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**Could time go in a circle, so that we survive  
through our past lying also in our future?  
Transcript**

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## MORTAL QUESTIONS:

### Could time go in a circle, so that we survive through our past lying also in our future?

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#### The possibility in principle

We usually think of time as a straight line, but could time go round in a circle? How could that be imagined? Think of yourself as standing on an old-fashioned clock face at the position of 3 o'clock. 12 o'clock would then be behind you, and yet it would also lie in front of you. You could think of 12 o'clock as representing your birth. In that case, your birth would lie in two directions from you, both behind and in front. That would not mean that you had two births. There are not two 12 o'clocks on the clock face. It is merely that your birth lies in two directions, in the past, but also in the future. This would seem to guarantee life with no permanent end. On your deathbed, you could reflect that in due course, your birth, your one and only birth would be occurring.

That is what it would be like. But what on earth could induce anyone to think that it was actually the case? Suppose that there was only a finite number of distinguishable events in the history of the universe. We would then expect there to be a first event and a last event. But suppose further that every event seemed to have a preceding cause and a following effect, so that none looked like a first or a last event. Would that mean that time had gone in a circle? Not necessarily. An alternative conclusion would be that history was repeating itself exactly, and that exactly similar events were recurring in an exactly similar cycle. In that case, only the events would be coming back round in a circle. Time itself would still be a straight line, and the similar events would be happening again further along the line. If there was never a last event, the cycle of events would, presumably be repeating itself without end, an infinite number of times.

But some people would think even one exact repetition impossible. How, they would ask, could the events be different, if there was nothing to differentiate them, given that they were exactly alike? The obvious answer would be that the *time* was different. Some would ask, how could the time be different, if there was nothing to differentiate the time, given that it was characterised by exactly similar events? But others would say that times can be different, even if there is nothing further to differentiate them. I am inclined to agree with that, and consequently so far, I do not see a reason to say that time itself, as opposed to the events, was forming a circle.

On the other hand, presumably, if events were happening again in exactly the same way as before, that could not be a mere coincidence, especially, if they happened in an exactly similar way an infinite number of times. In that case, something must be *forcing* them to recur in exactly the same way. What then if we found good evidence that there was no forcing, because there were quantum jumps which were not necessitated by anything? This is in fact the view of quantum physics. Nothing makes it inevitable that a small lump of radio-active material will emit radiation in the next 60 seconds. If it does, that is undetermined, and not inevitable. We should need to be sure that there were no other sources of necessity, for example that God was not constrained to make history recur in exactly the same way, because his good nature did not allow him to accept anything less than the best possible history. If we had good reason to believe that no necessity was operating, we could not stomach the consequence that history was by mere chance repeating itself exactly again and again. Now we should need another hypothesis. And this is where circular time would come in.

The situation now would be that there is no first event lacking a predecessor, nor a last event lacking a successor. Yet this is not because history is repeating itself infinitely many times, nor because there is an infinite number of distinguishable events - we started by postulating a finite number. With infinity of either kind ruled out, we need a different explanation of there being no first event or last. The best explanation would be that time was circular. A circle of time would contain no first time and no last time, and that would now be the best explanation of there Professor Richard Sorabji being no first or last event, despite the series of events being finite. A large circle of millions of years would be the least problematic, as we shall see. Although we should die, we should also be able always to have our birth in the future.

Every event in circular time, including your birth, would be both past and future. Does that make a nonsense of the distinction between past and future? No, if you sail around the globe, starting from London, although you leave London behind, London will always be ahead of you also. And circular time would be like spherical space in this regard.

But do not the notions of past and future refer to the direction of time from past to future, and would there be any direction, if all

events lie equally in the past and future? Yes, there would still be one single direction, because for any three events there would be a particular order in which they could be reached. If a tree is planted, sprouts and gives shade, all three events are equally past and future, yet from the planting, the shading can only be *reached via* the sprouting. You cannot *reach* these events in a different order, such as planting, then shading, then sprouting. Reaching is a mobile notion, unlike the static notion of lying. All events *lie* equally in the past and future. To bring out the directionality, we need to appeal to *reaching*. (Some people appeal instead to one-way processes like entropy, but I do not believe that that helps).

There would also be a set order of explanation. The planting would be needed for the shading, *because* it was needed for the sprouting. Explanation would also retain its directionality.

### **Our actual situation**

So far I have only said that the universe might have been so constructed as to allow time to be circular. But is there any chance that the actual universe we live in really is like this? The great mathematician Goedel thought so. Relativity theory implies, he said, that if one could reach a high enough velocity in a space rocket and if the matter in the universe is distributed in a certain way, then as a space traveller you would loop back in your personal time to the past long before your birth. In that case, your birth would lie in your personal future, so that we should have the same result that you could look forward to your birth always being in your future. Goedel's case is different from the one I have described, in that, following Relativity theory; he is talking of your personal time. Those not in the space rocket with you would have a different time, and their time would not loop. It would be best if you jumped in a discontinuous or incommensurable leap backwards in personal time. If instead your personal time in the space rocket slid smoothly backwards, we would get the funny situation that when in your space rocket you had been gliding backwards for five minutes of your personal time, you would also be on the ground five minutes before launch. We should have to wonder whether there would be enough atoms to make up both of you, the one still on the ground and the one already aloft.

But what about the shared time of those of us who do not travel at these velocities in space rockets? Does modern physics rule out the possibility of our time being circular, with its theory that everything started from a big bang? Why should it rule out circularity? For modern physics admits that it has nothing to say about whether anything occurred before the big bang. That bang might merely have been the most recent bang in an alternating series of explosions and implosions. Such a universe, though the merest speculation, has been called a ping-pong universe. Could not a ping-pong universe form a great circle of time punctuated by pings and pongs, none of them looking like the first or last?

With any universe in circular time, the physics would need to be different, because everything that was done in the past would need to be undone in time for it to be done in the future. Your atoms, scattered at your one and only death, would need to be assembled in time for your one and only birth. That should not be difficult, given a large circle of time. But the case of a ping-pong circle would create a special difficulty. No atoms survive in the intense chaos of a big bang. Since you have only one birth in circular time, your future birth needs the very same atoms as it needed before. But after a big bang, your atoms could only be re-identified as similar atoms, similarly placed, not as the very same atoms. There would be no independent way of establishing more than exact similarity. There is a tension here between the needs of the circular hypothesis, that only one set of atoms can be involved in your one and only birth, and the lack of any independent way of giving sense to the idea that the very same atoms have survived through a big bang. Does this mean that after all, although time might have been circular, the big bang has in fact ruled this out? Or could the case for time being circular give sense on its own to the claim that the very same atoms were in play, despite the senselessness of the idea of tracing them through a big bang? I am supposing that the situation might be best described in terms of the very same atoms, despite the atoms not being traceable in principle.

### **The crazy 40-year circle**

But now I want to introduce a complication. Can we imagine a small time-circle, say, one of 40 years? We know that we are not living in a universe with a 40-year time circle, but would such a universe even be possible in principle? Now, if you died at age 39, you would only need to wait one year in order to be born. Or you could last all 40 years, if you dwindled down into the very seeds from which you were born. This would fulfil the prediction of the Pre-Socratic philosopher, Alcmaeon, that we should be immortal, if we could join our beginning to our end.

This already shows that the physics of a 40-year cycle would need to be very different if everything done was to be undone in time for its future doing. You could also kill your parents, but they would need to be resuscitated in time to give birth to you.

There might seem to be a new danger, that in a 40-year cycle, an event might cause itself, either causally explaining itself, or

causally guaranteeing itself, or being a causally necessary prerequisite for itself. Suppose I plant a tree, and that helps to bring about the shade in my house. Might the shade motivate me to do the planting? And in that case would not the planting *indirectly* have caused the shading? I think not. Certainly, it does not *follow* that if, A (planting) explains B (shading), and B (shading) explains C (planting), A (planting) has to explain C (planting). We should need in the new situation to treat causal guarantees and causal prerequisites in the same way as we treat explanations, and be ready just to refuse to allow that an event is ever causally related to itself.

But what would the psychological demands of a 40-year cycle be like? You need not worry that it would be tedious to live the same life over again almost at once, because you would not be living it again. In a time-circle, you live only once, even though your life is both past and future. It might be tedious, if you were born with memory of your life, and not only tedious, but also a source of terror and guilt at what you knew was going to happen. It would also interfere with deliberation, if you already knew the outcome. Even stranger, if when planting a tree, you remembered planting it, then presumably you could in principle remember remembering. But all these ills could be cured at one blow, if we assume that birth wipes out memory, just as we silently assumed this in the case of a long time-circle, or at least that it wipes out most memory. The long and the short circle are not in principle different in this regard.

One psychological demand would be severe, if you realised that time was circular and that all progress would be undone. This is what St Augustine thought revolting about the different hypothesis that history will repeat itself exactly. Christ's crucifixion and attempt to redeem us would then have been pointless. In circular time too, we should have to accept, if we understood our situation, that any achievement would be undone. The best psychological attitude for coping with this would be to try to enjoy the *process* of bringing something about and not set our hearts on the *outcome* of the process. This was recommended in any case by the ancient Stoics and Epicureans, who told you to live in the present, not in the future. The unending future offered by this short circle would, if recognised, call for a lot of psychological adjustment.

But now let me imagine something even stranger. Suppose that you neither died, nor dwindled, after 40 years of the 40-year circle. We should now have to distinguish your personal time from the universal time of 40 years. You could last to a personal age of 50 years, provided that you moved out of the way to make room for your younger self to be born, and provided you shed the particles making up your body in time for your younger self to pick them up. Buildings could not have a personal time of more than 40 years, because they cannot move out of the way of each other and transfer their particles. You and your baby self could converse with each other, and we should have to extend our concept of a person to allow that the same person could be in two bodies and in two different states of mind at the same time, even though the older body was continuous with the baby body. By 'continuous' I mean that if a team of detectives had followed the body of the baby from infancy, later members of the team would find that they finished up dogging the footsteps of the older you. You would now have more than one vantage point simultaneously both on the external world and on yourself. And in your two minds you would see your baby self and your older self both from the inside and from the outside. You could also remember your younger vantage point. The possibility mentioned before of killing your parent could now be extended. The older self could kill the younger, provided that the younger was resuscitated in time to be the killer. The world would be the richer, because it would contain juxtaposed developments which went beyond the first 40 years of your personal time. The world would be richer still, if you lived to 90 years of personal time. Then there could be three juxtaposed selves. Whenever you died there would be at least one self surviving and possibly more.

### **Irrevocability and inevitability**

But circular time does not require anything as complicated as a 40-year circle, much less a 40-year circle in which people live to a personal time of 50 years. So the idea of circular time does not stand and fall with these possibilities. I want to finish by looking at two further questions. I said that in circular time the universe would need to be indeterministic. That is, the events in it should not have been inevitable all along. But since every event in circular time would be past, would not every event be irrevocable, and therefore inevitable? There is a counter-argument: since every event in circular time would be future, would it not remain for ever open what was going to happen? Which conclusion should we believe? The case for irrevocability says that if I consider planting a tree, in order to give shade to my house in the future, that future, in circular time, is also past, and so the shading or non-shading of my house is already irrevocable. So for that matter is the planting, or non-planting.

The shading would not be irrevocable, I believe, and I believe we can see this by considering what we mean by irrevocability. I believe irrevocability needs to be defined in terms of 'were' and 'would'. To say that the shading is irrevocable is to say that even if I *were* to refrain from planting, it *would* make no difference to my house having been shaded. But if that is what irrevocability means, it is not true that the past shading is irrevocable. For, if I *were* to refrain from planting, it might very well make a difference. My house might well not have been shaded.

There is another mistake that we must avoid. It concerns the difference between 'will not' and 'cannot'. If my house has already been shaded because of tomorrow's tree-planting, it follows that I *will not* refrain from planting. It does not follow that I *cannot* refrain from planting.

If we want to deploy the word 'cannot', we shall have to deploy it at a different point in the sentence. It *cannot* be the case that my house has been shaded by my tomorrow's planting and that I refrain from planting tomorrow. But now we must guard against a further mistake. It concerns the difference between the impossibility of a certain combination, and the impossibility of refraining. What is impossible here is the *combination* of planting with refraining from planting, and it tells us nothing relevant that that *combination* is impossible. What has not been shown is that the *refraining* itself is impossible.

It may be wondered if there are other sources of inevitability. Certainly, we need not be bugged by some interfering memory that we did or didn't plant, which would inhibit our deliberating what to do. For as mentioned before, memories need not all be preserved. Nor need there be causes compelling us to plant. Causal factors will compel, if they are themselves irrevocable, and if furthermore they necessitate. I do not think that either is true of our case. I have just been claiming that things would not be irrevocable. I have also argued elsewhere that what is caused is not in every case necessitated.

### **Backwards Causation**

Let me come to my last subject. Circular time seems to have committed me to backwards causation. I could plant a tree tomorrow in order to shade my house yesterday. And backwards causation has been said to be impossible. The most powerful objection to backwards causation that I know is the 'sabotage' objection of Michael Dummett. But the objection is addressed to backwards causation in linear time and I believe it is inapplicable to circular. I have some additional doubts about it in any case, and I also have some qualifications to make to the claim that in circular time causation runs backwards.

In a way, causation in circular time is no more backwards than forwards, since the planting is past and the shading future as much as the other way round. In addition, as stated above, as between the three events of planting, sprouting and shading, the order of reaching and the order of explanation is in the usual direction. Nonetheless, let us consider the sabotage objection.

The sabotage objection is that after yesterday's shading, sabotage could have prevented tomorrow's planting, so (it is alleged) tomorrow's planting cannot be the cause. Why can it not be the cause? There have been several suggestions on this, but let me take the simplest two. Once the shading has happened, it is irrevocable, so the planting cannot be needed, as is shown by the fact that if we were to sabotage the planting, the shading would still have taken place. Alternatively, it will have been shown that the planting does not add to the probability of the shading.

To these two versions of the sabotage objection, there are several answers. First, as I have said, in circular time, the shading is not irrevocable, nor, to speak in terms of 'were' and 'would', can it be assumed that the shading *would* still have taken place, even if we *were* to sabotage planting. Actually, in circular time, nothing would *become* irrevocable: it would either be irrevocable or revocable at all times. I have argued for the latter.

But secondly, suppose that shading *would* still have taken place. This would not show that planting had not in fact been its cause, but only that planting was not a necessary prerequisite, because other causes of tree-shade would have been available in case of need, such as windblown seedlings, or underground suckers.

It would also show that planting does not increase the probability of tree-shade. But that can be freely admitted. The planting could still have been the cause, even if it made the shading *less* probable, as well it might, for the seedlings and suckers might be a more reliable method of securing tree-shade, and the planting might have been obstructing these more reliable methods.

There has been another reply to the sabotage objection, which does not, however, tempt me. It has been suggested that the sabotage of planting might turn out to be frustrated, however hard the saboteurs tried. Would that show that planting really was the cause? I am not tempted either by the reply that has been suggested to this reply, that it would rather show that the planting was the *effect* of the shading. Although the mechanism of such causation would be unfamiliar it has been said, at least the causation would be in the normal direction, from past to future.

This exchange seems to me mistaken. For one thing, in circular time, the frustration of sabotage would be no more forwards causation than backwards. Further, in circular time, even if yesterday's shading was causing tomorrow's planting, that would not, given the circularity, prevent tomorrow's planting *also* causing yesterday's shading. Indeed, that double direction of causation

might be confirmed. For if, in circular time, shading could not be sabotaged after planting any more easily than planting after shading, the failure of sabotage ought to show, if it shows anything at all, that each causes the other.

But does it show anything at all? The mechanism of such causation is admitted to be unfamiliar. And it would be even more unfamiliar, if there were, say, three possible causes of shading, namely planting, seedlings and suckers. By what possible mechanism could shading frustrate sabotage on all three causes, and guarantee that at least one of the three would occur? If that really happened, rather than conclude that shading was the cause, we might rather conclude that nature allowed such things as shading only when paired with a cause. And that conclusion would leave intact the claim that tomorrow's planting could cause yesterday's shading.

I do not think that circular time involves backwards causation of any unacceptable kind.

### **Conclusion concerning mortality**

I can now draw a conclusion about surviving death. I believe that circular time is in principle possible. There is no reason to assert, but also no way to deny that our universe, despite its inclusion of at least one big bang, might involve a huge circle of time. As we would have no knowledge of this, we cannot enjoy, if this is what we want, more than the possibility that our dying breath will not be our last. In principle it would have been possible for there to be a universe with a 40-year time cycle. In such a universe, we might dwindle and re-grow, rather than die, or be dead only very briefly. But it would be an extremely bizarre universe, and it would take much psychological *effort* to make it tolerable.

In the last two lectures I have surveyed some ways in which we might survive death. In the next, I shall ask whether it is irrational to be dismayed if we do not.