An Exploration of Perceived Time

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How, exactly, does time accelerate when you age?

1 Suppositions

We could guess that you experience time by comparing the passing moments to the sum of all the time you have experienced—in other words, someone who has lived for eight years will experience any given span at half the speed of someone who has lived for sixteen. More precisely, the rate at which time seems to pass would be proportional to the total amount of time perceived.

In order to formalize this, we define a few variables: let a denote actual time elapsed, in years (for convenience), and let p denote *perceived* time elapsed, in a special unit called "lifetimes." One lifetime is, at any given moment in someone's life, equal to the amount of time they have lived. The crucial concept is that lifetimes appear to pass at an approximately constant rate, but are not one-for-one equal to the passage of actual time.

2 Calculations

At any given moment, the rate of change of actual time with respect to perceived time is

$$\frac{da}{dp} = a.$$

The units here should be interpreted as "years per lifetime." For example, when you are 12 years old, one lifetime for you is 12 years, and thus the instantaneous rate of change of actual time would be 12 years every lifetime.

This is a separable differential equation and may be solved for $a(p)$, yielding

$$\begin{aligned} \frac{da}{a} &= dp \\ \ln a &= p + c,\ a > 0 \\ a(p) &= e^{p+c} = Ae^p. \end{aligned}$$

Simple enough. But what is A?

The naïve solution would be to let $a(0) = 0$ and solve for A—start at the beginning of life with no perceived time elapsed. However, this yields

$$0 = Ae^0 \implies A = 0,\ a(p) = 0,$$

which is not a very interesting function. This result makes sense, however, as one lifetime would be equal to zero at that point, implying that $a'(p)$ would also be zero and time would stand still. Since time obviously does pass subjectively, we are instead left with a different question: when do we first think about the passage of time?

In most children, "tomorrow" is seen as different from "an hour from now" or "a year from now" around four or five years of age. Since our model is based on conscious comparison of the passage of time to all time experienced, this seems like a fine place to start our count. To allow for the fact that the time before that age is at least partially remembered, we will say that the model starts at one lifetime elapsed. We now have $a(1) = 5$ as our initial condition, yielding

$$\begin{aligned} 5 &= Ae^1 = Ae \\ A &= \frac{5}{e}, \text{ so} \\ a(p) &= \frac{5}{e}e^p,\ p \geq 1 \end{aligned}$$

We now have a function. I do not find this form of $a(p)$ particularly illuminating, however, and so opt to write it as

$$a(p) = 5e^{p-1},\ p \geq 1.$$

3 Implications

Now that we have a formula, we may compute some landmarks of interest.

3.1 Ages for Integer p

Since $a(0)$ is not defined, the integer values of p and corresponding values of $a(p)$ one could reasonably be expected to experience are

$$\begin{aligned} a(1) &= 5 \\ a(2) &\approx 14 \\ a(3) &\approx 37 \\ a(4) &\approx 100. \end{aligned}$$

There is, perhaps, some mysterious sense to these ages. I could see an argument that the life experience accumulated from ages 5 to 14 about equals, in impact, that accumulated from 14 to 37 or 37 to 100. They also appear to approximately bookend infancy, childhood, and two parts of maturity.

Around age 5 is also where we first understand the finality of death. This is not surprising: we're one lifetime in.

3.2 Middle Age

From the values above, perceived middle age would seem to occur around age 14, as four lifespans is about as much as anyone could expect to live and 14 is right in the middle of that. However, the first lifespan in the model does not have *much* experience associated with it, and so 2.5 lifespans might be a more reasonable estimate of halfway through properly perceived time. This would place perceived middle age at

$$a(2.5) \approx 22.$$

Being 20 years old at the time of this writing, I will note that I feel as though the midpoint of my life is not far off, but I still have a comfortable amount of time left.

So what about so-called midlife crises, at actual (not perceived) middle age? The corresponding value of p for an age of 50 would be

$$\begin{aligned} 50 &= 5e^{t-1} \\ 10 &= e^{t-1} \\ t &= \ln 10 + 1 \\ &\approx 3.3, \end{aligned}$$

which is about 77% of the way through the three properly perceived lifespans. In other words, people may have a crisis around this age because they feel like their time is rapidly running out. The 53-year-old contributor to this document will confirm that this is an accurate description of said crisis.

4 Limitations

This model assumes that the perceived rate of the passage of time is related to what you compare the passing time with. Anything that alters that comparison will necessarily affect the model—perhaps not in the long run, but at least locally. You could focus your internal comparison on a shorter interval, perhaps through meditation, and thus manually slow down time. Certain drugs may have the same effect.

I also do not believe that this model is necessarily accurate on a second-by-second basis. I suspect that time actually passes at the same rate throughout life, and it is only *looking back* on everything that this model would come into play. I thus offer a word of caution to anyone reading this: though time may appear to accelerate, it does not necessarily do so.

But what do I know, anyway?