

Imagine for a second that everyone had a magical cube in their pockets. With the right permutation, you could materialize all kinds of food or drink.

At first there was only one cube in existence and nobody knew what it did until after about a year of fiddling with the thing, someone found the permutation for water. After that, they started to quickly figure out how to make more things like tea and avocados and all kinds of vegetables. Over several years, they figured out how to manufacture the cubes efficiently and inexpensively and with a lot more cubes and plenty of people to play with them, things rapidly progressed to the point where they were making more complex things like kimchi, butter or yogurt. Cube users were increasing exponentially and the whole world was excited about this- it was going to cure world hunger, standard of living would increase across the globe, everyone would have infinite access to healthy foods! Along the way people figured out how to make snacks like oreos. A couple days later beer was added to the list, and discussions began about whether or not to let minors have a cube. Then a bunch of hard liquors came out and a few people became slightly worried about the whole situation. Then a couple weeks later two guys from Virginia show up and say "Hey uhhh we just made cocaine with the cube." Most people thought it might be better if everyone didn't have infinite supply of cocaine at all times, but at this point millions of people already had cubes and it was drastically improving their lives.

For the first time in most of these people's lives, they were in a situation where they had access to a huge variety of choices at all moments during the day . They could do anything from having the highest quality nourishing meal, to deciding to add just one or two cookies to their lunch, or they could say "Work's not going so well, maybe a spot of cocaine would help." And that's kind of what we have with the internet. It's unrealistic to say you get pathologically addicted to the internet as fast as you would to cocaine, but just as the mystical cube people can choose to nourish or poison their bodies at any point in the day, the internet allows us to subject our brains to information that enriches our intellect and gives us new perspectives, OR we can choose streams of information that leave us thinking "*What I have been doing the last 30 minutes?*"

The thing is, the problem goes deeper than just the **minutes** you lost to twitter, facebook or reddit. The **way** you use the internet literally changes your brain's default way of operating, and part of it has to do with how intimately your brain interacts with tools. A 2010 research article from the association of psychological science found that when you are using a tool, your brain understands the tool not as something you are manipulating with your hands, but as an actual part of your body. For example if you have someone hold a marker and then you could ask their brain to describe their right hand, the brain might say something like "*I have 6 rods coming out of a meat filled slab. 5 of the rods are bendable and 3 of them are attached to a rigid, meatless rod.*" Kind of like you are what you eat, from your brain's perspective you are what you use.

But what about more abstract tools? In Nicholas Carr's book "The Shallows," which is about how the internet affects your brain, he explains how different tools change our perception of the world and the the actual way we think, and not just *what* we think about. One example is the

very simple and useful tool that is the map. Without the map people would rely on their sight as well as their understanding of intricate smells and sounds to create a 3D landscape in their minds. The map then simplifies this complex process down to just visualizing your position in space as a point on a 2D plane.

Another example is how originally our perception of time was an understanding of how cycles and rhythms of the natural world relate to each other. With the advent of the mechanical clock, we began to look at our day as just a compilation of neatly segmented slices of time.

Even something as simple as the spaces between words can be considered a tool that changes the way we use our brains. For a while, there were no spaces between words and everything was just jammed together, so you had to read the text out loud to see where one word began and another ended. This complicated and tiring task of pronouncing everything out loud meant people didn't read for very long periods of time. Putting spaces between words made the task of reading much easier to the point that people could read silently to themselves for much longer stretches of time. Because people now had something they could engage with and stay concentrated on for hours at a time, deep focus became a more widespread skill.

Naturally, we are wired in a way that our default state is to be always alert to new stimuli or pieces of information. From your brain's perspective, being ready to rapidly switch your attention from gathering berries to examining the noise of a snapping twig is much more helpful for survival than the ability to contemplate one story or one subject for hours at a time. Getting distracted was useful. While there are some situations like hunting in which the ability to focus was necessary for survival, the book acted as one of the first tools that developed the contemplative and creative mind by rewiring the brain for enhanced concentration.

However, the recent internet environment is one that wires peoples' brains for enhanced distractibility. At all times you have multiple streams of information in the form of notifications, advertisements, suggested videos, and messages from your friends and even something as innocent as a blog post or text article is usually peppered with hyperlinks you can choose to click on. Our brains are naturally on the alert for new information, and the more we're exposed to this kind of virtual interface, the more our brain decides to rewire itself to respond to and even *crave* these internet distractions. Try and think about how long you usually stay on one tab, one application or one video at a time. Might be no longer than a couple minutes or even a few seconds. How many tab switches does it take to get a proper email written? If you're on your computer, how many tabs do you have open right now? You might have flipped over to facebook in just the course of this video without even realizing it. I've even found myself opening up reddit on my phone while watching a movie on my TV that I'm *enjoying*. I'm already entertained, so what am I doing?

Findings in neuroplasticity research are consistently showing that the brain has the remarkable ability to literally rewire itself to be more suited to its environment. In stroke patients, because paralyzed limbs were a result of damage to the the area of the brain that controlled that limb, the

assumption was there would be very little room for recovery. But, by doing things like putting a patient's good hand in an oven mitt and taping it up with duct tape, they had no choice but to try to use the dysfunctional limb. In response their brains reconfigured themselves to map different areas to controlling that and remapped themselves to assign different neurons to the task of operating that limb. This produced remarkable recoveries of function in their dysfunctional limbs.

By the same token, you can exercise or let atrophy different modes of thinking. Maybe at some point you finally set some time aside to work on that big project you've been meaning to do, only to find yourself feeling uncomfortable and asking yourself "*Why can't I focus?*"

The reason is the same as why most people can't sign their names with their left hand. You don't usually

Alright, so what if we are gearing our brains to be distracted? Maybe things take a bit longer to do- that's not *that* terrible.

The problem with getting distracted has to do with how your short term memory processing works. Your brain, ironically, can be compared to a web browser. For example, when you're shopping on Amazon, you might want to go back a couple pages to double check the price of something. You can do this by clicking the back button because the web browser stores those pages in its recent history. When you're doing something like reading a book, your brain is processing and storing the information in short term memory so it can relate the paragraph you're reading to the last couple paragraphs you just read. If you get distracted by a text message while you're reading, you might find that when you go back to the sentence you were just on, you're asking "*Wait, who are they talking about?*" This is because getting distracted and shifting your attention to the text message is like clearing your recent browser history. Your brain can't hit the back button to review what it just read because it dumped what was in the short term memory to focus on the text message, so you have to reread the last paragraph or two.

Then, Being distracted like this gets in the way of the insightful, creative thinking necessary to complete fulfilling and ambitious tasks. You process information in the short term memory like this when you're doing anything from working on a business idea, to practicing piano or writing an article. With enough time and **uninterrupted focus**, the information slowly trickles from your conscious short term memory to your subconscious long term memory. And it's only when information is in the long term memory that you can make insightful connections with other pieces of information you've picked up in the past. The reason you get those Aha! Moments and creative insights out of the blue is because in the background, your subconscious long term memory is processing new and old bits of information and making connections between them. This is also why you might not feel any improvement while practicing piano, but you're suddenly better the next day. It's because you focused and practiced long enough that the information went from your short term memory to your long term memory and the long term memory then did its processing job.

When something distracts you and pulls your focus from the task at hand, this transfer of information from short term to long term memory gets **interrupted**. Unfortunately you can't really be aware of this **subconscious** long term memory process is being disrupted. The reason you didn't come up with any good ideas during the brain storming session or are having trouble grasping the material for a class could be that you're clearing your brain's recent browser history too often by getting distracted and you're not letting your long term memory connect the dots for you.

The primary message of Cal Newport's book "Deep Work" is that the ability to focus and concentrate deeply is crucial for being successful in fulfilling endeavors, whether it's learning a new skill, writing a book, developing a business plan for a new company or creating a piece of art. To be truly productive and successful professionally or creatively in this competitive and fast moving world, you need to set up long blocks of time where you can work completely uninterrupted **and** you'll need to have developed a mind where distraction is not the default mode.

When people are picking out what to eat they kind of have it in the back of their mind how that piece of food is going to change their body. They can expect that while processed junk food does taste good, it will make them gain weight and have less energy. But I don't think enough people are thinking "*Is the way I'm about to use my smart phone right now going to change my brain's default setting to be more focused or more distracted?*"

Looking at a couple memes for 5 minutes when you need a quick break from work probably doesn't feel like a big deal and it probably isn't. Then again, your brain has the annoying ability to quickly habituate towards activities that provide enjoyment for very little energy. Have you ever been in that situation where it's 4PM, you've been working pretty hard and you get the idea to go get a cookie. You figure just one cookie isn't going to make you fat and it will help you get through the last bit of the day, so you get the cookie. But then the *next day*, 4PM rolls around and you suddenly have a craving for something sweet...

Looking back on my cube analogy, cocaine may seem like too intense of an example for the bad aspects of the internet. Well, research has shown that the difficulty with cocaine isn't just that it rewires your pleasure center to make you addicted to it, cocaine actually damages the dendrites of the neurons in the prefrontal cortex- this is the area of the brain that is responsible for executive control. Executive control is essentially the ability to stay rational, maintain focus and exert willpower in order to achieve some sort of long term goal. This means that at the same time one area of the addict's brain is wired to crave cocaine, the area that he needs to rely on to resist these cravings is damaged. So, it's this kind of rewiring of the brain in a way that interferes with your ability to reach your personal potential that I'm pointing to when I make the comparison to certain negative aspects of the internet.

While it happens slowly, these quick or instant bursts of new and interesting information from the internet can become a slippery slope into a brain that enjoys and desires distraction and

prefer instant gratification. Also, consider this: in cases of people truly addicted to the internet they also have severely reduced executive function, similar to the cocaine addicts.

In many ways, the internet is an incredibly useful and helpful tool. But a deeper understanding of which aspects of the internet affect your brain in what ways is necessary to modify your usage in a way that keeps your brain functioning the way you want it to. We'll be looking at this more in depth soon, so stick around.

[End]

[Below is some stuff that didn't make it into the script ...If you're into that kind of thing]

[Initially, the cube analogy was much longer but I felt it was too much]

Imagine for a second that in 1989 a scientist invented a magical cube that could theoretically create any kind of food or drink. Initially, though, he and his colleagues couldn't do anything with it because in order to produce something, you had to find the right combination or permutation of the cube. So after several months after the cube was invented, nothing happened and people were just fiddling with it randomly. Right when everyone was assuming that the cube didn't actually do anything, one dude comes along and figures out the configuration to create water. This was an immense breakthrough and the scientists celebrated amongst themselves. After a while they figure out how to create a turnip - another amazing achievement. While exciting, the cube's refresh rate was about an hour and it cost a million dollars to create that one cube. A bottle of water and a turnip every hour wasn't going to save many lives.

Nonetheless, they continued to make progress- they found the permutations for carrots, broccoli, avocados, and all kinds of other plant foods. The next big milestone was when they learned to create peanuts, a decent source of protein. Two new teams of scientists are dedicated to the project with the goal of producing a cheaper cube and improving the refresh rate on the cube.

After a couple years, things really start to take off. They're up to dozens of varieties of vegetables, they're producing all kinds of nuts, seeds, and berries and the refresh rate and cost of making a cube has been consistently cut in half every year.

The scientists are incredibly excited and expecting at least two nobel prizes, one in peace for being on the brink of curing world hunger and either chemistry or physics since they're not exactly sure how the cube works. (They're leaning more towards physics since they think the food is being ported in through some kind of wormhole)

13 years later things are still going strong. The refresh rate is down to less than half a second and the cubes cost just a bit more than a hundred dollars to produce. With the ability to globally share information between cubes, the magical consumpto-cube project has become open source and configurations that produce more and more complex things like herbs and spices are rapidly appearing.

People have everything from coconuts to jalapenos to nutmeg to truffles and the scientists are rewarded with 7 nobel prizes and some guys even figure out how to make cookies and other complex desserts. Everything's going great and journalists are talking about the advent of a true utopia and then suddenly two guys from Virginia introduce the product of the newest configuration: cocaine.

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[I thought it would be fun to put that scene in the Matrix: "Why do my eyes hurt?" "Because you've never used them before" to make the analogy that kids nowadays might be really frustrated when they get into college or their first job and find that they're expected to focus one thing for long period of time except they've never been without some form of distraction (smartphone) for extended periods of time. Was hard to get it to flow with the rest of the script so I left it out.]