their brains are *awesome*. Those simple implements like hunger & lust have morphed into an entire toolbox of fancy gadgets. And those gadgets have a name: emotions. Those same neurotransmitter-based signals that forced *C. elegans* to eat all his spinach are now signaling all sorts of crazy & unbelievable things. And they're doing it mile-a-minute. If a roundworm's simple signaling system woke up inside a human brain, it would feel like a previously perpetually-recluse hydrogen atom suddenly transported to the center of a blazing sun.

And yet, *C. elegans* likely begat those proto-emotions that begat our complex (& *very* complex) emotions. Look closely at the value gain/loss judgements that are at the heart of so many primary emotional pairs. What was the original *object of value*, the one that hunger & satiation managed? *Food*. Hunger. Pain. Value loss. / Satiation. Pleasure. Value gain. *Rodney saved the yummy and felt pleasure*. And these *other entities* we are always judging, Agents of Value—what was the original *other entity* that early animal brains were most interested in evaluating? *Our mate*. Lust. Affection. Agent of Gain. / Repulsion. Animosity. Agent of Loss. *Rodney felt angry toward the wanderer*.

And as early creatures began to sample & consume a wider range of resources (primarily food) they needed a way to signal which resources to accept and which to reject. *Swallow the ripe apple. Spit out the rotten apple*. These accept & reject signals were triggered by pre-programmed data sets that could be broadly applied. In other words, our natural rejection response to rottenness (*disgust*) applies to all kinds of rotten food, not just rotten apples. Therefore, what we are essentially doing is using a broadly-applicable, but rigidly-defined data set to evaluate a wide range of resources and determine which ones to accept or reject. Read that sentence again. Doesn't that sound an awful lot like a *belief*? And what's that feeling we have toward someone who has

violated one of our beliefs? *Disgust*. Rejection. Disgust. Belief violation. / Acceptance. Admiration. Belief compliance. *When Rodney saw that the yummy was poopy, he gagged. Then he looked at the wanderer and shook his head, disgusted by the other man's violation of a solemn truth: Don't shit where you eat.*

Things got even more complicated when—in the middle of that 700 million year blink—advancing creatures got their own cool new (but still primal) feeling-based signaling gadget: *fight or flight*. This little device provided a super-useful survival skill—a method for choosing the most appropriate response to immediate danger. *I can take him! Let's do this!* or *No way, man! Run!* Whaddaya know...*a validity judgement—assessing which one of two predictions is more likely to either achieve a gain or avoid a loss. Fight. Confidence. Prediction success. / Flight. Anxiety. Prediction failure. Rodney hesitated as he reached into the fire for his possibly-poopy yummy.*

Keep in mind, exercising *fight or flight* is not the same as identifying a possibly-edible fruit and feeling compelled to eat it. That's simple value gain recognition & signaling. You know *exactly* what to do: eat the fruit. (And once you're eating, respond to any *disgustingness*, which is also exact: spit it out.) But *fight/flight* is likely tied to our ancestral validity systems because it involved assessing two possibilities that might be best. *If I run, I might get away &*

*live. If I fight, I might win & live.* You don't know exactly what to do, you're weighing your choices—measuring the validity or likelihood of each prediction.

Which leaves us with one untethered primitive feeling: strength/fatigue. Is this category a little too imprecise? Probably—inasmuch as it doesn't distinguish between an overall state of fitness & simply feeling rested/unrested. But at its core, strength/fatigue represents a more fundamental, action-specific judgement: *am I able to keep going or must I stop?* This judgement is most vital at times when a creature's survival depends on its ability to squeeze every last bit of life-saving action out of whatever physical resources remain—which can be hindered by things like pain & fatigue (feelings creatures typically experience in these survival-challenged moments). Once again, nervous systems around the globe went back to that oh-so-reliable tool for a little help in these situations:

neurotransmitters. Vertebrates got a gift—*endorphins*, which are released during moments of pain, excitement, exercise & fatigue (and others, like orgasm, but let's stay focused). These endorphins are known to create feelings associated with pleasure, and to be released in moments when we're trying to squeeze the most out of our resources (injury, exhaustion, sex).

Thus, it seems likely that—as the modern human brain emerged—mechanisms rooted in that primitive strength/fatigue feeling (& involving endorphins) evolved into what we think of as *willpower*: the attempt to "consciously" bolster a struggling or difficult effort. It's hard to sketch the full relationship between this mechanism and our emotions, but it's clear that it plays a role in heightening both the very open & very guarded states generated by our primary pairs—making us more effective in each state. And so, we can imagine how a complex relationship between these systems evolved from millions of years of interactions between those primitive mechanisms: hunger/satiation, lust/repulsion, acceptance/rejection, fight/flight & strength/fatigue.

And those primitive mechanisms are still a part of our emotional kingdom; those original systems remain almost fully intact. In fact, they are still essentially the *rulers* of that kingdom. Most of the time, these proto-emotions (which we now think of as essentially *urges*) are the last obstacle that any narratively-based decision must confront before action is taken. And the highest level of any urge will almost always supersede *any* narrative desire. If you are starving/parched, in the throes of lust, completely exhausted, repulsed by rottenness or in the grip of fight/flight—those primal urges will very likely be

prioritized over your narrative goal (unless you've developed—or were born with—a *wicked* willpower mechanism). This dominance of our ancestral urges over their modern offspring offers unexpected proof of an age-old truism: *we'll always be your parents, and we'll always know what's best for you.*

### **Emotion, Meet Modularity**

How, then, did we develop our modern, complex emotions from these primitive proto-emotional pairs? Well, that requires some speculation *about* the speculation, but since we're already deep in our "what-if" rabbit hole, let's keep digging...

Our filmstrip slips into one last flashback from that 700 million year blink: the long stretch when early mammal brains were morphing into the human one. This is likely the time when all of those uniquely modular neural structures (discussed in the previous essay) began to evolve. And it was this modularization of basic data & larger "ideas" that lit the fuse that led to our emotional explosion.

Think of it this way—those early mammals were actually pretty smart critters. They could *remember* stuff and make use of it later. *Check out that tiny-brained mouse memorizing the fancy maze that leads to the yummy.* And evolving emotions played a big part in this memory device. The *pleasure* of the yummy helps encode the *pattern* of the

maze into the mouse's memory. But those mice-like early mammal minds had a flaw: non-modular data structures—a result of their neural limitations. In the mouse's brain, that memory of the maze isn't a collection of turns, it's one big pattern. Which is why, when Mr. Mouse encounters a similar-but-different maze—i.e., the same exact first half, but different thereafter—the mouse will not recognize that the mazes are *partly* the same. He'll either ultimately think of them as entirely different mazes, or exactly the same one (leaving the mouse continually baffled whenever he reaches the different second half). Thus, those pain/pleasure mechanics are still pretty broad in their application—always associating themselves with large, highly-detailed data patterns.

But as mammals' neural structures evolved and data became more modular, emotions were able to associate to those modular & more specific pieces of data. These newly diversified associations between feelings & data likely allowed emotions to differentiate as they grew more interwoven with specific kinds of data modules.

Thus, using these evolved modular systems, a dog can learn to *symbolically* associate the first step in a sequence with the *actual* pleasure derived from the last step. *Pavlov's dog*: ring the bell and the dog salivates in anticipation of the predicted food pleasure,

*not because he wants to eat the bell.* Now anticipatory emotions are possible: fear, excitement, confidence, anxiety. And these symbolic inanimate objects soon—or simultaneously—allow for symbolic *entities*: Agents of Value. *Viola!* Anger, gratitude, affection & animosity join the kingdom.

And by the time humans arrive in our story, this modularity has gone gonzo. We can do all of this symbolic, predictive & other entity stuff *way, way* better. A massive cerebral cortex allows far more data to be stored for reference, comparison & analysis. Advanced neurons with more connections & more sophisticated associative powers enable data tagging & comparisons to be done with greater precision, and allow our predictions to become vastly more complicated.

Emerging research suggests that these modern pattern & prediction mechanisms even involve our cerebellum (which brains originally employed purely to control motor function). And our dizzyingly complex use of those age-old neurotransmitters—combined with our immaculately-tuned amygdala & thalamus—allow for complex new ways to use those pain & pleasure responses. Guilt, pride, admiration, greed, generosity, jealousy, all the blends & hues—all are now possible. *The Mothership has arrived.* And she has a passenger: consciousness. Which probably means that Descartes' elegant definition of "being" (after all these

centuries) is in need one small edit: I think *and feel*, therefore I am. It's a little less succinct, but maybe a little more true—after all, without *love*, what are we?

### **A Ghost in the Machine**

And so, our filmstrip fades to black, the music swells and...wait a minute—what's that? You *feel* something? You mean the *music* made you *feel something*? Almost forgot about that—music. Pretty cool stuff. And maybe the *coolest* thing about music: we're born with it.

Before you worry that we've suddenly gone wildly off track, *don't*—this is the perfect place to conclude our epidemiological examination of emotions. That's because (and although it's silly, I'll remind you again—we're *speculating* here) music seems to have a very special role in the blueprint of our emotional kingdom. It seems to be a kind of *pattern primer*. Remember that exciting part of the movie "*Contact*" when the crazy-brilliant, recluse mogul sends Jodie Foster the *primer* (a mathematic key or decoder of sorts) that allows her to interpret & implement the hopelessly-complicated alien blueprint? In our filmstrip, the human brain's myriad narrative-building, emotion-generating mechanisms are the blueprint—and music is a pattern primer that helps us to interpret & use it.

Music has two vital qualities. One: it is a data pattern that simultaneously accounts for defined "vertical" or parallel relationships between its elements (chords) and defined "linear" or sequential relationships between its elements (melody). Two: the various pattern combinations resulting from these vertical & linear data relationships produce *emotions*. In other words: multiple linear narratives (melody) that can be woven together (chords) to produce emotions.

Thus, music looks like a genetically pre-programmed way for our brain to teach itself how to use its "blank slate" narrative & emotional mechanisms (whose pattern-analysis & predictions require *recorded data* to really get rolling). Music is a primer for the blueprint associating patterns with emotions—which is going to be the first thing that our vast, initially-empty data-bank (the cerebral cortex) needs to learn in order to begin filling it with that crucial recorded data.

Music is a ghost in the machine. Because our DNA can't pass along the actual data that human brains use to create all that magic, it instead sneaks into the operating system all the pre-programmed emotional responses to the patterns of music. This pattern primer likely helps our infant brains to begin making those all-important associations between the mechanisms that analyze complex patterns & predictions (narratives) and those mechanisms that produce

behavior-guiding emotions. Theoretically, music might actually help to “jumpstart” (or at least “lubricate”) the observe-analyze-respond loop that is the engine of our consciousness. Music, however, obviously isn’t the only primer available to us (deaf humans’ brains seem to get started up just fine without it). Conveniently, DNA is a pretty spectacular courier of information. It’s easy to imagine lots of visual, tactile, olfactory, etc. pattern primers being packaged in our genes—ensuring plenty of redundancy for a resource of vital importance.

Nonetheless—whether or not it’s merely a blind spot darkened by a false belief—music *seems* to be uniquely capable in its role as our gateway drug to the addictive & ceaseless pleasures (& pains) that come from associating patterns with emotion. Which is why it feels so...*lifelike*. Why it’s so extraordinarily powerful in imprinting a specific moment with its specific feelings—which can still be distinctly reproduced when the music is heard again, even a lifetime later. Music doesn’t just know *how to work* the system, it helped *build* the system.

That’s also likely why music feels so fundamentally *symbolic* to us, why it so often seems to express how we feel better than we can actually express with words. Words are *almost* perfect. Music is *sublime*. And of course it is. It’s some of the most-

ancient, most-eloquent code in the universe—light years before the code of words. So yes, words are more versatile & programmable—wizards of the high-speed modern, modular brain. But just as modern emotion’s ancestors (urges) still speak to us most clearly, music knows us in a way that words do not. When our minds, at last, are nearly-gone of all those magnificent associations & cross-associations of data devoured in our lifetime—one set of associations typically remains beyond all others: the musical ones. Thought leaves us, but song often stays—nearly to the end.

And if you believed that all of this complex neural magnificence was bestowed upon us by some vast & unknowable intelligence—as you might suspect, *I do not*—but if you did, then you might assume this *musical persistence* was its parting gift to our consciousness. That before our consciousness goes, before it fails—as it must—it still retains something ancient & sublime, something that might allow us to remain in some way *human* until the end. For music mimics human life at its most fundamental: the association of data, *experience*, with emotion.

Yes, in the end, we are merely the *courier* of a *smaller courier* (that brilliant DNA). But what gives our experience—our journey delivering this valuable parcel to the next generation—what gives that journey any meaning to us at all is the emotion we feel along the way. Does

it matter that the ultimate purpose of these emotions is simply to make us a better courier, and *not* actually to imbue our journey with meaning? I don't know. *Does it?* Does it matter to *you*? Now that you are contemplating these possible truths—do you love your mother less? Is there no more anger when you think of that President whom you hate? Is there nothing you desire any longer? Emotions *are* confirmation bias: they matter to us because they *feel* like they do. Thus, the gains & losses, Agents of Value, and validity that our emotions paint our world with—and the beliefs they reinforce—they all matter too, *because it feels like they do*.

And so it is. We are a paradox of emotion—feeling like our lives matter because we feel like our lives matter. Well then, fuck it: *feel*. And let the *logic* of your *emotions* lead you. Let them make you believe that everything in this life that you *feel* like you believe actually *matters*. Find the love. Go after happiness. Why not? If you're stuck inside of a finite and ultimately inescapable & indecipherable illusion, only a fool would hope that illusion becomes a nightmare.

We're here, my fellow humans. *We're in it*. And we're only in it once. We might as well dream the dream.

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