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From Vicious Circle To Virtuous ?

The Quest To Stimulate Happy Chemicals

Imagine you're receiving an honorary doctorate from the Institute of Human Accomplishment. A huge audience applauds wildly as you express your gratitude. You feel great. A few minutes later, however, the ceremony is over and your happy chemicals are reabsorbed. You trigger some more when you reminisce, but you are soon back to who you were before the ceremony.

When a happy chemical surge is over, you notice your unhappy chemicals again. That prompts you to scan for threats. Was my speech well-received? Why did my friends miss it? Who will like my next accomplishment?

The world is full of potential threats, but you notice them less while happy chemicals are spurting. Once the spurt fades, unhappy chemicals grab your attention. You wonder how to get the good feeling back. Getting another honorary doctorate seems the way to go because you've built a huge connection.

Your brain is always looking for ways to feel good. Often, that leads to things that are good for you. Sleep feels good when you're tired, and warmth feels good when you're cold. Life is simple when you can relieve unhappy chemicals by doing things that feel good.

When that doesn't work, any way of feeling good seems enticing. Things that worked in the past come to mind. Maybe your bottle

cap collection, or your Great Aunt Hilda. The brain expects things that felt good before to feel good again.

Your bottle cap collection can't protect you from harm, of course. But when your brain is screaming "do something," anything that triggers happy chemicals masks unhappy chemicals. Distraction is not the best survival strategy when your cortisol is triggered by a lion. But when your boss is in a bad mood, it's nice to have a way to mask your bad feelings.

Our happy chemical strategies are often a mystery to us. Why does your bottle cap collection give you pleasure while a fishing trip does nothing for you? Each brain learns from the experiences it has. If a child pulls out his collection on a day when he's experiencing a lot of pain, and then the pain stops, his brain "learns" that focusing on the collection stops pain. Each of us learns ways of stopping pain and turning on happy chemicals. We don't learn by intellectually analyzing every possible action. We learn from accidents of experience.

Often, the strategies we pick up are useful. When I was a child, I read books because it distracted me from what was going on around me. I did not think of reading as a way to promote my long-term survival. No one encouraged me to read. Indeed, it was considered rebellious and lazy. When I saw the hostility it provoked in my mother, I was more motivated to distract myself with books. Fortunately for me, that strategy had survival value.

But every strategy disappoints you because it never makes you as happy as it did at first.

And every happy strategy has side effects, which add up when you repeat it.[1]

We're motivated to repeat a strategy anyway because we want more happy chemicals.

Side effects may accumulate to the point where they stimulate unhappy chemicals. A vicious cycle results, as you keep seeking happy chemicals with a behavior that causes more unhappiness.

Happy chemicals disappoint for a good reason. They evolved to excite you about new rewards, not to waste your attention on the same old reward. Discovering a new planet would excite you, but looking at your planet every day would not re-kindle the initial excitement. If you expected to live at that level of excitement forever, you would be disappointed.

I feel a thrill when I walk into a coffee-roasting shop. Sometimes I comment on the delicious smell to the person behind the counter, and I realize they don't notice it. They have habituated to the fabulous smell. If I went to work at a coffee roaster in order to feel constant joy, I would be disappointed.

But such disappointment is hard to avoid, because your brain builds expectations when something feels good. This chapter describes the disappointment each happy chemical leads to. We'll explore dopamine disappointment, oxytocin disappointment, endorphin disappointment and serotonin disappointment.

Your brain doesn't give up after a disappointment. It tries again. It trusts its own circuits because they come from its own experience. If you had a great time at a party after you got a bad grade in math, your brain built a link that suggests partying when you feel bad about math. The same parties will not make you as happy as they once did, however, and bad grades may pile up and make you more unhappy. You might respond by partying even more. You could build a new circuit that helps you feel good about doing your math homework. If you don't, the vicious circle is likely to continue.

Vicious cycles I have known	
Happy habits that mask unhappy chemicals	
Side effects that trigger more unhappiness	

You can probably think of ten vicious cycles in ten seconds: junk food, alcohol, love affairs, drugs, losing your temper, gaming, getting recognition, shopping, watching a screen, telling other people what to do, withdrawing, career advancement, pleasing people, climbing mountains,

something different? It's hard to believe that you're perceiving it differently. We are not aware of our own habituation.

The brain triggers joy when it encounters any new way to meet its needs. New food. New love. New places. New techniques. After a while, the new thing doesn't measure up. "It's not the way I remember it." You may wish you could trade it in for another new thing. But when you understand your own brain, you realize that the disappointment comes from you rather than the thing itself.

When a dopamine spurt ends, it may feel like something is wrong. But dopamine is supposed to rise and fall. Imagine your ancestor finding a river full of fish. He's very excited as he runs back to tell his clan about it. Dopamine creates the energy to run back and the memory to find the spot again. Then the dopamine has done its job. It's not needed anymore. He might feel happiness in other ways. Serotonin might surge when he thinks of the respect he will get from his tribe, and oxytocin might spurt when he thinks of the shared pleasure of feasting. But his dopamine will dip unless he finds an even bigger run of fish.

When dopamine dips, your unhappy chemicals get your attention. You get that "do something" feeling, and you have to decide what to do. One option is to accept the unhappy chemicals and figure out what's triggering them. Another option is to quickly distract yourself from them with a behavior you expect to trigger more dopamine.

Imagine a teenager at a gambling casino. He wins $50, and gets extremely excited. His brain "learns" that gambling triggers that great "I did it!" feeling. He is not consciously telling himself that gambling promotes survival. But the next time he feels bad, the idea of going to a casino lights up. When an evening of gambling doesn't trigger the great feeling he expects, he gambles more. Soon he's feeling bad about all the money he lost. The bad feeling drives him to look for a way to feel better, which activates the thought of gambling. You can have a gambling habit at any age. But a young brain more easily builds neural highways big enough to endure despite disappointment.

When you're young, it's easy to experience something as "the best ever" and "the worst ever." Your brain sees this as important survival information, so your neurochemicals are triggered. That "paves" neural pathways, which help recognize that experience in the future. Of course

when you encounter it again, it is no longer the best or worst you've ever experienced.

Imagine a child winning a spelling bee. He feels more respect and acceptance (serotonin and oxytocin) than ever. He wants that good feeling again, so he spends a lot of time studying spelling words. His brain squirts dopamine each time he mentally seeks and finds the spelling of a word. Every step toward his goal triggers more dopamine. The good feeling distracts him from any bad feelings he may have had. You can't control many of the threats around you, so it's nice to know you can get a good feeling whenever you pick up your dictionary. It works if your brain has linked spelling to an anticipated reward.

But the day will come when this habit disappoints. If the child wins a few more competitions, the same old reward may fail to mask the threatened feelings he is experiencing. He will seek a bigger reward to trigger more dopamine. He might focus on the school talent show, or getting into Harvard.

Whether you've linked dopamine to studying or gambling, it eventually disappoints. Like the juiced-up monkeys in Chapter 1, your brain takes the juice you have for granted instead of cranking out more happy chemicals. But if you lose the juice you took for granted, you're darned unhappy. Managing such a brain is not easy, but it's the responsibility that comes with being alive.

Drug addicts say they are "always chasing the first high." The first time you take a drug, the good feeling is more intense than any feeling you could get naturally. Since your brain equates good feelings with meeting your survival needs, it seems like the drug meets your needs better than anything you've ever experienced. You take the drug again, expecting more of that feeling. But this time it is not the best feeling you've ever had. You're disappointed. If you took more, that could be the best experience ever....You are constantly choosing between disappointment and taking more.

Your brain is chasing the first high whether it's a natural or an artificial high you're anticipating. Artificial highs build bigger circuits and usually have worse side effects, but many natural-high stimulators have harmful side effects when repeated too often. People keep seeking despite the side effects because the expectation of a reward equals dopamine. Whether you are seeking the next drink or the next donut or the next

shopping expedition or the next investment, your dopamine starts flowing the moment you start seeking it. The reward is never as big as you expect, so you continue seeking.

We don't usually think of seeking as fun. When you seek a donut, you think it's the donut you want. But that great dopamine feeling flows while you're looking for a parking spot near the donut shop. To your brain, it's like foraging: scanning the environment for details leading to a reward. When you find a parking spot, your brain says hooray! More dopamine. We evolved to survive by sifting through lots of detail in search of reward-relevant patterns. Whether you're looking for a good bar, or a good stock, or a good gift, seeking stimulates dopamine. → gamify

Computer games reward that urge to seek and find, but not if you play the same game over and over. That's why you get rewarded with a new level. Going to a museum or a mall stimulates dopamine because you are busy scanning lots of details in search of familiar patterns. It's foraging without the food. But you need to keep scanning new details or your dopamine will droop. That's why museums change their exhibitions and malls change their merchandise.

When a game or museum or mall stops feeling good, you might say "they don't make them like they used to." You may not realize that the change is in you rather than in the outside world. When your brain can find a reward without much seeking, it doesn't release much dopamine.

Dopamine disappointments	

Collecting is a popular hobby because it overcomes dopamine disappointment. It gives you a never-ending reason to seek. As soon as you find one object of desire, you look for another. You always know what you "need" because the collection defines it. You bring lots of knowledge to the pursuit, so your mind is too busy to notice unhappy chemicals.

Adding to your collection feels like meeting a survival need, even though nothing you collect actually promotes survival. You rarely hear a collector say their collection is complete and they are just enjoying it as is. The good dopamine feeling stops if you stop seeking. Bonding with and one-upping other collectors may stimulate oxytocin and serotonin too.

Planning a project triggers dopamine. It might be a party or a home re-model or a life transition. Thinking about the end result makes you feel good, and each step that brings you closer stimulates dopamine despite the inevitable frustration of a longterm project. Once the party is over or the house is remodeled, you may feel like something is missing. Dopamine is missing, and you may be tempted to start a new project.

Travel stimulates dopamine because it bombards your senses with new inputs. Planning a trip stimulates it too because you anticipate the great feeling of being at your destination. When you arrive at that tropical island with its perfect bands of blue and white, you get a rush of excitement. But in a few minutes your focus shifts to the practicalities of settling into your room, and the dopamine wears down. When you wake up the next morning, the excitement of being there is somewhat fresh again. But as the day wears on, you become who you were before the vacation.

Not all dopamine-fueled habits are bad habits. Thomas Edison stayed up late at night trying again and again to find filaments that would make electric light. Diseases have been cured because researchers spent long hours sifting and sorting through details in search of patterns. When they found what they were looking for, they typically set out in search of the next goal. Our brains were not designed for us to sit around contemplating what we already have. They were not designed to trigger excitement for no reason. They were designed for us to keep finding new ways to promote survival.

Romantic love is perhaps the most familiar example of dopamine disappointment. When people are "in love," they don't realize they are riding on the dopamine triggered by the satisfaction of a long quest or pursuit. The same reward does not excite you forever. Dopamine dips,

and unhappy chemicals get your attention. You may think your partner is causing the unhappiness because you don't understand dopamine disappointment. You may think a new partner will make you happy, because your brain learned that from the last partner. But if you expect to feel the excitement of new love all the time, you will probably find yourself in a vicious cycle.

If you expect a life of constant dopamine joy and excitement, you are likely to be disappointed.

Endorphin Disappointment

Real pain triggers endorphin. But if you took the drastic step of inflicting pain on yourself to get the endorphin, you would be disappointed. It would take more and more pain to trigger the same endorphin feeling.

Starving yourself stimulates a good endorphin feeling, but you have to keep starving more to get the same feeling.

Exercise triggers the good feeling, but the same level of exertion will soon disappoint you. You have to keep doing more to get the same feeling.

Obviously, hurting your body to enjoy the endorphin is a tragic and dangerous vicious cycle. But it explains why people who hurt themselves seem inclined to hurt themselves more. We did not evolve to inflict pain on ourselves intentionally to get an endorphin high. Pain warns you of imminent survival threat. In the world before emergency rooms and anesthesia, the bad feeling was incentive enough to avoid pain-inflicting behaviors.

If you are a person who never exercises, you will get a great endorphin feeling the first day you start. That's a nice reward, and of course you should continue to exercise. But you won't get that good feeling the second day unless you exercise more. And of course, you should. However, the day will soon come when one of your body parts cannot tolerate the escalation necessary for endorphin. If you can't get yourself to exercise without that reward, you're in trouble.

Some people are so intent on endorphin that they harm their body until they get it. I used to play tennis in a friendly, uncompetitive ladies group. I was amazed to learn that most of the ladies played in pain.

Many of them took anti-inflammatories before they went out to play. My father died of liver cancer after taking these pain relievers, so I quit the tennis group and looked for other kinds of exercise. When I run into the tennis ladies, they look good, but when I ask how they feel, they are still in pain.

Starving triggers endorphin. If you ever missed a couple of meals, you may have started feeling a little high. As soon as you eat something, that good feeling stops. Your body knows that the good feeling of eating has more survival value than the good feeling of starving. The pain of starving is survival information we were not designed to ignore.

Opium and its derivatives stimulate endorphin without physical pain. But they have terrible side effects. First, they undermine your natural happy-chemical mechanism. Second, they mask any pain you have while using them, resulting in dangerous neglect of personal care. Third, you habituate to them, so you need to use more to get the same effect. Harmful side effects accumulate quickly, leading to more unhappy chemicals, more urge to use, and a fast-spinning vicious cycle.

Endorphin disappoints you after a short time because it evolved for emergency use only. Occasionally, people are tempted to ignore bodily pain because of the way endorphin distracts them from social pain. Tragically, the body habituates to the pain but the brain keeps seeking the good feeling. When you try to manipulate your body into triggering endorphin, you can do damage without noticing.

Endorphin disappointments	

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Oxytocin Disappointment

A good way to understand oxytocin disappointment is to imagine yourself getting a massage. The first few moments feel phenomenal. Then your mind drifts and you can literally forget you are receiving a massage. You enjoy it, of course, but the oxytocin explosion doesn't last. You might blame your massage therapist if you don't understand that your brain habituates to things, even great things.

Oxytocin is released at birth, which eases the stress of coming into the world. But soon you need more. Animals lick their young and humans cuddle them. As oxytocin is stimulated, the child learns to trust the parent. That wires the child to trigger oxytocin in future circumstances that are similar.

When our trust is disappointed, we wire ourselves to fear trusting in future circumstances that are similar. Social trust is not easy to sustain. We mammals are so alert for potential threats that you may feel attacked when you hear a slight change in tone. Oxytocin protects you from quitting your job the moment a co-worker wrinkles his forehead at you, or running away from home the moment your relatives cluck their tongues at you. Oxytocin protected your ancestors from leaving the tribe every time someone got on their nerves, thus saving them from the dangers that befall lone individuals in the wilderness. But at some point, your bad feelings about someone exceed your good feelings, and you lose trust.

Children on a playground learn about social trust. They learn to seek support where good feelings are triggered, and not to expect support where cortisol has been triggered. If a classmate helps you with homework, it feels good and a path to your oxytocin is paved. When a schoolmate disappoints you, the bad feelings make connections that protect you from more bad feelings.

The pain of disappointed trust enters every life. If your parents put your needs first when you were young, it's disappointing to learn that the rest of the world doesn't treat you this way. And if your parents were not worthy of your trust, then you learned about disappointment even earlier.

Whether or not you suffer the kind of dramatic betrayals well-known in fiction, smaller disappointments of trust are part of daily life. For example, you may feel disillusioned when you're finally accepted into a group or organization you longed to be in. Before you were admitted, you

idealized the group. You imagined how good it would feel to belong. But once you're in it, you see its flaws. You wonder how they could be so crass. You start thinking that maybe another group or organization would make you happy. A vicious cycle can result.

Gangs are a tragic example of oxytocin disappointment. People join gangs because they create a sense of security and protection. Social trust develops through aggression against rival gangs. But group mates also turn on each other as they jockey for position within the group. The risk is huge in a culture of aggression, since those closest to you can most easily harm you. The risk motivates gang members to build solidarity through more aggression against third parties. They're in a vicious cycle.

My grandparents came from Sicily, where the Mafia builds social bonds with violence. The Mafia offers the illusion of safety by promising protection from violence if you cooperate. But you're not safe for long because one day you will inconvenience the predators you associate with and become prey rather than an ally. You learn that you cannot trust anyone. This dangerous isolation leaves you eager to trust anyone who triggers your oxytocin with a gesture of goodwill, and the cycle continues.

No one mentioned the Mafia when I was growing up, and I presumed it was an invention of Hollywood. But I began researching my roots and was horrified to discover the tragic lives of my ancestors. Surviving in a culture of violence means choosing at every moment between the risk of cooperating and the risk of not cooperating. Trust sounds like a virtue, but trusting a predator who expects complete submission may not promote survival. Or it may. The uncertainty is huge.

All human cultures experience oxytocin disappointment in some way. Primates build in-group bonds by distinguishing themselves from out-groups. But within the group, conflict is a routine part of primate life. Group members tolerate the pain because they don't want to lose their social support network. They accept behaviors from group-mates that they would never tolerate from outsiders. A big part of social trust is sustaining expectations despite disappointments. That's what oxytocin circuits do.

"Battered spouse syndrome" is a tragic example of oxytocin disappointment, as is "battered child syndrome." Abused individuals often cover up for their abusers instead of promoting their own survival. They blame themselves for the betrayal of trust and desperately seek ways to

build to re-kindle it. Instead of building new trust with new people, they keep trying to build it with the abuser they're wired to expect good feelings from.

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An alcoholic looking for someone to drink with is another famous example of oxytocin disappointment. People seek trust from those they expect to accept them, bad habits and all. Eaters bond with eaters, drug users bond with drug users, shoppers bond with shoppers and angry ragers bond with angry ragers. When you're with your social allies, you can feel good about yourself despite your drinking or shopping or raging. But when you decide to get control of your habit, you will not get support from your allies. They may even undermine your efforts to conquer your habit. Many people continue the habit rather than risk losing their friends. When the habit makes them feel bad, their "friends" make them feel good.

Trust sounds nice, but too much trust can undermine survival. Imagine a child who trusts his parents to tie his shoes and cut his meat for too long. Imagine a student who trusts others to do his homework for him. Imagine a spouse who trusts his partner to deal with the world for him. The good feeling of trust may distract you from building the skills you need to promote your own survival. Awareness of your limitations gives you a bad feeling, so you quickly seek a good feeling by leaning on the person you trust. More frustration results, and your brain does something about it in the way it has learned. A vicious cycle of trust and frustration results.

Oxytocin disappointments	

If you expect the good feeling of oxytocin to bring you constant happiness and relieve all your unhappy chemicals, you are likely to be disappointed.

Serotonin Disappointment

When people respect you, it feels good, and your brain looks for ways to get that feeling again. But the same old respect doesn't thrill you after a while, and your brain looks for ways to get more. When your quest for respect is disappointed, it feels bad. You look for a way to feel good, and getting more respect is one way your brain knows to do that.

When you go to a shop or a restaurant, the staff treats you with great respect. They're paid to act like the customer is always right. But you don't get such deference in the rest of life. Most of the time, you live in a world where others are as convinced of their own cause as much as you are of yours. If you rely too much on the pleasure of getting respect, you may end up disappointed.

When we see others caught in this conundrum, we may think they're foolish. We know our survival does not depend on which table we sit at for lunch. But the brain evolved to keep striving to promote itself. It did not evolve to say, "I'm important enough now. I can just relax."

Every Hollywood story has this thread. No matter how much recognition a person gets, they feel bad when it stops. They blame others for their loss of the limelight (the ruthlessness of the industry, the fickleness of public taste, the incompetence of management). They don't blame their own mammal brain, which refuses to release more serotonin unless you get more respect. While it's easy to notice this theme in the movies, it pervades private life too. Getting respect from those around you feels good, and some people don't know when to stop. They make a habit of imposing their wishes on others just for the pleasure of it. As soon as that pleasure ebbs, they have an urge to do it again. When they lack a way to get deference from others and have to face the world without that serotonin boost, they crash and burn.

Paradoxically, the quest for respect has also fueled human achievement. The desire for respect is real; squelching it is no path to happiness. But to seek respect is to risk disappointment. Serotonin inevitably dips because you cannot get increasing respect every moment of

your life. When it dips, you might get the feeling that something is wrong with the world. You might rush to seek more, and ignore the side effects.

A person who buys the latest status object feels frustrated when others catch up. A person who gets their dream job soon focuses on the next dream job. A person who controls every move of those around him complains that his subordinates don't comply fast enough. A big fish in a small pond dreams of a bigger pond.

You may think you'll be happy once you set a record at your bowling alley, but your mind will soon turn to the next record. The brain learns to feel important in a particular way, and then it looks for more of that feeling.

When Marlon Brando wails, "I coulda been a contender," in *On the Waterfront*, you believe he'd be happy if he had won a boxing title. But in all probability, his brain would have contended for more once he got it.

Many people stimulate that good serotonin feeling by trying to rescue others. Feeling like a hero is a reliable way to stimulate your serotonin. But the good feeling soon passes and you have to rescue again. Sometimes rescuers reward bad behavior in others because they are so eager to rescue. Some rescue efforts fail, and the rescuer urgently seeks any rescue opportunity they can find because that's how their brain learned to shift from bad feelings to good feelings.

Serotonin disappointment is often blamed on "our society," but status-seeking is easy to see in other cultures and time periods. In traditional cultures, mothers-in-law often dominate their daughters-in-law with sheer despotism. Cruelty to servants is often accepted. We may think tribal societies are egalitarian when their dominance hierarchy is implicit. But unspoken expectations are often backed up by violence, so each individual quickly submits to avoid harm. Traditional people, like modern people, live in cultures that do not give them a serotonin high all the time.

Social dominance commands our attention because it promotes your genes, and that's what mammals care about once their immediate needs are met. This urge is expressed in many ways. Many people are interested in helping children get ahead. And many people are interested in how their hair looks. You may not be focused on reproduction per se, but anything that could affect your reproductive potential triggers your brain chemicals. That's why "bad hair" and children's disappointments trigger

surprisingly bad feelings. Any small obstacle to getting respect can trigger you more than you might have thought.

People often have a sense of crisis today, though our lives are far more secure than our ancestors. That's because your brain doesn't compare your life to your ancestors' lives. It compares with something you know, like the cousin who is doing better than you. No matter how much good you have, that cousin is a reminder of what you don't have. Perhaps you grew up hearing a parent complain about what others got that they didn't get. Instead of enjoying your freedom from the constant disease and violence of the past, your brain looks for more, and gets disappointed.

When you see others get recognition you long for, it can feel bad. Your brain looks for ways to feel better, and what it comes up with is anything that got you recognition in the past. If you don't get the recognition you seek, you try again. When children fail to make the team or get a prom date, we teach them to keep trying. Seeking recognition is part of a healthy human life, despite the potential for disappointment. Animals often stop trying because they get bitten and clawed when they over-reach. But humans are polite to the telemarketer and the failed election candidate and the washed-up singer. We know they are seeking happiness in whatever way they've learned.

Winning the love of a higher-status person is a widespread strategy for stimulating serotonin. Of course, we don't consciously equate love with status. But when a high-status person of the right gender notices you, your brain lights up. Your neurochemistry screams *"Go toward this. It is very good for your survival."* Even bonobos, the apes known for their sexual dynamism, compete vigorously for high-status partners.

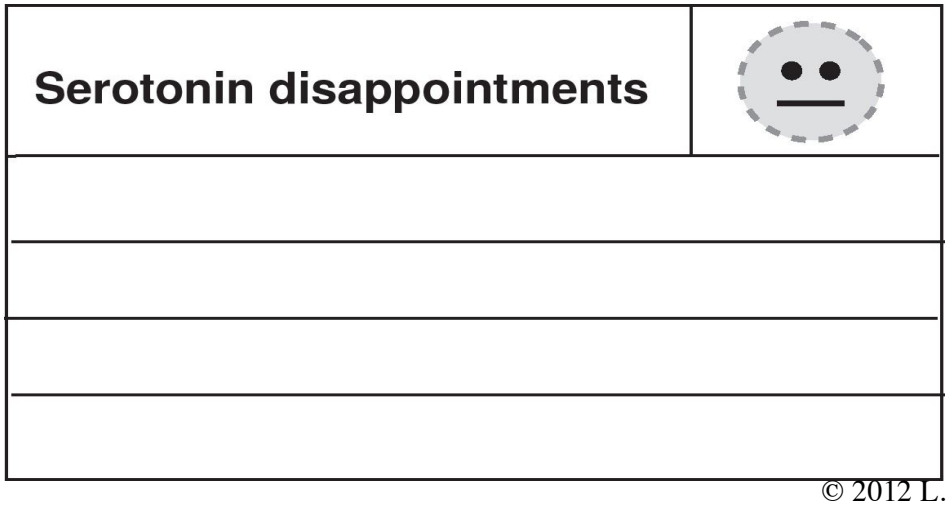
Once that trophy partner is yours, however, your serotonin stops surging. It would surge again if you found an even higher-status love object. Probably you restrain the urge to do that, but you can imagine others yielding to it. A super-star spouse makes a person feel good, and that wires the brain to expect good feelings by acquiring a super-star spouse again. That is why some people repeat the quest despite the side effects.

Many people protect themselves from serotonin disappointment by saying they don't care about status. But their neurochemicals respond to their status ups and downs whether they intend to or not. The response is shaped by life experience. If you lived a few centuries ago, you might have

fought duels to defend your status. Females were often confined to their homes to protect their status.

No matter what your experience, the circuits you built when you were young are the superhighways to your neurochemicals. Perhaps you grew up with relatives who dominated you, and you learned to expect disrespect from others. By contrast, you may have grown up with a lot of admirers, and now you expect admiration from others. No matter how you got wired up, respect feels good, but the feeling soon passes and you have to do more to get more.

If you expect serotonin to make you feel good all the time, you will be disappointed.



Habits and Side Effects

The curious thing about disappointment is that it doesn't delete the circuit. If you expect a lottery ticket to make you feel good, you keep expecting that after many tickets lose. If you expect a night on the town to make you feel good, you keep expecting that even though you wake up feeling bad and not remembering the night.

We often respond to disappointment by trying again. That means we get the side effects again. At first, side effects are small, so it's easy to tell yourself "it's just one little cookie." "It's just one little drink." "It's just a little flirtation." "It's just a little splurge." "It's just a little anger." "It's just a little down time." "It's just a little risk." "It's just a little party."

"It's just a little project." "It's just a little confidence-booster." "It's just a little lie." "It's just a little competition."

Side effects pile up when you repeat a behavior a lot. But you want to repeat it anyway because you expect it to replace unhappy chemicals with happy chemicals. This may not sound logical, but neural pathways are not created by logic. They're created by repetition and emotion, as we'll see in the following chapter.

The quirky "logic" of our neural pathways was explained to me by a hypnotist who helps people quit smoking. Imagine a fourteen year-old boy at a party, he said. The boy sees a girl he wants to talk to, but he's afraid. He tries a cigarette to steady his nerves, and it works! The girl returns his affection, and his happy chemical flow. So his brain connects the cigarette to the reward. And because this reward is so relevant to "reproductive success," it triggers a huge spurt of neurochemicals, creating a huge link in his brain. Cigarettes meet survival needs, from the mammal brain's perspective. Of course the boy doesn't think this in words, but the next time he needs confidence in the face of a "survival challenge," his brain will light up the idea of smoking. The neural pathway keeps developing.

If this person tries to stop smoking years later, the insecurity of the fourteen year-old boy at a party will suddenly well up in him. That insecurity has no where to go without the smoking pathway. Until he builds a new pathway, he will feel like his survival is threatened when he resists the urge for a cigarette. His mammal brain will think of smoking as its survival tool until he gives it a new survival tool.

Without your happy habit, unhappy chemicals can seem overwhelming. It feels like you're in danger, even when you're actually reducing your danger by avoiding harmful behaviors. Your neurochemicals may give you the idea that you must repeat the "happy" behavior now to save your life. But your cortex can inhibit an impulse from the mammal brain. The moment you do that, a virtuous circle begins.

Building a Virtuous Circle

All it takes to start a virtuous circle is to do nothing. That's hard to do in the moment your unhappy chemicals are screaming "do something

or you will die." But if you do something, you are likely to repeat the vicious cycle. Doing nothing is the first step to freeing yourself from it.

Doing nothing means accepting unhappy chemicals instead of rushing to fix them or mask them. Then your brain learns that you won't die, even though it feels that way.

Doing nothing gives your brain time to generate an alternative. You may have no alternative that feels as good as you expect your happy habit to feel. But the more you do nothing in the face of that "do something feeling," the more you give alternative pathways a chance to grow. Over time, you will trigger happy chemicals in new ways and your new pathways will grow solid. Eventually, they will steer electricity away from the habit you'd rather do without.

New habits are not easy to develop. A new behavior that feels good instantly is likely to have side effects of its own. A new behavior that doesn't feel good instantly is hard to build into a habit.

But when you know how your brain works, you can build more happy habits with fewer side effects. You can start a virtuous circle without being virtuous. The following chapters show how.

4

How Your Brain Wires Itself

Building new neural circuits is hard because your old pathways are efficient. Flimsy new pathways have trouble competing with them. Here's a brief explanation of how your existing circuits got built from experience. Understanding your equipment makes it easy to see why old circuits have power, and why persistence is needed to build new ones.

Five Ways Experience Changes Your Brain

1. Experience Insulates Your Neural Wiring

The neurons you use repeatedly develop a fatty coating called "myelin." Myelinated neurons are extremely fast, like optical fiber. Most of your myelination occurred by age fifteen, and a lot of it happen by age two. Young brains produce a lot of myelin, which is why child prodigies exist, and why it's hard to learn a new language after puberty. Myelinated circuits make a task feel effortless compared to doing it with slow, naked neurons.

The adult brain is stingy with myelin. We did not evolve to rebuild our neural networks in adulthood. We evolved to build an operating system during our years of dependency, and then start having children building their operating system.

Myelination requires repetition, even when you're young. Anything you do repeatedly in youth develops big branches in your neural network. Myelinated neurons look white, which is why we have "white

matter" under our "gray matter." In a significant way, it's the core of who you are.

You rely on your myelinated circuits most of the time because they're so efficient. When you use neurons you haven't already greased, something feels wrong. It's the feeling you have when you try to speak a foreign language. Your thoughts come faster than your words because they're produced by myelinated circuits while the words come from scrawny, undeveloped circuits. Perhaps you've gone skiing and watched a tiny kid whiz past you. You struggle to execute a checklist of bodily movements you learned in a lesson, while the child seems to do it effortlessly.

You may think myelin is "wasted" on the young. But in the state of nature, it makes sense to build a mental model of the world when you're young and then stick with it. Once you learn that fire is hot and gravity makes you fall, and you don't need to re-learn it. At puberty you need to update your mental model of the world as you move to a new ecological niche to improve your reproductive prospects. That's why myelin spurts around puberty. After that, creatures put their neural network to use forming the next generation instead of re-inventing the wheel. As much as you might prefer to unlearn some things you learned long ago, it's good to know why your brain doesn't cooperate.

2. Neurons Atrophy from Lack of Experience

Your brain started pruning itself at age two. Neurons that weren't used began to wither. Surprisingly, this stimulates knowledge. It helps a toddler use the circuits he's already built instead of spreading his attention around the way a newborn does. A toddler focuses on things that felt good or bad to him in the past, and those circuits build.

The brain does much of its pruning between ages two and seven. This helps a child to link new learning to his existing circuits instead of building lots of separate circuits. Richly interconnected networks are much more useful in making sense of the world.

By the time you are seven, you are good at seeing what you have already seen and hearing what you have already heard. You may think this is bad, but the value is clear if you think about how easy it is to lie to a six-year old. If you tell the same lie to an eight-year old, he will question it. He compares what you tell him to his life experience. If there's no fit, he's

able to trust his own mental representation of the world instead of yours. This had tremendous survival value in a world where parents often died young and children met their own survival needs.

When you were young, some of your neurons were swept away like autumn leaves, which streamlined your thought process. You kept adding new knowledge, of course. But you focused on things relevant to your old knowledge. You tended to shy away from things completely unconnected to your past experience, because they were hard to process. When electricity speeds through your circuits, you have the feeling you know what is going on. When you see things unrelated to your prior experience, little electricity is triggered, so you have little confidence in your information.

Unfamiliar inputs are not connected to your neurochemicals, so it's hard to judge if they're "good for you" or "bad for you." Your brain is motivated to see the good and avoid the bad, so it focuses on inputs relevant to those goals. As a result, you keep developing connected neurons and not developing others. Some neurons atrophy because they haven't become relevant to your survival.

3. Experience Makes Synapses Efficient

Electricity does not flow easily through your brain. When an electrical impulse travels along a neuron, it dies out when it reaches the end unless it has enough oomph to jump across the gap, or *synapse* to the next neuron. Synapses that haven't been crossed before are inefficient and harder to cross. But electricity sails easily across a developed synapse, so one neuron reliably activates the next.

Synapses develop from repetition and emotion. Emotions develop a synapse quickly, while repetition develops them slowly.

Emotions are neurochemicals that make immediate and permanent changes to the synapses they encounter. Here's a simple example. I used to carry popcorn on long plane trips because it was a convenient and welcome pleasure. One day I chipped a tooth on popcorn, and I never wanted to travel with it again. In an instant, the feeling of being stranded in the air with a cracked tooth triggered enough cortisol to build a strong new connection.

Repetition can develop a synapse without neurochemicals, but it takes a lot longer. When a synapse is activated many times, it gradually

becomes efficient at transmitting an electrochemical signal.

Synapses are not like muscles in the sense that we need to develop all of our muscles, but if you developed all your synapses you couldn't make sense of the world. Instead, we develop networks that represent our environment, so we can sift down to the facts most relevant to survival. We are intelligent because our neurons are connected in ways that reflect our good and bad experiences with the world around us. Synapses create the connections, whether they build up slowly from repetition or get turbo-charged by molecules of pleasure or pain.

4. New Synapses Grow

Each neuron can have many synapses because it can grow multiple branches or *dendrites*. New dendrites and synapses get created because two neurons literally reach out and touch each other if they are stimulated at the same time. A neuron grows toward an electrical hot spot, and a new synapse is born when a dendrite gets close enough for its electricity to jump to another neuron. When this happens, you connect two ideas.

Other people's connections are easy to see. A person who likes politics seems to connect everything to politics. A person who likes dogs connects everything to dogs, and a religious person connects everything to their beliefs. You see one person zooming in on the negative side of things while another sees the positive. When it comes to your own connections, however, it feels like you're just seeing "the truth." You don't realize that your well-used neurons grew tentacles to each other.

5. Emotional Receptors Grow and Atrophy

Neurochemicals are protein molecules that fit receptors on the surface of your neurons. These molecules have complex shapes, so each one fits a specific receptor like a key fits a lock. Sometimes you get flooded by more emotional chemicals than your receptors can process. You feel overwhelmed and disoriented, whether the flood is happy or unhappy. Your brain adapts when you are "going through" something by building more receptors to help you process the messages.

When receptors aren't used for a while, they disappear. This flexibility is good, but it also means that you have to use your happy

receptors or lose them.

When happy chemicals are released, they float around until they find receptors they can fit into. When a happy-chemical key opens a receptor lock, the neuron fires. That's how you "know" what you're happy about. And that's how you build the expectation of more happiness from a particular source.

Free Will

Neurochemicals are constantly sending signals through your brain and body, but you don't have to act on these signals. Your pre-frontal cortex is able to *inhibit* an action. It's able to shift your attention in one direction or another. That gives your limbic system time to generate a new conclusion about your best survival option.

No matter what circuits you happen to have, you are free to resist an impulse and generate another one. You are constantly deciding whether to act on your impulses or generate alternatives, but you do it so efficiently that you hardly notice.

You are free to choose where to direct your attention. You are always deciding which external signals and internal signals to focus on. You are always ignoring some external and internal information because it's impossible to process everything. As the world filters in through your senses and lights up your circuits, you are always choosing whether to act on that impulse or allow the electricity to spill over into another circuit.

Sometimes it feels like a signal has commanded your attention. A signal that fits one of your well-developed circuits activates a strong message effortlessly. A signal that doesn't fit one of your well-developed circuits only gives you a weak message unless you concentrate your attention on it. Your decisions about where to put your attention are the core of your free will. Whether you give your attention to the circuits that surge effortlessly, or concentrate on weaker, more diffuse activations, you are exercising your free will.

Everyone's attention is limited, and the more you invest in one place, you have less left for other things. The more attention you pay to unfamiliar signals, the less you have left for everything else. You are always

deciding which use of your attention best promotes your survival. We guide these decisions with habits so we don't use up our attention on them.

Imagine your ancestor seeing a lion while out hunting. He monitors the lion to see which way it's headed. At some point he decides he's better off running away, and focuses his attention on the ground in front of him instead of the details of the lion. You do the same thing when changing lanes in traffic. From moment to moment, you decide where is the best place to focus your attention in order to be safe. These decisions happen instantaneously so as not to waste your attention.

Now imagine a person who spends most of his attention watching television. When he thinks of shutting the television, he gets a bad feeling. To avoid that threatened feeling, he shifts his attention back to the television. This is his habit, but he is always free to observe other information about what is going on in his life.

Sometimes your brain generates conflicting impulses. You want to smoke and you don't. You want to eat pizza and you don't. You want to study and you don't. You want to call your mother and you don't. You are always deciding which impulse to act on and which to inhibit.

Apes can inhibit an impulse, too. When an ape looks at a juicy mango, he wants it, but he also wants to avoid being bitten by the bigger ape next to him. He inhibits his impulse to grab while assessing all the survival-relevant information around him.

You have more neurons than an ape, especially in the important pre-frontal cortex. You can consider more options, and you can even generate options in your mind that you've never experienced in the sensory world. It all depends on where you direct your attention. When you don't direct, your big old circuits dominate your attention.

Repetition and Emotion Build Connections

Before there was "education," and even before there was language, circuits built from repetition and emotion.

A baby chimpanzee learns while watching the world from his mother's lap. Though he doesn't know what food is, he sees crumbs fall from her mouth. They land on her chest right in front of his eyes. He thinks of grasping a crumb and putting it into his mouth because his mirror

neurons light up when she does this. He can't get his muscles to do it until he's made several tries. That's frustrating, but he's fully nourished by her milk and protected by her touch. When he finally gets a crumb into his mouth, it tastes good! His dopamine surges. That feels good, which motivates him to seek more.

Mother chimps don't feed their children except for breast milk. If the little tyke wants solids, he has to get it himself. By the time he's big enough to need the extra nutrition, he has accumulated experience with things you put in your mouth. As he grows, he follows his mother when she forages. He repeatedly sees the plants she chooses. She doesn't explicitly show him or push him. He learns because food is rewarding. Over time, he imitates his mother's foraging behavior and wires himself to eat what she eats. By the time his mother has passed on, he will have the skills he needs to survive without her.

Chimpanzees eat a lot of leaves, and research suggests they can recognize more than a hundred different kinds. They even select leaves with medical properties when they are sick. But the big reward in a chimp's life is food rich in protein, such as nuts, insects and meat. These foods are difficult to obtain. Here again, children are not "provisioned." They only get the reward if they execute the skill.

A young chimp can take years to succeed at cracking open a nut. He gets interested because he tastes the crumbs his mother leaves in the shells of her nuts. "Wow!" His dopamine responds because nuts have a higher fat content than most food he encounters. But when he tries to imitate his mother's nut-cracking movements, the darned thing doesn't open. He persists because the expectation of a big reward triggers dopamine, and because he has other nut-seekers to mirror.

I once spent ten minutes watching a young capuchin monkey try and fail to crack open a nut. I was overwhelmed by an urge to "help," so I looked for a zookeeper. When I found one, she told me they are well fed, and the activity is natural, and I shouldn't worry about it. If I were running that monkey's "education," he wouldn't learn survival skills, and the species would die out.

Young primates learn social skills the same way they learn foraging skills. They start on mother's lap, watching her interact with others. A young monkey sees his mother dominate some of the time and submit some of the time. He doesn't need to label it. His mirror neurons

trigger trust when she trusts another, and fear when she fears another. This builds pathways that guide him as he interacts with others directly. He seeks the good feelings of trust and dominance, and avoids the bad feeling of pain. By the time he's grown, he's wired to survive within the social expectations of his troop.

Chimps are not born pre-programmed with all the necessary survival knowledge. We know this because their mothers invest almost five years in them before reproducing again. That means the mother's genetic survival benefits more from nurturing one than from creating another.

Chimps learn how to survive from the good feelings of dopamine, oxytocin and serotonin. We do the same. Though we learn some things consciously, like long division and punctuation, we learn a lot from the links our neurochemicals build. Experience tells you whether math or grammar feels good or bad. It feels good to master something, and it feels bad to be wrong about something. Repetition and emotion work together to build our survival knowledge.

Early survival circuits shape the passions of our lives. Sometimes this is obvious, like a child who decides to be a doctor after watching a sick family member get cured. More often, our passions have no obvious link to survival because a child's understanding of survival is limited. For example, if you got respect from your basket-weaving teacher, you might decide to devote your life to basket-weaving. If you see a rock star getting respect, you might aim to be a rock star. Later on you might realize that your passions do not promote survival, but by then the major pathways to your happy chemicals are already built.

People often complain that "we don't learn from experience." But in fact we do. We learn from experiences that are repeated or neurochemically reinforced. We learn in youth when the brain is more plastic. Experience makes some circuits so efficient that we keep using them. If you have a circuit that gets you into trouble, you can be sure that circuit got you rewards in the past.

Happy-chemical infrastructure

By the time you reach adulthood, you have built the neural infrastructure that tells your brain what is good for you. This is not the

survival system you'd come up with if you started today with a blank sheet of paper. It's the system you connected one neuron at a time from the moment your senses began taking in information.

Genes play a role in your neural infrastructure. An amazing example is the laboratory mouse who started digging the first time he touched dirt. Researchers took laboratory mice whose ancestors had lived in cages for 30-60 generations. These mice not only dug when they hit the ground, but they dug burrows with characteristics that matched their wild counterparts. The circuits for this survival behavior seem to be inborn.

But our brains are different from mice. Their cortex is tiny, which means their ability to learn from experience is tiny. They are built to run on innate rather than learned circuits. Our cortex is huge because we are designed to fill it up with acquired knowledge. We are not meant to run on pre-loaded programs.

Every creature in nature runs on as few neurons as possible because neurons are metabolically expensive. They consume more oxygen and glucose than an active muscle. It takes so much energy to keep a neuron alive that they actually make it harder to survive. Neurons only promote survival if you really get your money's worth out of them, by wiring them up with survival-relevant information. Natural selection gave humans a gargantuan number of neurons. That means we were meant to use the experience we've stored in our neurons, not to ignore it.

The bigger a creature's cortex, the longer its childhood. It takes a long time to connect neurons in ways that promote survival. Small-brained creatures have short childhoods because they don't need to boot up their operating system. A mouse is a parent by the time it's two months old. A giraffe virtually "hits the ground running." It crashes four feet from the womb to the ground, and in a few weeks it can do almost everything an adult can do. Primates have a very long childhood, by comparison. A monkey's childhood is twice as long as a gazelle's, an ape's childhood is twice as long as a monkey's, and a human's is double that of an ape.

Childhood is metabolically expensive because dependency reduces the number of offspring a mother can have. You might expect natural selection to reward shorter childhoods, but creatures evolved longer childhoods over time. Natural selection rewarded creatures that use their early dependency to learn survival skills.

A long childhood frees a creature from immediate survival pressure so it can learn by interacting with its environment. Animals with short periods of early dependency rely on the survival knowledge they inherited. They're born adapted to a specific ecological niche, and typically die outside that niche. Humans are born ready to adapt to whatever niche we're born into.

And this is why it's so hard to unlearn a happy-chemical strategy once you've learned it. You evolved to rely on your neural network as if your life depended on it.

We don't usually think of our childhood experience as survival knowledge because it doesn't tell you how to get a job with a retirement package. Your early survival learning tells you how to feel good and avoid feeling bad. This is the navigation system you have to pilot yourself through adult survival challenges. For example, your boss makes you feel bad, but the money feels good, and unemployment feels bad, so reconciling with your boss feels good.

Sophisticated adults don't imagine themselves relying on childhood experience to navigate survival. But if you examine your likes and dislikes, you will see how they were built. I discovered a curious example in myself. I noticed that I get excited about opportunities to choose colors. This is not an obvious survival skill, so I tried to make sense of it. The core experience was clear. When I was twelve, my mother inherited $2,000 (about $15,000 in today's money). It was a lot to my mother, and it came from the father who had abused and abandoned her, so she decided to spend it redecorating. She brought me along on shopping missions, and asked my opinion about color swatches.

My mother didn't respect my opinion very often, so this felt good. The happy chemicals told my brain that this was important survival information. I didn't consciously tell myself "choosing colors is a way to get respect." I didn't need to. The respect simply triggered serotonin, and that connected all the neurons that were active at the moment. I created a connection between color and feeling good without knowing it. I didn't do it for lofty reasons. I did it because it was true in my experience.

Most important, the decorating project made my mother happy. I hardly ever saw her happy, so this was significant information for my brain. My mirror neurons registered her happiness without any need for me to consciously embrace decorating. The good feelings wired me to get more

good feeling in this particular way. Of all the ways to feel good in the world, the ways already etched into your neurons are the ones you notice.

My brain was already prepared to respond to color long before this happened. When I was in elementary school, my mother gave me a lot of paint-by-number kits. I also made art by gluing mosaic tiles and colored pebbles onto backboards in the manner popular in the early 1960s. These kits gave me a feeling of accomplishment and helped me focus on something other than the unpleasantness around me. Repetition and emotion trained my brain to sift and sort through colors. Without the intent to seek happiness or promote survival, I built circuits for doing that.

Happy chemical infrastructure 	
Repetition circuits	
Emotion circuits	

When I grew up and got a place of my own, I enjoyed decorating it. In fact, I was constantly interested in redecorating. After a while, I realized that another remodeling project would not really meet my needs. But I still felt the urge to do it. So instead of acting on that urge, I set out to understand it. I traced one experience to another until the connections made sense.

I like color the way many people like sports. If you grew up around someone who loved sports, you found it easy to build that neural infrastructure. When I understood why color made me happy, I looked at it in a new way. I made good use of the happy-chemical infrastructure I had. When I create a Powerpoint presentation, I enjoy adding color. When I get dressed or cook dinner, I enjoy the color. I allow myself to linger over the

details I'm wired to enjoy. This activates my happy circuits without needing to redecorate. I use my circuits to promote my current survival needs rather than the needs that first built the links.

My brain connected decorating to survival because it connected my mother to survival. We end up with quirky circuits because we build on the connections we have. When you end up with a behavior that doesn't make sense, you can be sure it made sense at an earlier time. You can't just delete it, but you can substitute a new circuit that makes sense to you today. It won't happen effortlessly the way it did when you were young. But repetition and emotion can make it happen.

Social learning equals survival

In the mammal world, social skills are as relevant to survival as physical skills because they're essential for reproductive success. In-born social skills are key for small-brained creatures, but big-brained mammals learn social skills from repetition and emotion.

In the animal world, male and female reproductive strategies are distinct, but both depend on social skills. A female can only birth a limited number of offspring, and many of them perish before puberty. The survival of her genes depends on her ability to keep her children alive. Social skills help her get protection, nutrition, and better paternal genes. A male mammal has less invested in each offspring, so his genes benefit from a quantity strategy. Social skills help him attract females and compete with other males. The male and female strategies overlap, and evolution seems to increase the overlap.

For both genders, the acceptance and respect of your peers promotes survival. Monkey studies show that social alliances increase mating opportunities and boost the survival prospects of offspring. So it's not surprising that natural selection created a brain that seeks social alliances. Social skills build without effort or intent as you interact with the world around you.

Children build social skills without insight into their long-term needs. A child survives by getting social support, and his happy chemicals build links when he gets it. Any behavior that works builds a link, even if it seems anti-social or anti-survival from an adult perspective. If a bad

behavior gets a child a reward, his brain tags that behavior as useful for survival. If a child gets a lot of support when they are hostile or aggressive, and the support disappears when they're cooperative, their brain learns to be hostile or aggressive. If a child gets rewarded when they're sick, and they lose the rewards as they get well, those neurochemical ups and downs build lasting links

Your brain doesn't care what parenting experts and etiquette manuals say. It builds links when you actually feel rewarded or threatened. You end up with a complex neural infrastructure for seeking respect, acceptance and trust.

Adolescence added a layer to your infrastructure. The hormones of puberty are neurochemicals that cause your neurons to connect and myelinate more easily. Anything that got you respect or attention in your teen years developed big fat circuits. Any threat to your respect and attention in this period made an impression on your brain. Whatever helped you build trust with social allies, or threatened the trust you had, built your pathways. Whenever you experienced the thrill of new rewards, you built links that remain with you.

The neuroplasticity of puberty helps us build new circuits just when we need them. In nature, adolescents often leave home to reproduce. That prevents in-breeding, which leads to more surviving offspring. Brains good at learning a new environment in puberty had more reproductive success, and natural selection built a brain good at re-building its circuits then.

Social survival circuits 	
Early Childhood	
Teen Years	

Social learning interconnects with other learning. Basic physiological functions like walking, eating and even breathing are shaped by social learning. An infant learns to regulate his breathing when he's held against his mother's chest and he feels her breathe. Physical needs and social needs are one to a child.

Children learn self-management by experiencing the way the adults around them manage themselves. You add a layer of self-management circuits in adolescence through interactions with peers and available adults. You didn't choose the early rewards and pains that wove your circuits. And you needn't remember the experiences that built them to be motivated by them today. We are born to build our social operating system in youth.

Remodeling

Most people end up with a circuit they'd rather do without. And most people wish for more happy chemicals with fewer side effects. You can build new circuits, but not in the effortless way it happened the first time. It takes repetition and emotion.

Emotion is a Catch-22 because anything that feels good quickly has side effects. People often gain weight when they quit smoking because food feels good instantly. People often develop a new phobia when they conquer an old phobia because it immediately restores that feeling of control. Emotion works fast, but it leads to behaviors with unwanted consequences.

Repetition takes time, but it builds behaviors with fewer side effects. If you expose yourself to something over and over, it can "grow on you." You can get to like things that are good for you, even if you don't like them instantly. But who wants to repeat something over and over if it doesn't feel good? Usually, people don't, which is why we tend to rely on the circuits built by accidents of experience. You will be shaped by accident unless you start repeating things by choice.

Learning to like something new takes longer than you'd think, however. Your brain doesn't see it as important information if it doesn't trigger your happy chemicals. And new things are hard to focus on because the neurons don't fire easily.

Here's a simple example. Fred wants to drink less alcohol. He decides to substitute a new pleasure with fewer side effects. He looks around for something that can grow on him and remembers how he enjoyed sketching when he was young. He resolves to take out his sketch pad every time he feels like drinking. Fred doesn't actually feel like sketching when he longs for a drink. And once he starts sketching, he doesn't feel fabulous. So he accepts that he will live with bad feelings for a while. He plans to do this for two months because he has a big event on the calendar then.

At first, he finds it hard. He hates his sketches and he hates the feeling he gets when he doesn't drink. But he sticks to his goal of repeating the strategy whether it feels good immediately or not. After a while, Fred learns to see the sketching time as a gift he's given himself rather than an extra burden on his already hard life. He learns that his unhappy feelings pass without killing him, and once they've passed, he discovers the pleasure of being alert and responsible. Before the two months is over, he stops looking at the calendar. His sketching circuit has grown as big as his alcohol circuit. Now, he's a healthy person with a fun hobby and a cool skill, not a person at war with himself.

Choosing an activity already linked to his happy chemicals helped him reach his goal of feeling good without alcohol. Sketching gives Fred something to do when his brain has that "do something" feeling. He needed to build a big circuit to compete with the alcohol circuit that was already big. Fred is so pleased with his re-model that he decides to create another new circuit to tackle another challenge in his life.

Deciding which alternative circuit to build is complex. Sometimes it takes a little trial and error to find a new habit that works and minimizes side effects. Consider Louise, who wants a new job but can't get herself to make a sustained job search. She feels bad about her prospects, so she spends her time on things that help her not think about it. A vicious cycle results. Louise resolves to break the cycle by learning to feel good about job hunting. She sets the goal of applying to two jobs a day, developing her career skills for two hours a day, and then feeling good about the effort.

On the first day, she meets her goal, but feels awful. She rewards herself with an ice cream, but finds herself craving more ice cream when she finishes. The next day, she calls a friend after her accomplishment, but finds she does not enjoy discussing these labors. On

the third day, it's dark by the time her career advancement work is over, so she decides to celebrate with a night on the town. The next morning, she finds it hard to get started. She goes to a coffee shop, and by the time she finishes the coffee, she's in the middle of her first application. It flows without pain, so the next day, she heads for a designer coffee, and brims with ideas as she drinks it. The following day, she finds herself actually looking forward to her coffee-plus-accomplishment routine, and by the next week she has figured out how to make low-fat designer drinks at home. When six weeks have gone by, she's under consideration for a number of jobs, and has accumulated a wealth of interview experience. Most important, she feels good about doing it, so she wants to do more.

The point is not that coffee solves problems. The point is that inertia is hard to overcome. A habit that will feel good later can be hard to start now. With trial and error, you can find a new habit that will work for you.

Every brain is different. Some people would have a whole pot of coffee and never push the submit button on those job applications. Some people would sketch passionately but spill wine all over their sketchpad. You might experiment with a few alternatives before you commit to one for 45 days. But if you keep starting over, your new habit will never build. After a few test runs, you must commit to repeating your new behavior whether it feels good or not.

Everyone can find a healthy new behavior and repeat it until it becomes a habit. No one can do this for you and you cannot do it for someone else.