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Meno (1972)

In the approximation of classical relativistic theory the creation of an electron pair (electron A, positron B) might be represented by the start of two world lines from the point of creation, 1. The world line of the positron will then continue until it annihilates another electron, C, at a world point 2. Between the times t_1 and t_2 there are then three world lines, before and after only one. However, the world lines of C, B, and A together form one continuous line albeit the “positron part” B of this continuous line is directed backwards in time. Following the charge rather than the particles corresponds to considering this continuous world line as a whole rather than breaking it into its parts.¹

Plato in his *Meno* argues that knowledge is reminiscence: Socrates summons a slave boy ignorant of mathematics and starts cross-examining him about a geometrical demonstration; when the kid begins to evince understanding he claims this is evidence that what is

¹ R. P. Feynman, “The Theory of Positrons.” *Physical Review* Volume 76, Number 6. September 15, 1949, pp. 749-759. — In his Nobel lecture [1965] he cheerfully admits to having stolen this idea from Wheeler.

known, or knowledge of abstractions, at least, is already resident in the soul; which must therefore be immortal.²

It seems to me that this argument is more or less correct; though I don't think it says what Plato thought it did. — Certainly it has aged well; what Chomsky said about grammar and innate ideas was not very different.

Presumably Plato thought of this because learning something feels³ more or less the same as remembering: you don't understand, and then you do. There is an abruptness to it, which he remarks; something that feels like the transition from lost to found.

Of course you wonder then about imagination — is this like remembering something that didn't happen? — but the real curiosity is invention, because this is exactly like remembering something you have yet to learn.

² I think that insofar as Plato's argument works, here as always it actually shows that the soul lies outside of, is independent of time, that it is Being and not Becoming, and that if you pitch this in contemporary language most people would still buy it. Not that this has anything to do with playing harps in the Celestial choir; Plato is as usual prone to what appear to us to be purely verbal confusions like the conflation of "timeless" with "immortal." But I would point out, e.g., that though Windows 3.1 — no, too dreadful, I shouldn't say that, I should say the System 7 Mac OS — may not be running on anything at the moment, this doesn't mean it doesn't *exist*. — Though it hasn't *gone* anywhere either. — Compare also the Pythagorean doctrine of metempsychosis with (software) "installation": they are not precisely isomorphic, and indeed it's strange no one thought of the idea that more than one person may have been who you were in a previous life; many distinct persons have the same physical ancestors, after all. (And do all bacteria have the same soul? really, we can do this all night —)

³ It is amusing to try to come up with an explanation for this subjective feeling: learning involves an inductive computation which is much longer and more complex than it appears to the conscious mind; many processes go on in parallel to try to piece together a solution to the problem; when the result is presented to consciousness, the fragments of understanding are, by this time, things which are "already known," and the process of retrieving them to explain the whole is isomorphic to remembering; so when the conscious ego sees the answer it is, indeed, something already resident in the soul, albeit in a part not easily accessible to conscious inspection; the effect is functionally not dissimilar to retrieving memories from a past life.

So you could with equal justice say this: if knowledge is reminiscence, then invention is remembering backwards in time.

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Because Plato's argument doesn't have any direction to it. If you believed it, it would apply as easily to something no one has learned yet — to any possible result of mathematics, if not to any sort of contingent matter of fact: I could recover the memory of the proof of the Birch/Swinnerton-Dyer conjecture, for instance; though presumably not of how I'd spend the prize money once I published it. — If the soul⁴ is boundless and immortal and swims in the sea of eternal truth, time cannot apply to it.

(Leibniz remarks “every mind is of unbounded duration.”)⁵

Admittedly this creates a problem with why you understand premises before conclusions: what kind of ordering is introduced by the arrow of logical inference? Is it the same as the arrow of time? — it doesn't appear to be, at least, since in a proof many premises may precede a conclusion, and the order among them is somewhat arbitrary, not necessarily linear. (Linearity is an artifact of exposition.)

This has something to do with the P/NP distinction, about which — ha! — more anon, but for the moment note that one way of stating that⁶ is to say there is an inherent difference in difficulty between finding a proof and verifying one. — The latter is straightforward and

⁴ “The soul” has several different meanings, and the one I take seriously (Aristotle's) is rather different from Plato's; let alone from what Catholic theology derived from it. But we're playing by Plato's rules here.

⁵ Loemker, p. 160.

⁶ See Jan Mycielski, “The meaning of the conjecture $P \neq NP$ for mathematical logic.” *The American Mathematical Monthly*, **90** [1983], 129-130.

leads from a leaf of the tree back to the root, which is linear; the former is a search, involves tracing a path from the root of the tree to the leaf that holds the solution, and is in general exponential.

In this sense the distinction between remembering and inventing is just which computation is harder. Time reversal is not a symmetry of the problem.

(Unlike quantum field theory: obviously this argument only occurred to me because I knew that Feynman identified positrons with electrons running backward in time, but the situations are not isomorphic.)

I.e. in following a proof we have a series of applications of modus ponens: $A, A \rightarrow B$, therefore B . We write this down and it looks linear, but if we turn it upside-down the illusion evaporates: from B there are an arbitrarily large set of pairs $B \leftarrow A, A$ to derive it from. Even when we can bound the number, as in a procedure like the construction of a semantic tableaux, the complexity of the search grows exponentially in length.

It is for some reason like this that you can remember where you came from but not usually where you are going. — Penrose has an elaborate argument about Fourier decompositions and the wave equation, but Patti Smith is more succinct: “I don’t fuck much with the past but I fuck plenty with the future.”

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Personal immortality

The argument of the *Meno* is that the soul is independent of time. It says both that you always have existed and that you always will.

Young children seem to believe this instinctively. A Pythagorean belief in metempsychosis is as natural as primitive animism.

When I was a child my sister and I would address one another at the breakfast table: “When I was a bird, I used to go like this [making swooping motions with our forks].” — Of course isn’t that a peculiar use of “when”? It seems to point not so much to past or future as to some location elsewhere in the manifold of possibility; somewhere sideways in time.

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Meno postscript

The traditional conception of the immortality of the soul is one of an extended life: this world, *and then* the next; the linear continuation of personal identity by the accretion of memories, an uninterrupted thread. This seems strangely limited. One could attempt instead to imagine higher forms of consciousness — suppose, for instance, that one began with the original thread, the life-line with its beginning and end, and extended it in another dimension,⁷ into a sort of ribbon; this might be a kind of extension into parallel worlds, but there could be other interpretations as well. — But more or less by definition this is beyond human comprehension.

Regarding it as Nietzsche did contemplating Goethe, a life taken as a whole might be regarded as a work of art — though if so one never completed but abandoned — as a kind of moment of apprehension in a larger consciousness, say; then one can ask, by analogy, what might *follow* that, and it would look more like a variation, an imitation, perhaps, or an annotated commentary, or an answer to the question “how else might it have been done?”

It probably isn't an accident that all this occurs to me while listening to Gould play the Eroica Variations.

⁷ J.W. Dunne proposed a similar idea in *An Experiment With Time* [London: A & C Black, 1929], as a means of “explaining” the phenomenon, if it is one, of precognitive dreaming. For a while I took his stories seriously, but could never make sense of his explanation, which had something to do with his fascination with Minkowski space.