

Thinking, Remembering Thinking, Thinking
about a Memory of Thinking, and how that
Messes with Time

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Introduction

What happens in my mind happens in the universe. I am, after all, just another physical body spinning through the galaxy, riding the expanding wave of the big-bang, comfortably seated on the arrow-of-time. The imagination has a place, and every imagination moves at least a few thousand kilometres a second in this fast spinning Galaxy. My imagination, where I've time-warped across the universe, flown kilometres above the earth, and played carelessly with my past and future, is much easier to see as something quite separate from the body that spins around the galaxy for real. It's as if what I imagine appears in a bubble that pops off my head, a piece of consciousness attached, and drifts away guided by nothing but its own laws of physics. This is perfectly fine to believe, it won't threaten the true nature of time and space in the universe, because those time and space distorted bubbles are nothing but the very expected outcomes of human-imaginations. What's far more interesting to the universe about conscious-minds is the evolved structure that patterns the development of knowledge in the brain, the part that's spinning through the galaxy for real, carrying forth that knowledge-accumulation, crossing paths with other bodies, sometimes colliding and bursting into pieces that form their own little worlds.

In 2020, I thought a lot about thinking. For the first half of the year I ran through a forested trail for an hour every morning, intending the run to be a meditation where, against the backdrop of repetition, I would explore more deeply the act of reflecting on my memories-of-thinking, feeling, and experiences-of-awareness. The typically calming effect of my run instead started fueling a hyperspeed looping through memories-of-remembered-thinking and memories-of-remembered-feelings; jumping, erratically, as I

flashed, randomly, people and events from life to entice reactions in my mind to analyse. As my cardio-strength increased and allowed for faster charges up and down steep dirt trails, mercifully beneath the shade of old-growth hard-woods, it started to feel like I was turning my internal world into a particle accelerator for neurological activity.

During this exercise I let up a bit on my life-long-pursuit to create stillness in my verbal thinking, which has forever plagued me in the form of imagined dialogues that are also intrusive thoughts. Instead, I allowed the verbage to run, and in the wake of these events I investigated more closely the hypothesis that a verbal thought inevitably has a non-verbal predecessor. Sure enough I remembered memories-of-thinking that included both verbal thoughts and cognitive-understandings, as well as memories of causal connections between them. Still I probed, asking, what preceded all that? I expanded the practice beyond verbal thinking, smashing my memories of all types of thought against each other so that I could attempt a hard, deep look at that wall of nothing just one notch in time past my thoughts. Unlike in CERN, the raw, objective-as-possible images I returned with always came out black and featureless.

I would frequently follow up these runs with some fast typing into my info-diary, my name for a living document where I brainstorm ideas, experiment with creative writing, write about what I'm reading, and write actual diary entries. On one such occasion I surprised myself with the realisation that I couldn't answer a fairly simple question: how do I really know that I experienced the thinking event that I remember having? Might the brain simply write in the memory of the thinking event without bothering with the thinking in the first place? In a system that is forever concerned with efficiency, sometimes decommissioning evolved abilities for efficiency's sake, why not? What would be lost? Even if this seems unlikely, what about my memory of how long the thought occurred for, when it happened, and in what order compared to other internal-information-processing-events I can remember? Most importantly, if I can't confirm the timing or even existence of the thinking-events I remember, who can?

These questions are what led me to write this essay. They're all questions I could ask about my memory of real life events as well, but my memories of life-external would not lead me to question the nature of my mind's place in time. Human minds have the benefit of knowing, through collective agreement, that real life events do happen somewhere on the arrow-of-time. In the external world, we believe in the arrow-of-time, that march along the path. Sometimes that path does muddy the mind's perception of the steady walk forward with events that contextually connect to other events, or events that repeat in a series scattered over normal-time's continuous journey, but in all moments the mind can still feel anchored to the arrow-of-time because in all moments normal-time retains some recognizable level of unpredictability.

No matter how much is learned about life in this universe, the path forward through time is still recognizably heterogeneous. If anyone has ever felt the universe has imprisoned them in a time loop, or distorted their normally steady walk forward, if they ever felt that time is not what they thought but more like a house of mirrors, all they had to do was discuss event distribution along the arrow-of-time with others, and so far the strength of truth that comes from mutual agreement has been enough to set the arrow-of-time straight. But while mutual agreement is epistemologically important to knowledge, knowledge-sets that accumulate in human minds do not come solely from multi-mind-development. Understanding knowledge in the human mind means understanding how the mind in part develops knowledge in the brain all on its own.

Section 1: Remembered-Thinking-Theory

If you wanted to fill in the details surrounding a memory of an event, like viewing a show at a music festival, what would you do? You could revisit the site of the festival, ask friends you went with to share stories, or see the same show again somewhere else, meet the performers, and ask about their perspectives. But what if you wanted to fill in the details surrounding the memory of a thinking-event, like a fantasy of yourself on the stage instead of the performers? You could repeat the fantasy again, this time with more awareness of what was happening in your mind during the visualisation, but how would you know for sure that any of the qualities of the repeated fantasy match those of the first iteration? How would you know for certain you visualised the same sights, the same sounds, or experienced the same affiliated feelings, or even started and ended the fantasy the same way, with the same duration in between? For the memory from real life, you have people, things and events in the external universe that confirm for you the continuity between where the show took place, how long the show lasted, and who or what was involved, but nothing can confirm this kind of continuity for you in terms of your thinking-events. In fact, this experiment leads to an unanswerable question: how do you really know that you had any of the thoughts that you remember having?

Remembered-thinking-theory asserts that the human mind is incapable of knowing for certain that thinking-events written into its memory actually happened, and is even less capable of confirming, through its subsequent analysis, the purpose, cause, context or intention behind remembered-thinking, or the similarity of remembered-thinking-events to other presumed-to-exist iterations of the events. This at first suggests that

remembered-internal-events are weaker in structure in the universe than remembered-external-events, but a proper analysis of the structure of internal and external event-memories shows that the opposite is in fact true.

A Proper Comparison Between Remembered-Internal-Events and Remembered-External-Events Sheds New Light on Old Epistemological Questions

THE CONTRAST between the inherent qualities of remembered-external-events and remembered-internal-events I believe sheds new light on a central epistemological problem that Einstein summarised well with his opinion on the matter:

“At this point an enigma presents itself which in all ages has agitated inquiring minds. How can it be that mathematics, being after all a product of human thought which is independent of experience, is so admirably appropriate to the objects of reality? Is human reason, then, without experience, merely by taking thought, able to fathom the properties of real things?

“In my opinion the answer to this question is, briefly, this: as far as the propositions of mathematics refer to reality, they are not certain; and as far as they are certain, they do not refer to reality.” (Einstein, 1921)

In *Geometry and Experience*, Einstein continues to contemplate the question with enlightened writings about axiomatics in mathematics. Axiomatics in mathematics, in the context of this essay, are the exemplars of permanence*. A most important axiomatic statement

*Permanence in this essay represents perceived repetition, continuity, causal and contextual relationships, and all their knowledge descendants (e.g. abstract concepts, or mathematical systems). It is almost synonymous with uniformity-in-nature (which represents the debated philosophical belief, underlying all sciences, that observable qualities of past-events will dependably reappear in future-events; the debate references Hume through the so-called problem-of-induction), but because of the arguments presented in this essay, permanence is shown to really only encompass perceived uniformity in the universe internal to a conscious mind.

in mathematics is that between any two points there is one and only one straight line. There is a subtle evolution to Einstein's thinking about straight lines and Euclidean geometry, encoded in how he speaks about the abstract rigid body, and then later in how he speaks more concretely about practically rigid bodies*. Slowly he came to the epistemological belief that straight lines, and Euclidean geometry itself, do not have a true physical representation in this universe:

In a discussion following a 1911 lecture on Special Relativity, he says, "A body moving in a certain direction gets flattened, it becomes an ellipsoid in the direction of motion. Thus, rigid bodies do not exist, because all bodies are in motion. This is something that runs counter to the naive conception, and it is what disturbs many physicists, namely, to have to assume that rigid bodies do not exist." (Einstein, 1911).

In his 1916 book on relativity, he says, "The subtlety of the concept of space was enhanced by the discovery that there exist no completely rigid bodies. All bodies are elastically deformable and alter in volume with change in temperature." (Einstein, 1916).

And in the same 1921 lecture that heads this section, *Geometry and Experience*, he says, "I attach special importance to the view of geometry which I have just set forth, because without it I should have been unable to formulate the theory of relativity. Without it the following reflection would have been impossible: in a system of reference rotating relatively to an inertial system, the laws of disposition of rigid bodies do not correspond to the rules of Euclidean geometry on account of the Lorentz contraction; thus if we admit non-inertial systems on an equal footing, we must abandon Euclidean geometry." (Einstein, 1921)

The brain is a prediction machine, and the outcomes of its predictions must have played a significant role in its evolution. So

*1913 was the first time Einstein used the term "practically rigid" to describe bodies in theoretical physics. He discussed "rigid" bodies at least as early as his famous 1905 paper *Electrodynamics of Moving Bodies*, which introduced Special Relativity.

Einstein's epistemological thoughts lead to an evolutionary question: how is it that the brain would come to predict the existence of qualities like undeformable rigidity, perfect repetitions, and seamless continuity, and crystallise from them magnificently complex and useful structures like Euclidean geometry, when those qualities themselves simply do not exist outside the brain's own conceptual systems? It is this phenomenon that remembered-thinking-theory describes.

While External-Event-Hypotheses Eventually Achieve Maximum Entropy, Internal-Event-Hypotheses Eventually Achieve Zero Entropy

TO ANSWER the evolutionary question, I'll first outline what might disprove the hypothesis that "this event always happens", or "that thing has a continuous existence", or "this repetition is the cause of that continuity". Whether for an event or a thing, the conscious mind gathers its later-remembered-evidence through discrete, intermittent observations, because the mind is not capable of continuous conscious awareness of a continuous sense experience of any one thing for any significant duration. Even its own memories are only ever observed through discrete, intermittent observations. So the evidence for a hypothesis about permanence is inevitably made up of a series of remembered-internal-events, or remembered-external-events, that are remembered with boundaries (a beginning and an end), a duration, and a disposition for connecting with other events, either causally, contextually, or as one iteration in a repeating or continuous event.

The mind recognizes repeated events in the external universe, but it also understands that events aren't repeated perfectly, that repeatability in the external universe is only sort-of there. The mind makes deductions and inferences about the connections between remembered-events in the universe, but it knows that its deductions and inferences are vulnerable to criticism from other people, and future evidence that may disprove them. Remembered-external-events have so many unobserved connections to other events, so many unobserved qualities that may contaminate perfection, that the unknowable aspect of external events forever sits on the mind's judgements as it reflects on the boundaries, durations and connections it hypothesises. External

events have boundaries that are fuzzy and too complexly connected to ever know completely through connections between remembered-observations.

Remembered-thoughts also have boundaries. These boundaries may wrap around a perceived duration for the thought, such as the amount of time it took to visualise an athletic manoeuvre, or they may wrap around one in a series of memories-of-awareness of a continuous feeling, such as a moment-of-awareness of a sadness that lasts all day, or they may wrap around the logical beginning and end to a conceptual understanding, like the memory of a conceptual recollection of a story's plot line. What the following argument will show is that while memories of external events have fuzzy boundaries, imperfect repetitions, and are connected through inferred relationships that are vulnerable to disproof by other event-participants and future-evidence, remembered-thinking-events have, potentially, perfectly-formed boundaries, perfectly-repeated durations, perfectly-uniform dispositions for connecting with other events, and are, potentially, invulnerable to disproof.

As discrete, intermittent observations of a hypothesised continuity, repetition, or causal or contextual relationship accumulate over time, the mind is conscious of two general sources of potential disproof for its hypothesis: 1) that another conscious mind will disprove the hypothesis based on their own evidence from one of the ever accumulating iterations of the observed event-relationship, or 2) that the mind's own future observations will disprove the hypothesis.

Following the observation of an initial external-event, such as the first morning of a mind's commitment to exercise every morning, the mind likely has perfect certainty that it has remained committed. It may retain certainty until the 50th iteration, when it suddenly finds itself considering whether it missed one day a few weeks back. Unlikely as the possibility may seem, doubt has now been introduced, and perfect certainty has descended into likely probability. Perhaps later another mind claims to remember meeting for breakfast during the committed-mind's exercise time. Although the doubting-mind may not be a perfect source

on the claim, new doubt has been introduced, and the probability becomes less likely. Even if a break in the chain of days is never proven, the probability that the mind remained committed eventually becomes as likely as not-likely.

For external events, both the possibility of disproof from another conscious mind, and from the mind's own future observations, increase in their likeliness to disprove hypothesised uniformity as time goes on, and as the number of observations accumulates. Each observation is one that may come back from the past in the form of another conscious mind ready to debate the hypothesis, and every step forward into the future is another step towards a future that is filled with new, potentially observable, evidence regarding everything that preceded that step. Consider the perspective of David Hume, whom Albert Einstein acknowledged as the most significant philosophical influence on the development of Special Relativity:

“In all demonstrative sciences the rules are certain and infallible; but when we apply them, our fallible said uncertain faculties are very apt to depart from them, and fall into error. We must, therefore, in every reasoning form a new judgement, as a check or controul on our first judgement or belief; and must enlarge our view to comprehend a kind of history of all the instances, wherein our understanding has deceived us, compared with those, wherein its testimony was just and true. Our reason must be considered as a kind of cause, of which truth is the natural effect; but such-a-one as by the irruption of other causes, and by the inconstancy of our mental powers, may frequently be prevented. By this means all knowledge degenerates into probability...”

In other words, every piece of knowledge regarding an external event (or experiment), for each conscious mind that carries that knowledge, eventually descends into probability until that mind's perspective contains no knowledge at all regarding the event (Hume, 1739b). In the context of Shannon's Entropy (Shannon, 1948), this means all hypotheses regarding external events eventually achieve maximum entropy and zero information.

Internal-events, however, do not experience these same

diminishing probabilities, or at least they don't need to. Hypotheses regarding internal events that are kept private, that are understood only on an individual's own terms, are only ever debated by the individual when the individual realises they were wrong about their memory of their own thoughts. This sometimes happens, but less and less for thinking events that are further-and-further back in the past. For the vast majority of thinking events, the evidence regarding what happened during a series of events is experienced fully and with most certainty during the first recollection. Some new evidence may appear in the future, like a detail of the previous night's dream surfacing in the afternoon, but less so as time goes on.

In my internal-life (my thought-o-biography), uncertainty and blindness have not led to apathy, on the contrary, the unanswered questions about what surrounds supposedly-remembered-thoughts are prime for engaging my mind's ingenuity and inventiveness. Sometimes when the mind learns that it will never confirm absolutely any knowledge it develops regarding a particular challenge, rather than seeing pointlessness to the exercise, it can see freedom, and even quiver with excitement at the chance to invent and imagine without the risk of absolute disproof.

Armed with undebated hypotheses about its thought-o-biography, a conscious mind can even choose to feel an immense confidence about its own understanding of its own thinking history, about the supposed data-sets that exist to back up the mind's thought-derived conceptual understandings. This may sound like a phenomenon significant only to self-delusion, but the internal space described by remembered-thinking-theory is like a black hole, a place of unknowable states, so what exactly defines truth and reality for that place?

Unless neurologists learn how to observe and decipher the brain processing information, to observe the brain creating a memory of that same thinking-in-action, and to decipher the content contained in that memory of thinking-in-action, and to observe and decipher the crystallisation of memories-of-analysis-of-memories-of-thinking-remembered, conscious minds will never ever be able to confirm that a remembered-thinking-event actually happened the

way it's reported. Remembered-thinking-theory asserts that this is impossible, regardless of how far neurology or any other science progresses, and therefore that the uncertainty surrounding remembered-thinking, and the confidence established by the only source of information on remembered-thinking – the mind that had the thoughts – is representative of its fundamental, evolved, and (as I will demonstrate) time-distorted structure in this universe.

The result of the differences between remembered-thinking-events and remembered-external-events is an inversion of rates of disproof for perceived uniformity in the external world, and perceived uniformity in the internal world. With each step forward into the future, memories of external events seem messier and less certain, but, in stark contrast, with each step forward into the future, memories of internal events, in particular continuous or repeating events, seem more and more perfectly defined. Remembered-thinking-theory asserts that with time, all hypotheses regarding internal events eventually achieve zero entropy, and maximum information.

Perceived Uniformity-in-Nature Originates in Remembered-Thinking

TO ANSWER the evolutionary question, I must first answer a sub-question: what came first, perceived-permanence in the external world (in other words, uniformity-in-nature), or perceived-permanence in the internal world? Because of remembered-thinking-theory, and the following argument, I assert that they were both preceded by the conscious mind's capacity to remember its own thinking, which, through perfect unitization, enabled the mind to perceive repetition, continuity, causation and contextual relationships between thoughts. In other words, perceived-permanence in the internal world preceded perceived-uniformity-in-nature; and furthermore, because of remembered-thinking-theory, and the arguments made by Einstein in *Geometry and Experience*, and the second law of thermodynamics, and the expansion of the universe, I assert that perceived-permanence in the internal world is the source and sole-home of permanence, or uniformity-in-nature, not the external-universe itself.

Causation, which is the basis of all beliefs and matters-of-fact, necessitates spacetime-continuity in objects-of-cause and objects-of-effect, because their relationship must be observed repetitively in order to be perceived. This argument was established by Hume and survives today:

“’Tis therefore by experience only, that we can infer the existence of one object from that of another. The nature of experience is this. We remember to have had frequent instances of the existence of one species of objects; and also remember, that the individuals of another species of objects have always attended them, and have existed in a regular order of contiguity and succession with regard to them. Thus we remember to have seen that species of object we call flame, and to have felt that species of sensation we call heat. We likewise call to mind their constant conjunction in all past instances. Without any farther ceremony, we call the one cause and the other effect, and infer the existence of the one from that of the other.” (Hume, 1739a).

Remembered-thinking creates a perfect conceptual environment to build perceived-causation, because unresolvable-uncertainty about remembered-thinking is what allows for perfect boundaries, or unitization, and thus distinct repeatability (or custom, in Hume-ian terms). Furthermore, because uncertainty increases for two-thoughts-ago, three-thoughts-ago, and so on, causal-relationships between thoughts can seem more distinct simply by repeating the thought sequence, or even just perceiving it to have existed for a long time. In fact, with enough observations and passing of time, the mind can easily perceive the infinite life of causal relationships, as well as the infinite life of objects-of-cause, such as the awareness of a particular part of a remembered-external-event, and objects-of-effect, such as the self. A mind can remember a feeling and casually conceive of its infinite existence simply by saying to itself, “I always feel this way in moments like this”. The biological basis for comments like this, and any conceived-of-absolute, would evolve quite easily in a system that finds its greatest and most comforting certainty in permanence perceived to continue or repeat infinitely backward and forward through time.

And so I’ve reached an answer to the evolutionary question: I

believe the human mind is able to conceive of rigidity, repetition and continuity, with perfect certainty, despite living in a universe where no such things exist, where only approximate-uniformity exists, because the mind evolved a capacity to perceive permanence in the internal world first, so that permanence in the external-universe, or, in other words, uniformity-in-nature, was not required. All that was required was enough approximate-uniformity to make perceived-perfect-uniformity advantageous to the mind's genetic-survival. Based on these conclusions, remembered-thinking-theory asserts that the internal, time-distorted world created by remembered-thinking is the source and sole-home of continuity, repetition, and causal and contextual relationships.

Interlude: Geometry and Experience Remembered

A Rewrite of Einstein's Glass-Ball and White-Table thought experiment, presented in Geometry and Experience (1921)

I want you to remember visualising a glass sphere hovering above an infinitely extended white table that is otherwise surrounded by the darkness of an empty universe. Don't try to put the image in your head, that doesn't make sense anymore, you can only remember it. Now, it's been the case that the human mind should add a touch perception to three-dimensional visualisations, ever since artists of ancient times discovered that to create the concept of a three-dimensional object in the mind, like a sphere, it works best to show a sphere held in the hands, so that the mind can feel the curves, or balancing on a rim, so that the mind can see the weight of the sphere teetering from one side to the other, than to simply show the sight of a sphere, which the mind can only imagine, without a concept of touch, in a very low quality way. So, you may want to remember touching the glass sphere, or remember having pushed it, so that it wobbled and bounced in its hover a little, revealing its mass.

Next, remember that there was a lamp over the sphere, directly over top. Then, remember that there was a knitted cup-coaster in your hand, and that you placed it on the side of the glass sphere, and then left it, because just as the sphere magically hovered, the coaster magically stuck. Where was the coaster's shadow? How big was it? Can you remember? The light from the lamp did in fact reach out to infinity, that's what light does, albeit in the faintest of brightness as it extends to the ends of the universe. This coaster, however, placed on the side of the sphere, cast a shadow much closer than infinity, to a spot on the white table just a little ways to the side of the sphere.

Remember bringing that shadow closer to the sphere without having detached the coaster from the surface of the sphere. How did you do it? You moved the coaster down the sphere towards the point that was closest to the table. As you continued to move the coaster closer and closer to the bottom, you saw the shadow get smaller and smaller. Once the coaster reached the point closest to the table, the shadow shrunk to the exact size of the coaster, and sat directly beneath it. Remember continuing the experiment by moving the coaster up to the top of the sphere. As the coaster approached the equator of the sphere, the shadow as a whole moved away from the sphere. After the coaster passed the equator, the closer edge of the shadow moved closer to the sphere, but the outer edge continued its journey towards infinity. Do you remember what happened when the coaster reached the top of the sphere, directly beneath the lamp so that it had blocked all its light? The shadow's outer edge extended to infinity, creating darkness across the entirety of the white-table universe.

Einstein's visualisation is describing an infinite universe, because the coaster can move around the sphere for as long as it wants, for an infinite amount of time, even creating infinitely new path-shapes to trace. As it does, the shadow of the coaster also moves around in an infinite universe, but one laid out flat on the infinitely extended white table. The three-dimensional glass-sphere and its perfect re-representation on a two-dimensional table shows how a universe can be perfectly the same under dramatically different conceptual circumstances.

Remember that there was a stack of coasters in your pocket, and that they were six-sided-polygons, so that you could fit them together around the sphere, and so you did. You put one on the bottom point and started stacking them around it in a connected-circle. Eventually you covered the whole sphere, and therefore all of infinity on the two dimensional table. But how was that possible? First, the coaster roamed forever around an infinite universe, exploring the two-dimensional white-table in a way that seemed very similar to space-exploration in this universe, which often sorts its solar-systems and galaxies out in flat planes like the table. When you started stacking coasters, however, the sphere quite quickly

filled up in its very non-infinite capacity, and the two-dimensional plane became enveloped in the shadow of a fully-covered sphere. This was, without a doubt, a universe both bounded and infinite.

With this visualisation, Einstein was describing exactly what he felt general-relativity said about this universe. The two-dimensional table is like three-dimensional space, the place that human minds see themselves moving around in, while time ticks by in the background without any direct influence on any object. A universe where the position of things is described as much by time as by space (their worldline), is the sphere, and this sphere is the sphere on whose surface Einstein believed we lived, bounded, but infinite. I love this visualisation, but I'd like to make Einstein's point a little clearer with a slightly different tweak.

Remember that you also had a pocket full of rectangular-knitted-pieces that you could place around the sphere, stacking up rows like a mason. Remember that you did this, leaving the bottom half of the sphere already filled, and the top half still clear, so that a circular shadow cast out to a significant distance from the sphere. Remember that you gave yourself the challenge of moving the shadow towards infinity on the two dimensional white-table one step, equal to the distance of the last step, at a time. It's possible of course, all you had to do was remove some yarn from each new row of knitted pieces, so that the smaller pieces cast a shadow of equal size to the previous row. How did it all play out? Yes, of course you were able to continue to add layers of rectangles, expanding the shadow-sphere by shadow-rows of equal size, but the actual knitted pieces had to shrink in width with each new layer, until they were so small, and progress so slow, that not only did the knitted pieces never reach the top, they never really got that close. Yet, on the two-dimensional table, the shadow-rows continued to stack towards infinity for infinitely many rows of equal size. This phenomenon is bounded by a limit on the sphere, but by absolutely nothing on the two-dimensional table.

General Relativity has shown that, in the spatial universe, humanity will only ever be capable of moving small, incremental steps towards an unfathomable infinity. What it also shows, however, is that time is a dimension we move around in too. On the sphere,

where each individual conscious mind traces out its own world-line, the unfathomable infinity of the universe is expressed through an infinitely diverse selection of paths to trace, each featuring infinitely-heterogeneous experiences. That's how the universe gifts us with a bounded, but infinite life.

Section 2: The Principle of Infinite-Heterogeneity-in-Time

One of my assertions about thought is that there is no present moment when it comes to thinking, feeling, or experiences-of-awareness. My assertion that all internal events are remembered, and never experienced in a present moment, does not necessarily follow remembered-thinking-theory. So why do I make this assertion? I make it because I believe the qualities of thought that must descend from the nature of remembered-thinking account for all qualities of thought ever reported by conscious minds. Thoughts are experienced in units, where one follows another in such a way that one can cause the other, or relate to the other, and where both, or some aspect of both, can be seen as iterations in a series of repeating internal experiences. These relationships depend on the unitization of thought, on perfect separation, and the experience of exact-sameness between at least some aspects of thoughts. Unitization and permanence, and all their knowledge-descendants, are concepts that must be born from the only place where they could possibly exist in perfection, remembered-thinking, and it's there that they must continue to live.

The Mind Oscillates Between a State that Interacts with Normal-Time, and a Reflective State that Exists in a Consciously Created Past

Imagine a man walking in the middle of a field, unaware that a thunderstorm is brewing just above his head. Suddenly he's startled by a nearby lightning strike and crack of thunder. That lightning strike is an event in the external universe, an event that began with the sudden discharge of energy, and continued like the ripples emanating out in a pond from a drop of rain. For a drop of rain, the pond is the substrate through which the event reverberates. For the lightning strike, the air, the surrounding

electromagnetic field, and the weather system itself are substrates through which the event reverberates. For how long does it reverberate? I believe events in this universe, which is synonymous with saying all things in this universe, exist for as long as the event is discernible through its reverberations through a substrate. Eventually the ripple from a rain drop becomes indistinguishable from the criss-cross of ripples from all other raindrops. This is the same as saying the reverberations of events eventually achieve maximum entropy, and zero information, thus ceasing to exist. So to with the lightning strike: eventually the thunder rumbles itself out, the effect on surrounding fields becomes indistinguishable from all other field behaviour, and the weather system eats up the once distinguishable happening within its cycles.

A lightning strike experienced by the field-walker, however, will reverberate for much longer than it would without him. The field-walker's body and neurology are also substrates for an event to reverberate through: in this case the lightning-strike reverberates through his sense organs, the vibrations reverberate through his feet, and the event reverberates through his body in the form of a startled reaction to the lightning. All these subconscious processes I believe are as much a part of the event as the initial release of energy, because the substrate that is the brain and body make the event distinguishable in terms of its outward ripples through the universe. To define an event as something separate from any reverberation outward would necessarily lead to defining an event as a single, discrete point in spacetime, but nothing in this universe is a discrete point, and thus this provides no real way to define an event. Within the field-walker's neurology, this event ripples through brain regions like the hippocampus, which guides the ripples towards particular networks of neurons, where the ripples not only reverberate through existing connections, but through the ongoing process of building and breaking connections. These ripples will eventually slow to a point where the field-walker could label the event as a memory, but in reality that memory is nothing but the very event that began with the discharge of energy, only now reverberating very slowly through a substrate, but still maintaining something less than maximum entropy, and something more than zero information about the event.

Now imagine, immediately after the lightning strike, a heavy downpour begins, occupying the man's mind completely. He has no time to contemplate the lightening strike; that event, as powerful as it was, never enters consciousness, is never reflected upon at all, so it simply continues its slow reverberation within the brain, in the subconscious. The man runs for shelter, and once he finds a pavillion and sits down at a picnic table, he finally reflects on the initial lightning strike. Here is the dividing line between a biological organism, an event himself, interacting with other events in the universe in normal time, and a conscious mind establishing a new event in a time-distorted space. The space described by remembered-thinking-theory is nothing like a biological substrate that an event reverberates through. In the space created by remembered-thinking, the event must be unitized, at least as a remembered-remembering, and thus as an event separated from other events in the universe, and from most of its own reverberations.

This basic form of unitization, remembered-remembering, is as close as I believe a conscious mind gets to experiencing an actual present-moment (which is what it is, even if what's remembered is a reverberation of an event that began years prior). Typically far more unitization happens. The field-walker may contemplate the flash itself, or the crack of the thunder, or that wonderful startle he felt. In the perfect unitization of remembered-thinking, he can visualise comparable strikes, cracks and startles from his past, or that may happen in his future. He can visualise strikes, cracks and startles that have occurred forever, observed by his ancestors, or that will occur forever, and be observed by his descendants. What he can't do, in that conscious, reflective space, is experience directly or wholistically an actual present-moment-interaction with an event in the external universe.

The distinction is important, because both types of events create knowledge in the mind. A person's neurology is constantly acting as a substrate for a myriad of events that are still distinguishable through their neurological reverberations, but have yet to ever enter consciousness. That is knowledge, and even if those reverberations are never remembered as remembered-remembering (the means by which a real event ignites an internal event), those

reverberations will still affect a person's path through life, still affect the development of their knowledge, only from their subconscious. Even if the man were to never consciously remember the lightning strike, its subconscious reverberations may still affect how future weather forecasts change his field-walking plans.

There's one final, but very important point to make with this example. I assert that awareness, as it's most often described, is a remembered-thinking-event. What distinguishes knowledge built from real events, and knowledge built from remembered-thinking, is separation. Events that reverberate through the neurology are not separated by sense experience, by emotional experience, or a sense of duration or geography. They may reverberate through neural networks that are weighted to one aspect of cognitive understanding more than another, but that doesn't characterise the memory, just as lightning strikes are not wholly characterised by any one aspect of the event, but only by the total effects that reverberate out through the universe, at least if one wants to characterise lightening as a most objectively real event as can possibly be accomplished. The brain consumes real events in wholistic form subconsciously, while consciously the mind consumes events by seeing what it's seeing, hearing what it's hearing, and feeling what it's feeling. Conscious awareness is not a consumption of the world through the senses, but a remembering of a particular, unitized cognitive process as it processed information for a particular, unitized segment of time.

Imagine a second example: a woman rushing to a dinner party she's late for, and on the way she sees an old friend from long ago. In a brief exchange they agree to meet for coffee, and then she's off, rushing to the dinner party, reflecting not at all on the event that just occurred. The event that was the interaction between her and the old friend continues to reverberate within her neurology, although it has not ignited any internal events. Now imagine that the woman arrives at the dinner party. Still without ever reflecting on the memory, she's asked how she's doing by the host, a question which immediately launches her into the story of meeting an old friend on the way. In this case the real event has continued to reverberate through the universe, first through the substrate that is the woman's brain and body, then through the neural and

muscular process involved in speaking, then through the substrate of air in the form of words, then through the listener's neurology, where the event, remarkably, still reverberates with something less than maximum entropy and something more than zero information.

Later, after the dinner party, when the woman is home alone, she remembers telling the host about running into their old friend, and reflects on the memory. Now a real event has ignited an internal event, not the real event that was meeting the old friend, but the event that was talking about it with the dinner host, because she's remembering-remembering how she described the meeting to the host. If her brain were to decommission the neurological substrate that allowed the real meeting to continue reverberating in her mind, in favour of the memory of the internal event that is a remembered-remembering of what she described to the host, then that would become the knowledge of the event that the woman would report in any future recollections, not the knowledge once held by the real-event-reverberation in her brain that the host was allowed to witness. This is how remembered-thinking-theory shows that remembering straight from the neurological impression of a moment is something dramatically different from remembering the separated aspects of an event that are defined through internal reflections on remembered-remembering.

Consider one final example, this time from a letter written by a teenage Einstein to his recent board and study host, Pauline Winteler:

"Your lovely present gives me a welcome excuse to write to you again, the holiday's silence, the cozy quietude, to have a good chat with you, as if we were sitting together in the red room while the potatoes are getting brown with jealousy and the dear sun and some other dear thing peep into the room. When I think of that room, my head starts ringing in a delightfully mad way, and a thousand memories, some old, some young, some gay and others sad, embrace each other in a child-like fashion, as if they belonged together. " (Einstein, 1897)

The first sentence sounds much like one from the dinner guest

who spoke about a memory without first reflecting on the memory. Einstein is usually very careful with his words, but there's a clumsiness and speed to the thought expressed that makes it sound an awful lot like a quickly written sentence about a memory bubbling up, in the excitement of the letter-writing-moment, from the real-event-reverberations. The next sentence is the polar opposite: he writes about the relationship between the act-of-remembering, "When I think of that room,..." and an experience-of-awareness of a feeling, "...my head starts ringing in a delightfully mad way,..."; he writes about the categorical-identities of his remembered-(and analysed)-rememberings, "...and a thousand memories, some old, some young, some gay and others sad,..."; he writes about the relationships between those remembered-rememberings, "...embrace each other in a child-like fashion,...", and a hypothesised causal force that has the effect of their togetherness, "...as if they belonged together". This sentence could not have been written without some reflection on memories-of-thinking-about-memories-of-remembering. The two sentences together are a good example of how the mind may oscillate between reflection and in-the-moment states quickly throughout a single task, and draw from knowledge sets differently characterised by the two states. It's also a sample of how remembered-thinking-theory-analyses may proceed in literary studies, law, philosophy, or in common life.

I think everybody oscillates in and out of these two states all day everyday: a reflective-state, where some amount of attention is on a memory-of-thinking, and a present-moment-state, where the brain and body are nothing but a substrate for the reverberations of events in the universe. But I don't believe our reflective, introspective minds can ever really know what the other side of the oscillation is like, because the reflective-mind only understands the external-universe through memories-of-events-external that it has pulled apart and analysed as unitized parts of the whole. However, there is, I believe, a channel to the real universe that is never lost to the mind, regardless of what state it's in.

Without Determinism, Without the Past, there Still Remains an Intuitive Sense of Time

IN WHATEVER state a mind exists, it understands that it's

moving forward through time. While there are good arguments for the idea that conscious minds live in a simulation, and thus that the mind's conception of time is somehow created for it, either by the brain itself or artificially by an external force, I debate this possibility. I believe, on an intuitive level, that the mind's sense of forward movement through time is derived from a real interaction with the nature of the universe. My arguments so far, however, have disregarded what fundamentally defines time for the mind as a distortion created by the reflective-mind: the fact that we exist in a present-moment-event, that differentiates itself from other event-units by either being ahead or behind; and the fact that future events resemble past events in such a way that time can be understood as an evolution along a chain of predictable cause-and-effect relationships, in other words, that time is deterministic.

I assert that neither of these claims are valid except when explaining the past of a distorted version of time created inside each individual conscious mind; so, for the universe-external, what is left on an intuitive level? I believe the most powerful sense of forward movement through time is the fact that something unpredictable always happens eventually, the fact that week to week, day to day, and even moment to moment there are small indications that this iteration is not the same as the last iteration, or any before it; and the fact that the mind never really enters into a cyclic experience of time that is so precise in its repetition that the mind loses the sense of time it derives from a life of dependably heterogeneous events.

My principal of infinite-heterogeneity-in-time states that anything that exists in this universe must experience heterogeneity-in-time, so that it may experience direction-in-time over it's worldline*, a direction that flows forward towards infinite-heterogeneity.

*A worldline is a line drawn through a series of worldpoints that represent positions in four-dimensional space-time. You can walk the same path through space as I walk, and you can live at the same time I live, but you can't walk the same path I walk at the exact same time, so each of our lives occupies a perfectly unique path through space-time, our worldlines. The concept was pioneered by Hermann Minkowski, who was also a significant architect in the development of General Relativity.

The concept of infinity is used in the principle because it creates a means for defining forward movement that excludes a possibility for backwards movement. Forward movement is simply the constant occurrence of states that do not mirror any previous state in terms of how events relate to each other through each successive state change. The past is eliminated in the infinite-heterogeneity, because the past is something that matters to the future, in the way that a segment of deterministic links matters forever to every subsequent link in that chain. It is in fact by the disintegration of such predictable phenomenon that forward movement becomes recognizable through the infinite-heterogeneity. While the principle doesn't suggest that heterogeneity is the only, or the defining, quality of time, it asserts that something about the arch of time in the universe maintains infinitely-heterogeneous-experiences for everything in it.

The mind experiences the universe through perceived cyclic appearances of known events, interpreting them with knowledge developed partly from its internal reflections, and partly through impressions made direct from the external. They appear as round-a-bout chains of cause-and-effect, or cycles of appearances of ever-together contextual events, or cycles of experiences-of-awareness that allow the mind to perceive continuity. It is perfection in these cycles that I suggest would leave a conscious mind stuck in time, unable to perceive forward movement. Forward movement is always experienced because there are errors in the defined cycles perceived at every level in both common life and scientific observation; and because a close examination of any particular instance of a cycle, I assert, will inevitably show variant qualities that never could have been predicted no matter how well the cycle was understood.

I believe the principle of infinite-heterogeneity-in-time earns support by considering its theoretical counterpart. Infinite-heterogeneity-in-space applies to every event (or thing) in this universe in the sense that every event experiences a different relative position to every other event in the universe every time it changes position. This reasoning still applies to an event that moves back to it's original position, because of the ever-changing fabric of relative

positions in the universe; and because of that same ever-changing fabric, in particular because of the expansion of the universe, even staying still from one state of existence to the next means entering a new, completely unpredictable position relative to all other events.

From this position, to that position, then back to the beginning, that's what a moon always does. Here too the nature of approximate-uniformity shows itself: any perceived path-tracing-cycle will glitch and wobble more and more as the cycle ages. One day the universe will in fact eat up our moon and with it, any evidence of its spacial path. Spacetime together creates enough cycle disturbances even on the human time scale that only the biggest and most ancient universal phenomenons, like gravity, seem to hold precisely true to our scientific laws.

This is how the infinite-heterogeneity of the universe makes itself apparent in all perceptible cases. Is this how the real, unperceived universe operates? In cycles that continually glitch in new, unpredictable ways? In a sense I believe so, but I believe for every perceivably-cyclic series of events in the universe, glitches become more dense with time, and eventually the perceivable cycle disintegrates into the infinitely-heterogeneous change of universal states. This is what I believe approximate-uniformity in nature looks like, and this is all I believe determinism is and why it's not real enough to define time. Deterministic relationships between events only exist long enough to illuminate a recognizable path followed by certain events through the infinite-heterogeneity, a path that inevitably disintegrates and disappears. The logically defined connection never really exists, the true relationship observed is really just a disposition for certain events to remain close during that particular phase of approximate-uniformity, the way one magnet may seem to cause another to travel towards it, when in fact all that exists is the disposition for the two magnets to connect while they're close enough together.

The traditional, deterministic concept of time does in fact exist in this universe, but as a distortion that only exists in individual conscious minds. Once this allowance for determinism and permanence is made, it becomes intuitive to see not only how time actually exists in the universe, but how conscious minds interact

with normal time, and how their capacity to maintain permanence guides each mind along their own special path, their worldline, through the infinite-heterogeneity.

Section 3: Permanence Reviewed

“In the previous paragraphs we have attempted to describe how the concepts space, time and event can be put psychologically into relation with experiences. Considered logically, they are free creations of the human intelligence, tools of thought, which are to serve the purpose of bringing experiences into relation with each other, so that in this way they can be better surveyed. The attempt to become conscious of the empirical sources of these fundamental concepts should show to what extent we are actually bound to these concepts. In this way we become aware of our freedom...”

– Albert Einstein, *On The Special and General Theory of Relativity (A Popular Account)* (Einstein, 1916)

That each individual has the ability to conceive of permanence, with each conception tracing out a temporary path through the fog of time, is something that I’ve come to see as a precious power that deserves respect, and deliberate accommodation.

I don’t suggest this because of the utility permanence provides for future predictions in a universe of approximate-uniformity, a utility that has come about as part of the brain’s evolutionary story, or even because the externalisation and communilisation of that utility has generated a scientific understanding of the universe. The truth about the universe, about its infinitely-heterogeneous nature, shows just how powerful it is that the mind can conceive of repetition, such as an athletic manoeuvre or spiritual ritual, with a sense that it’s repeating it perfectly; or that the mind can develop knowledge about itself and its environment, such as the necessity to achieve a complex goal, without a fraction of a doubt; or that the mind can set a protocol for itself, such as a set of behavioural

strategies to enact before a common and stressful event, and have that protocol exist like a mountain through the storms of life; or that the mind can conceive of a continuity, such as a feeling about the specialness of a place, and have that feeling last with perfection for a lifetime, or even for perceived-infinity.

The reason I suggest the power to conceive of permanence deserves respect is because it's easy for the reflective-self to be coopted into, and for the mind to be irrevocably altered by, prescriptive technologies simply by living in a planned environment where everyone must play their part (Franklin, 1989). What makes the capacity to actually manifest perfect uniformity in nature more powerful than anything, is the fact that all the perfections of permanence can only exist inside an individual's conscious mind, and can never truly be understood or perceived by anyone or anything external to that individual. The acquisition of a human mind's capacity to maintain permanence seems mundane when the ask-of-you is to be aware of a simple rule, or to remember to do this every time you're in that place, or to know particular, permanent facts about your identity for if you're ever asked. But any part played in the framework of externalised, and therefore imperfect, permanence, no matter how simple, is a blind occupation of an individual's conscious mind's most profound and unknowable power.

The reason I suggest the power to conceive of permanence deserves deliberate accommodation is because by recognizing that every conceptual act of perception distorts time in this infinitely-heterogeneous-universe, a conscious mind learns what power it really has; it learns that the mind's interaction with normal-time, with the infinite-heterogeneity, with that part of existence not directly knowable to our introspective, verbal selves, is nevertheless guided wholly by what rules, abstracts and observations the mind deems permanent, or even infinite; and it therefore learns how much effect every permanence it creates, and every permanence created for it, bears for that mind's path through space and time, through their unknowable, uncrossable worldline.

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