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MOONWALKING WITH EINSTEIN

BY

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my notes

CHARACTER BUILDING

Memory training was considered a form of character building, a way of developing the cardinal virtue of prudence and ethics.

Only through memorizing could ideas truly be incorporated into one’s psyche and their values absorbed.

Memorization techniques existed to etch foundational texts and ideas into the brain.

A strong memory was seen as the greatest virtue since it represented the internalization of a universe of external knowledge.

Memory training is a form of mental workout. Over time, like any form of exercise, it'll make the brain fitter, quicker, and more nimble.

Roman orators argued that the art of memory - the proper retention and ordering of knowledge - was a vital instrument for the invention of new ideas.

A trained memory wasn't just about gaining easy access to information; it was about strengthening one's personal ethics and becoming a more complete person.

A trained memory was the key to cultivating "judgment, citizenship, and piety."

Schools go about teaching all wrong. They pour vast amounts of information into students' heads, but don't teach them how to retain it.

What one memorized helped shape one's character.

Where could one look for guidance about how to act, if not the depths of memory?

The ancient and medieval way of reading was totally different from how we read today. One didn't just memorize texts; one ruminated on them - chewed them up and regurgitated them like cud - and in the process, became intimate with them in a way that made them one's own.

Who are you going to be more impressed by, the person who has a litany of his own opinions, or the historian who can draw on the great thinkers who came before him?

The people whose intellects I most admire always seem to have a fitting anecdote or germane fact at the ready. They're able to reach out across the breadth of their learning and pluck from distant patches.

ATTENTION

What I had really trained my brain to do, as much as to memorize, was to be more mindful, and to pay attention to

the world around me. Remembering can only happen if you decide to take notice.

When we forget the name of a new acquaintance, it's because we're too busy thinking about what we're going to say next, instead of paying attention. Part of the reason techniques like visual imagery and the memory palace work so well is that they enforce a degree of attention and mindfulness that is normally lacking. You can't create an image of a word, a number, or a person's name without dwelling on it. And you can't dwell on something without making it more memorable.

From the vast amounts of data pouring in through the senses, our brains must quickly sift out which information is likely to have some bearing on the future, attend to that, and ignore the noise.

EXPERTISE

On every single test of general cognitive ability, the mental athletes' scores came back well within the normal range. The memory champs weren't smarter, and they didn't have special brains.

When the mental athletes were learning new information, they were engaging several regions of the brain known to be involved in two specific tasks: visual memory and spatial navigation.

Experts see the world differently. They notice things that nonexperts don't see. They home in on the information that matters most, and have an almost automatic sense of what to do with it. And most important, experts process the enormous amounts of information flowing through their senses in more sophisticated ways.

If every sensation or thought was immediately filed away in the enormous database that is our long-term memory, we'd be drowning in irrelevant information. Most of the things that pass through our brain don't need to be remembered any longer than the moment or two we spend perceiving them.

Like a computer, our ability to operate in the world, is limited by the amount of information we can juggle at one time. Unless we repeat things over and over, they tend to slip from our grasp.

Repeating them over and over again to themselves in the "phonological loop," which is just a fancy name for the little voice that we can hear inside our head when we talk to ourselves. The phonological loop acts as an echo, producing a short-term memory buffer that can store sounds for just a couple seconds.

Chunking is a way to decrease the number of items you have to remember by increasing the size of each item.

What we already know determines what we're able to learn.

Chunking takes seemingly meaningless information and reinterprets it in light of information that is already stored away somewhere in our long-term memory.

All experts use their memories to see the world differently. Over many years, they build up a bank of experience that shapes how they perceive new information.

Chess experts tended to see the right moves almost right away. It was as if the chess experts weren't thinking so much as reacting.

They talked about configurations of pieces like “pawn structures” and immediately noticed things that were out of sorts, like exposed rooks. They weren’t seeing the board as thirty-two pieces. They were seeing it as chunks of pieces, and systems of tension.

A telling fact about memory, and about expertise in general: We don’t remember isolated facts; we remember things in context.

Contrary to all the old wisdom that chess is an intellectual activity based on analysis, many of the chess master’s important decisions about which moves to make happen in the immediate act of perceiving the board.

Higher-rated chess players are recalling information from long-term memory. Lower-ranked players are encoding new information.

The experts are interpreting the present board in term of their massive knowledge of past ones. The lower-ranked players are seeing the board as something new.

What we call expertise is really just “vast amounts of knowledge, pattern-based retrieval, and planning mechanisms acquired over many years of experience in the associated domain.”

In other words, a great memory isn't just a by-product of expertise; it is the essence of expertise.

OK PLATEAU / DELIBERATE PRACTICE

Many people sit behind a keyboard for at least several hours a day in essence practicing their typing. Why don't they just keep getting better and better?

Three stages that anyone goes through when acquiring a new skill.

1. "cognitive stage" you're intellectualizing the task and discovering new strategies to accomplish it more proficiently.

2. "associative stage," you're concentrating less, making fewer major errors, and generally becoming more efficient.

3. "autonomous stage," when you figure that you've gotten as good as you need to get at the task and you're basically running on autopilot.

During that autonomous stage, you lose conscious control over what you're doing. Most of the time that's a good thing. Your mind has one less thing to worry about.

Call it the “OK plateau,” the point at which you decide you’re OK with how good you are at something, turn on autopilot, and stop improving.

What separates experts from the rest of us is that they tend to engage in a very directed, highly focused routine, which Ericsson has labeled “deliberate practice.”

Consciously keeping out of the autonomous stage while they practice by doing three things: focusing on their technique, staying goal-oriented, and getting constant and immediate feedback on their performance. In other words, they force themselves to stay in the “cognitive phase.”

Unless he’s consciously challenging himself and monitoring his performance - reviewing, responding, rethinking, rejiggering - it’s never going to make him appreciably better.

Regular practice simply isn’t enough. To improve, we must watch ourselves fail, and learn from our mistakes.

The best way to get out of the autonomous stage and off the OK plateau is to actually practice failing.

One way to do that is to put yourself in the mind of someone far more competent at the task you're trying to master, and try to figure out how that person works through problems.

The single best predictor of an individual's chess skill is not the amount of chess he's played against opponents, but rather the amount of time he's spent sitting alone working through old games.

Force yourself to type faster than feels comfortable, and to allow yourself to make mistakes.

Typists were repeatedly flashed words 10 to 15 percent faster than their fingers were able to translate them onto the keyboard. At first they weren't able to keep up, but over a period of days they figured out the obstacles that were slowing them down, and overcame them, and then continued to type at the faster speed.

Ericsson suggested I try the same thing with cards. He told me to find a metronome and to try to memorize a card every time it clicked. Once I figured out my limits, he instructed me to set the metronome 10 to 20 percent faster than that and keep trying at the quicker pace until I stopped making mistakes. Whenever I came across a card that was particularly troublesome, I was supposed to make a note of

it, and see if I could figure out why it was giving me problems. It worked, and within a couple days I was off the OK plateau and my card times began falling again at a steady clip. If they're not practicing deliberately, even experts can see their skills backslide.

My practice would have to be focused and deliberate. That meant I needed to collect data and analyze it for feedback. And that meant this whole operation was about to get ratcheted up.

Practice makes perfect. But only if it's the right kind of concentrated, self-conscious, deliberate practice. I'd learned firsthand that with focus, motivation, and, above all, time, the mind can be trained to do extraordinary things.

CREATIVITY AND INNOVATION

Learning, memory, and creativity are the same fundamental process directed with a different focus.

The art and science of memory is about developing the capacity to quickly create images that link disparate ideas.

Creativity is the ability to form similar connections between disparate images and to create something new and hurl it into the future so it becomes a poem, or a building, or a dance, or a novel.

Creativity is, in a sense, future memory.

If the essence of creativity is linking disparate facts and ideas, then the more facility you have making associations, and the more facts and ideas you have at your disposal, the better you'll be at coming up with new ideas.

Mnemosyne, the goddess of memory, was the mother of the Muses.

Latin root inventio is the basis of two words in our modern English vocabulary: inventory and invention.

In order to invent, one first needed a proper inventory, a bank of existing ideas to draw on. Not just an inventory, but an indexed inventory. One needed a way of finding just the right piece of information at just the right moment. This is what the art of memory was ultimately most useful for. It

was not merely a tool for recording but also a tool of invention and composition.

When information goes “in one ear and out the other,” it’s often because it doesn’t have anything to stick to.

The people whose intellects I most admire always seem to have a fitting anecdote or germane fact at the ready. They’re able to reach out across the breadth of their learning and pluck from distant patches.

People who have more associations to hang their memories on are more likely to remember new things, which in turn means they will know more, and be able to learn more. The more we remember, the better we are at processing the world.

LANDMARKS AND NOVELTY IN LIFE

The idea is to avoid that feeling you have when you get to the end of the year and feel like, where the hell did that go?

How to do it? By remembering more. By providing life with more chronological landmarks. By making yourself more aware of time's passage.

The more we pack our lives with memories, the slower time seems to fly.

Monotony collapses time; novelty unfolds it.

You can exercise daily and eat healthily and live a long life, while experiencing a short one.

If you spend your life sitting in a cubicle and passing papers, one day is bound to blend unmemorably into the next - and disappear.

That's why it's important to change routines regularly, and take vacations to exotic locales, and have as many new experiences as possible that can serve to anchor our memories.

Creating new memories stretches out psychological time, and lengthens our perception of our lives.

In youth we may have an absolutely new experience, subjective or objective, every hour of the day.

Life seems to speed up as we get older because life gets less memorable.

Of all the things one could be obsessive about collecting, memories of one's own life don't seem like the most unreasonable. There's something even strangely rational about it.

Socrates thought the unexamined life was not worth living. How much more so the unremembered life?

The elaborate system of externalized memory we've created is a way of fending off mortality.

Siffre spent two months living in total isolation in a subterranean cave, without access to clock, calendar, or sun. Sleeping and eating only when his body told him to, he sought to discover how the natural rhythms of human life would be affected by living "beyond time." Very quickly Siffre's memory deteriorated. In the dreary darkness, his days melded into one another and became one continuous, indistinguishable blob. Since there was nobody to talk to, and not much to do, there was nothing novel to impress itself

upon his memory. There were no chronological landmarks by which he could measure the passage of time. At some point he stopped being able to remember what happened even the day before.

PERMANENCE

Each time we think about a memory, we integrate it more deeply into our web of other memories, and therefore make it more stable and less likely to be dislodged.

Older memories are often remembered as if captured by a third person holding a camera, whereas more recent events tend to be remembered in the first person, as if through one's own eyes.

It's as if things that happened to us become simply things that happened.

Or as if, over time, the brain naturally turns episodes into facts.

Over time, as they are revisited and reinforced, memories are consolidated in a way that makes them impervious to erasure.

The vast majority of us don’t trust our memories. We find shortcuts to avoid relying on them. We complain about them endlessly, and see even their smallest lapses as evidence that they’re starting to fail us entirely.

If something is going to be made memorable, it has to be dwelled upon, repeated.

ASSOCIATIONS

The nonlinear associative nature of our brains makes it impossible for us to consciously search our memories in an orderly way. A memory only pops directly into consciousness if it is cued by some other thought or perception.

Take the kinds of memories our brains aren’t good at holding on to and transform them into the kinds of memories our brains were built for.

Change whatever boring thing is being inputted into your memory into something that is so colorful, so exciting, and so different from anything you’ve seen before that you can’t possibly forget it.

It’s very important to try to remember this image multisensorily. The more associative hooks a new piece of information has, the more securely it gets embedded into the network of things you already know, and the more likely it is to remain in memory.

It’s important that you deeply process that image, so you give it as much attention as possible.

Things that grab our attention are more memorable, and attention is not something you can simply will. It has to be pulled in by the details. By laying down elaborate, engaging, vivid images in your mind, it more or less guarantees that your brain is going to end up storing a robust, dependable memory.

Exaggerate its proportions. The funnier, lewder, and more bizarre, the better.

When we see in everyday life things that are petty, ordinary, and banal, we generally fail to remember them, because the mind is not being stirred by anything novel or marvelous. But if we see or hear something exceptionally base, dishonorable, extraordinary, great, unbelievable, or laughable, that we are likely to remember for a long time.

Create these sorts of lavish images on the fly, to paint in the mind a scene so unlike any that has been seen before that it cannot be forgotten. And to do it quickly.

Particularly interesting, and therefore memorable: jokes and sex.

Animate images tend to be more memorable than inanimate images.

Disfigure them, as by introducing one stained with blood or soiled with mud or smeared with red paint.

He has created his own dictionary of images for each of the two hundred most common words that can't easily be visualized.

"And" is a circle ("and" rhymes with rund, which means round in German).

"The" is someone walking on his knees (die, a German word for "the," rhymes with Knie, the German word for "knee").

When the poem reaches a period, he hammers a nail into that locus.

What do you do with words like "ephemeral" or "self" that are impossible to see?

Gunther's method of creating an image for the un-imageable is a very old one: to visualize a similarly sounding, or punning, word in its place.

This process of transforming words into images involves a kind of remembering by forgetting: In order to memorize a word by its sound, its meaning has to be completely dismissed.

Many actors will tell you that they break their lines into units they call "beats," each of which involves some specific intention or goal on the character's part, which they train themselves to empathize with.

Giving a line more associational hooks to hang on by embedding it in a context of both emotional and physical cues.

The art of memory is learning how little of an image you need to see to make it memorable.

Savor the images, and really enjoy them. So long as you're surprising yourself with their lively goodness,

MEMORY PALACE

Convert something unmemorable into a series of engrossing visual images and mentally arrange them within an imagined space, and suddenly those forgettable items become unforgettable.

Create a space in the mind's eye, a place that you know well and can easily visualize, and then populate that imagined place with images representing whatever you want to remember.

He used his own body parts as loci to help him memorize the entire 56,000-word, 1,774-page Oxford Chinese-English dictionary.

Humans are very, very good at learning spaces.

Walking around: Without really noticing it, you'd remember the whereabouts of hundreds of objects and all sorts of dimensions that you wouldn't even notice yourself noticing. If you actually add up all that information, it's like the equivalent of a short novel. But we don't ever register that as being a memory achievement. Humans just gobble up spatial information. The principle of the memory palace is to use

one’s exquisite spatial memory to structure and store information whose order comes less naturally.

The crucial thing was to choose a memory palace with which I was intimately familiar.

I first needed a stockpile of memory palaces at my disposal. I went for walks around the neighborhood. I visited friends’ houses, the local playground.

Know these buildings so thoroughly - have such a rich and textured set of associations with every corner of every room - that when it comes time to learn some new body of information, you can speed through your palaces, scattering images as quickly as you can sketch them in your imagination.

The better I knew the buildings, and the more each felt like home, the stickier my images would be, and the easier it would be to reconstruct them later. I’d need about a dozen memory palaces just to begin my training. He has several hundred, a metropolis of mental storehouses.

(The phrase “in the first place” is a vestige from the art of memory.)

ORAL TRADITIONS

The brain best remembers things that are repeated, rhythmic, rhyming, structured, and above all easily visualized.

If you can turn a set of words into a jingle, they can become exceedingly difficult to knock out of your head.

The reason we teach kids the alphabet in a song and not as twenty-six individual letters. Song is the ultimate structuring device for language.

The variability that is built into the poetry of oral traditions allows the bard to adapt the material to the audience, but it also allows more memorable versions of the poem to arise. Folklorists have compared oral poems to pebbles worn down by the water. They're made smooth over many retellings as the harder-to-remember pieces get chipped away, or made easier to retain and repeat. Irrelevant digressions are forgotten. Long or rare words are avoided.

The original oral performance with its poetry was stripped of functional purpose and relegated to the secondary role of

entertainment, one which it always had but which now became its sole purpose.

No longer burdened by the requirements of oral transmission, poetry was free to become art.

We don’t speak with spaces. Where one word ends and another begins is a relatively arbitrary linguistic convention. If you look at a sonographic chart visualizing the sound waves of someone speaking English, it’s practically impossible to tell where the spaces are, which is one of the reasons why it’s proven so difficult to train computers to recognize speech. Without sophisticated artificial intelligence capable of figuring out context, a computer has no way of telling the difference between “The stuffy nose may dim liquor” and “The stuff he knows made him lick her.”

Camillo believed there were images that could encapsulate vast and powerful concepts about the universe, and simply by memorizing those images, one would be able understand the hidden connections underlying everything.

NUMBERS / CARDS

A technique known as the “Major System,” invented around 1648 by Johann Winkelmann:
http://en.wikipedia.org/wiki/Major_system

Convert numbers into phonetic sounds. Those sounds can then be turned into words, which can in turn become images for a memory palace.

Memorizing long strings of numbers, “person-action-object,” or, simply, PAO. In the PAO system, every two-digit number from 00 to 99 is represented by a single image of a person performing an action on an object.

Any six-digit number, like say 34-13-79, can then be turned into a single image by combining the person from the first number with the action from the second and the object from the third.

It effectively generates a unique image for every number from 0 to 999,999.

Those associations are entirely arbitrary, and have to be learned in advance, which is to say it takes a lot of remembering just to be able to remember.

Memorize decks of playing cards in much the same way, using a PAO system in which each of the fifty-two cards is associated with its own person/action/object image. This allows any triplet of cards to be combined into a single image, and for a full deck to be condensed into just eighteen unique images.

To be maximally memorable, one's images have to appeal to one's own sense of what is colorful and interesting.

Before I could memorize any decks of cards, I first had to memorize those fifty-two images. No minor job.

BRAIN

Memories gradually decay with time along what's known as the "curve of forgetting."

From the moment you grasp a new piece of information, your memory's hold on it begins to slowly loosen, until finally it lets go altogether.

Hermann Ebbinghaus first brought the study of memory into the laboratory in the 1870s. In the last decades of the

nineteenth century, the German psychologist Hermann Ebbinghaus set out to quantify this inexorable process of forgetting. In order to understand how our memories fade over time, he spent years memorizing 2,300 three-letter nonsense syllables. At set periods, he would test himself to see how many of the syllables he'd forgotten and how many he'd managed to retain. When he graphed the results, he got a curve that looked like this (falling curve of spaced interfals.) No matter how many times he performed the experiment on himself, the results were always roughly the same: In the first hour after learning a set of nonsense syllables, more than half of them would be forgotten. After the first day, another 10 percent would disappear. After a month, another 14 percent. After that, the memories that were left had more or less stabilized - they had become consolidated in long-term memory - and the pace of forgetting slowed to a gentle creep.

A memory is a pattern of connections between your neurons.

No one has ever actually seen a memory in the human brain.

The brain makes sense up close and from far away. It's the in-between - the stuff of thought and memory, the language of the brain - that remains a profound mystery.

OTHER

Participatory journalism.

Ed was an aesthete, in the true Oscar Wilde sense. He participated in life as if it were art, and practiced a studied, careful carefreeness. His sense of what is worthy seemed to overlap very little with any conventional sense of what is useful, and if there were one precept that could be said to govern his life, it is that one's highest calling is to engage in enriching escapades at every turn. He was a genuine bon vivant.

(Amnesiac:) Trapped in this limbo of an eternal present, between a past he can't remember and a future he can't contemplate, he lives a sedentary life, completely free from worry. "He's happy all the time. Very happy. I guess it's because he doesn't have any stress in his life." In his chronic forgetfulness, EP has achieved a kind of pathological enlightenment, a perverted vision of the Buddhist ideal of living entirely in the present.

Source: Moonwalking with Einstein - by Joshua Foer | Derek Sivers