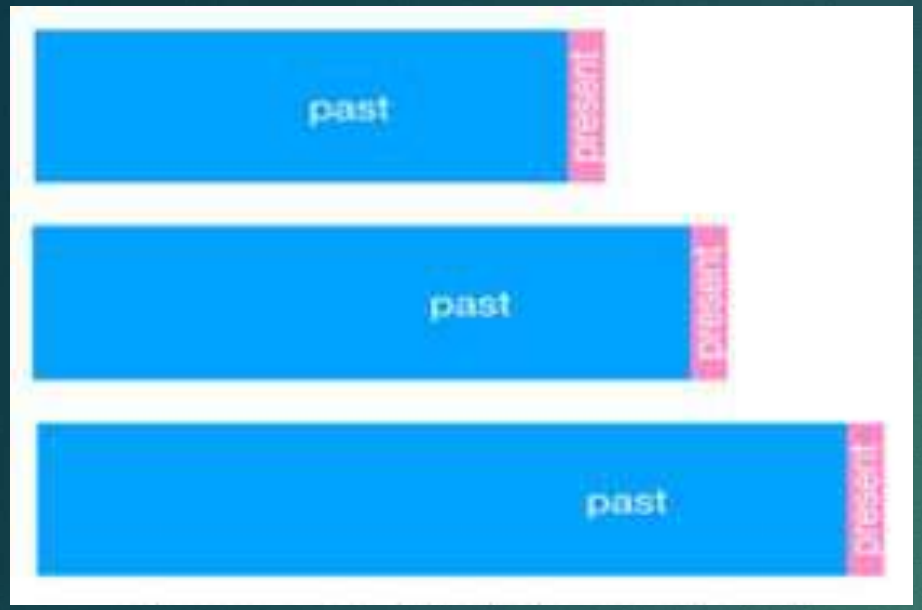
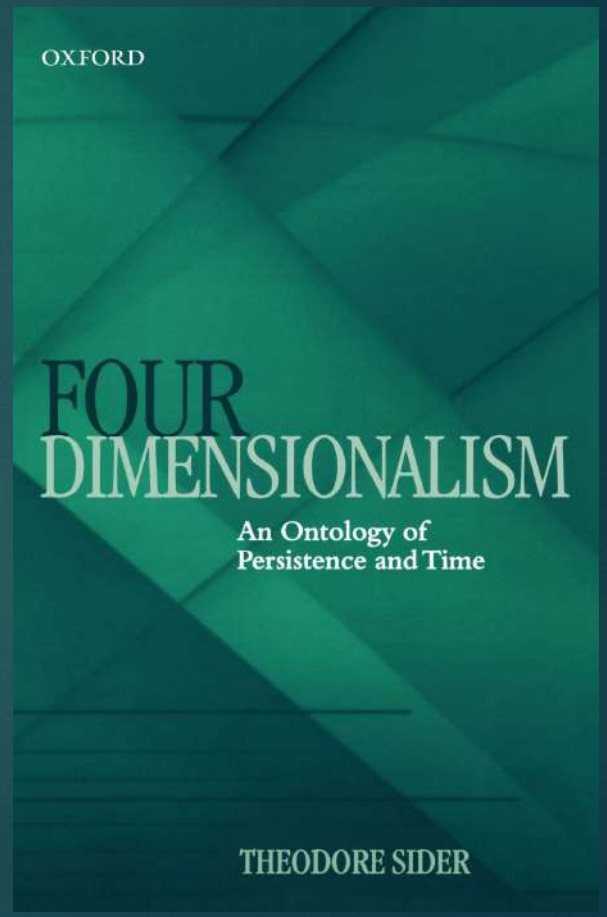


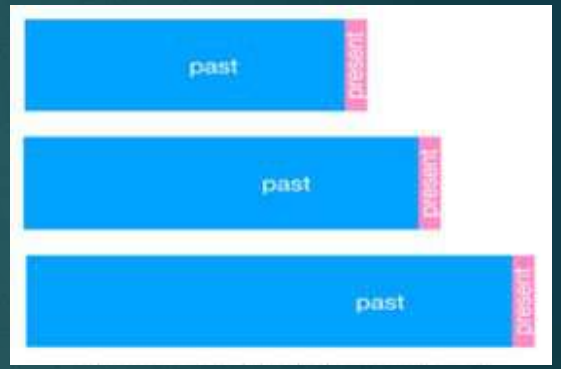
EXDURANTIST GROWING BLOCK THEORY – JAMIE TAYLOR

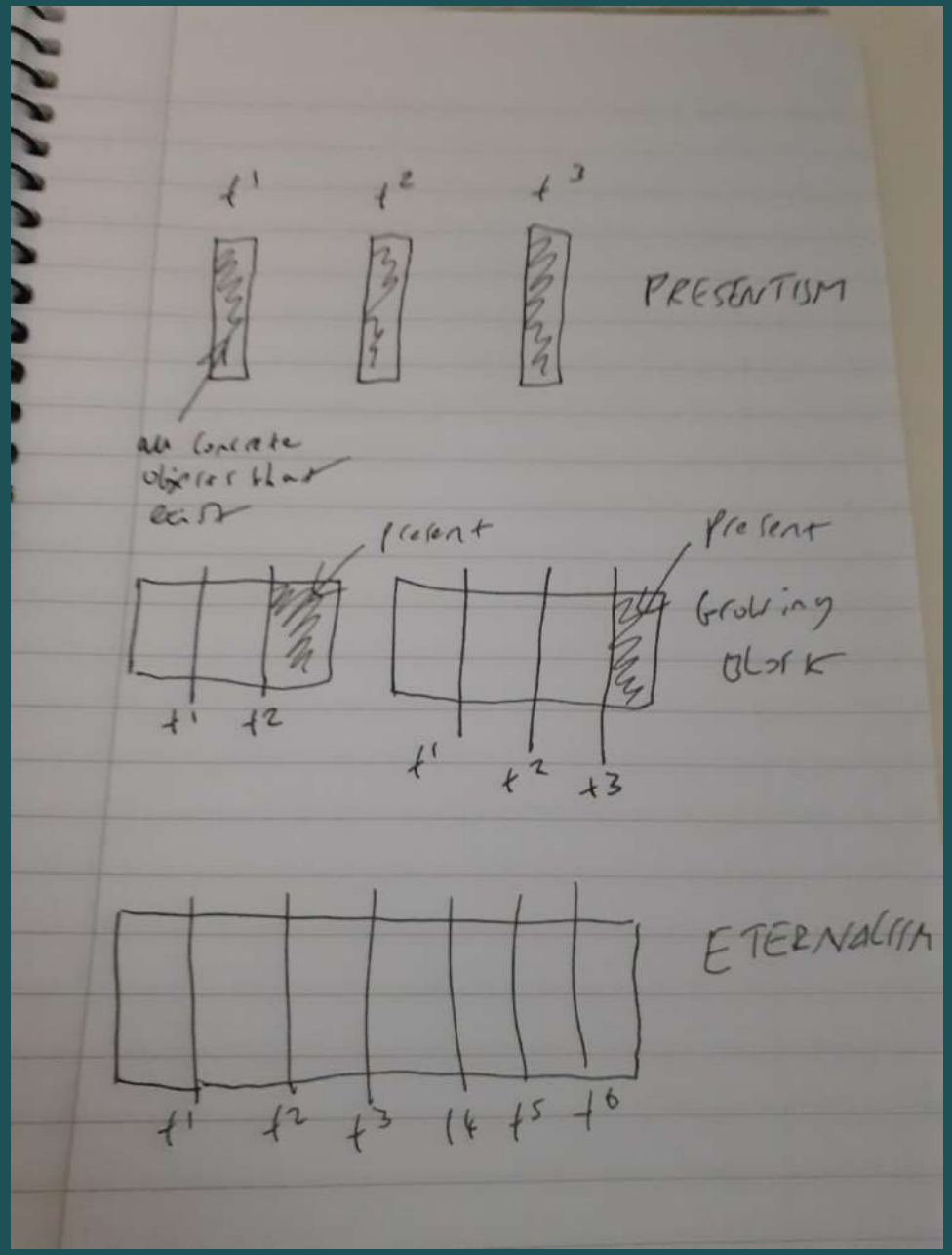


In this paper, I'm going to argue that there is strong motivation for four dimensionalists about persistence to embrace the growing block theory of time.

- In accepting GBT, the four dimensionalist will have an appealing account of change, in which an object can 'genuinely' change as it persists through time, in a more substantial way than merely having qualitatively different temporal parts at different times. That is, I propose that on four-dimensionalist GBT, change will involve the accumulation of new temporal parts as the block grows.

- I will then go onto show that four dimensionalist GBT is only plausible if one is an exdurantist – i.e. stage theorist - about persistence: that continuants are instantaneous stages, which are temporally counterpart related to stages at earlier/later times.

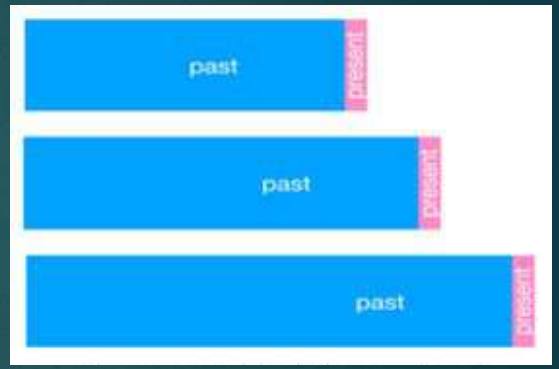



t1
t2
t3
PRESENTISM
present
present
Growing
Block
t1
t2
t3
t1
t2
t3
t4
t5
t6
ETERNALISM

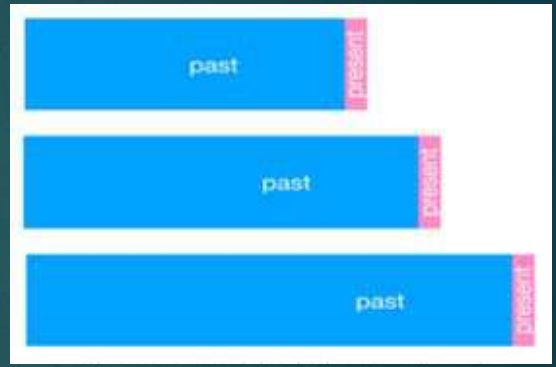
- According to the growing block theory (GBT) of time, past and present entities exist, but future ones do not. Reality consists of a continuously 'growing' block, where the sum of total what exists increases as the block grows. Things 'come into being' at the edge of the block, which is the present. And as the block grows, things in the present become part of the past.

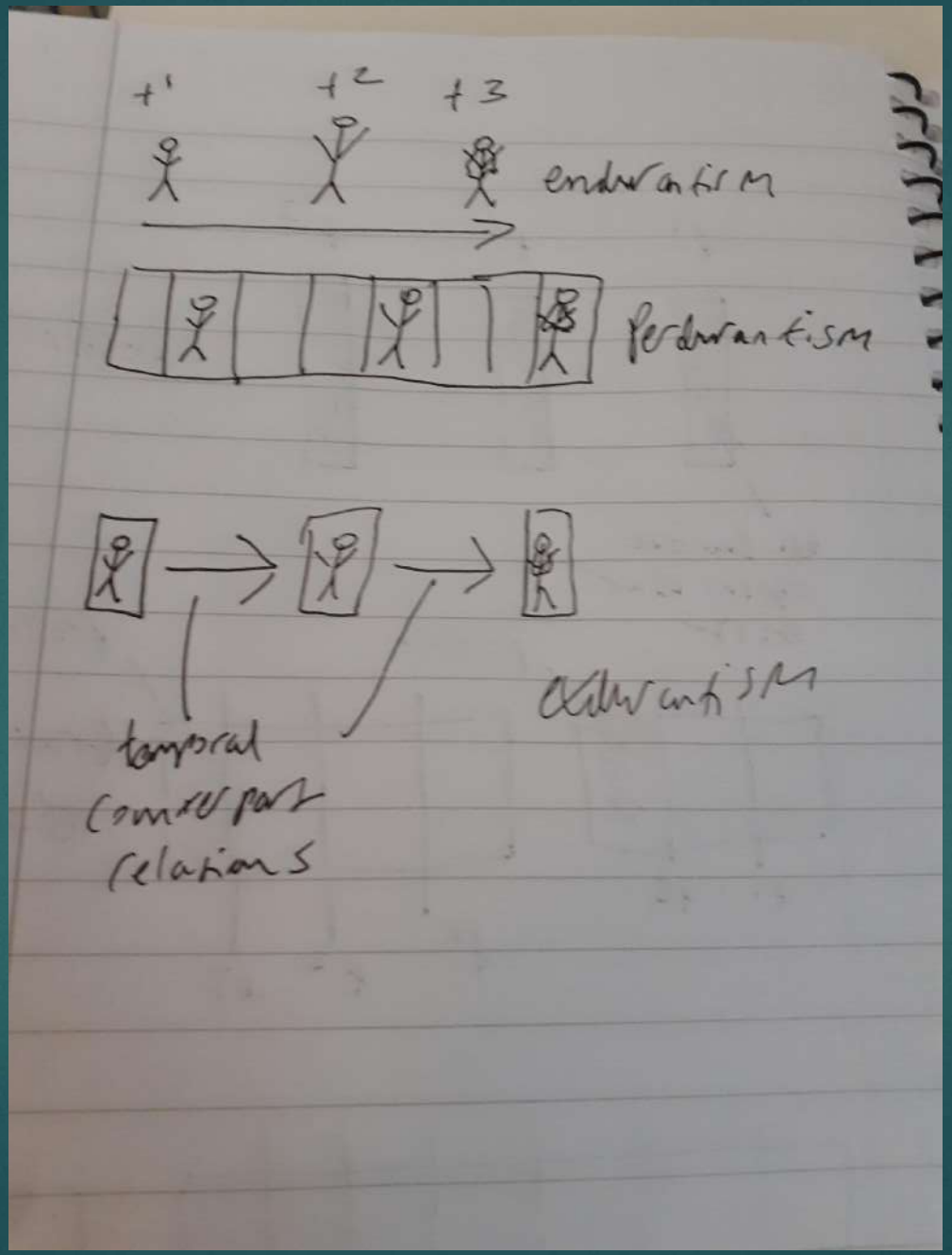
- GBT then shares features with both presentism and eternalism. Like presentism, GBT holds that there is an objective present, and what is present changes; like eternalism, it holds that past entities – once past - never change and will always remain in being.

- Given the asymmetry of its ontology, GBT seems to have a satisfying account of the – alleged - fixity of the past and openness of the future: the past is fixed because past entities exist, while the future is open because future entities do not.



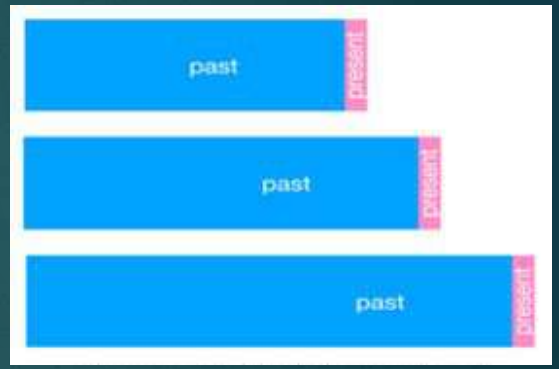
- I take four-dimensionalism to be thesis that objects possess temporal parts at every sub-unit of the unit of time they exist. Some object, *x*, is a temporal part of an object, *y*, at some interval of time *t* just in case that (i) *x* is part of *y*; (ii) *x* exists only during *t*; and (iii) *x* overlaps every part of *y* that exists at *t*. According to four-dimensionalists, objects persist by either possessing multiple temporal parts or standing in *temporal counterpart relations* to other temporal parts.
- There are two distinct varieties of four-dimensionalism: perdurantism (worm theory) and exdurantism (stage theory). Perdurantism is the thesis that objects persist by being a trans-temporal fusion of all their temporal parts/stages. Exdurantism, on the other hand, is the thesis that 'ordinary' objects are instantaneous stages which 'persist' through time by being temporally counterpart related to some other earlier/later stages.




t1
t2
t3
endurantism
perdurantism
temporal counterpart relations

- Before I go onto assess four-dimensionalist growing block theory, it is first necessary to examine the connection between GBT and the open future. Following work by Barnes and Cameron (2011), as well as Briggs and Forbes (2012), I understand the future as being open if and only if there are *at least some* propositions about the future which are *not yet determinately true or false*.

- Typically, GBT theorists accept that – it is at least metaphysically possible – the future is open, but it is possible that one could accept GBT while rejecting the open future. As Ross Cameron (2015, 194) notes, "The growing blocker is not even forced into saying the future is open in any sense whatsoever: she could hold, for example, that while there is no future ontology, there are brute facts about what will happen."

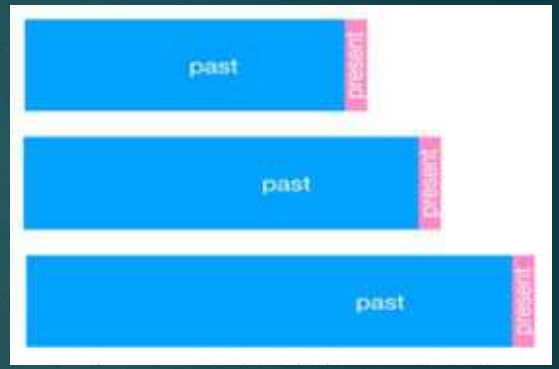


- I think can be shown is that such a version of GBT would be so unappealing nobody tempted by GBT would accept it. To begin with, the fact GBT that provides us with a satisfying account of the – alleged – fixity of the past and openness of the future, has been taken to be an important desiderata in its favour.

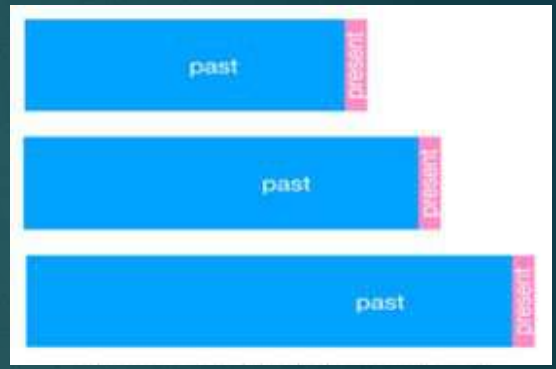
  - Such a version of GBT would be incompatible with the Indeterministic to Indeterminate (II) principle: $\exists w \neg((E \wedge L) \supset (\Delta[p] \vee \Delta\neg[p])) \supset \nabla[p]$

- (II) is very plausible if indeterminism and GBT is true; there are plausibly propositions about the future which are not yet determinately true.

  - Rejecting (II) would also undermine GBT's account of truthmaking as there would be either brute future truths or a presentist friendly account of truthmaking would be needed to account for certain future truths.

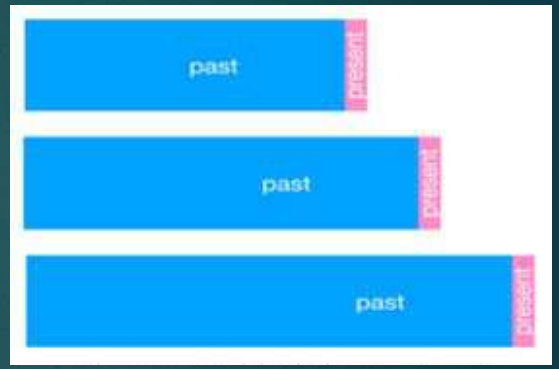


GBT four-dimensionalists have an appealing an account of change, in which – like their eternalist cohorts – their account of change enables them to give a satisfying solution to the problem of temporary intrinsics, but – unlike their eternalist cohorts - this account of change allows an object to change its properties in a more substantial way than merely having qualitatively different temporal parts. For many opponents of four-dimensionalism reject it because they hold that there is more to an object changing its properties than this. By accepting GBT, a four-dimensionalist can hold that objects change in a more substantial way than how there can be spatial variation in an object. Change doesn't just involve an object having a variation of temporal parts but involves the *accumulation of new qualitatively different temporal parts*.



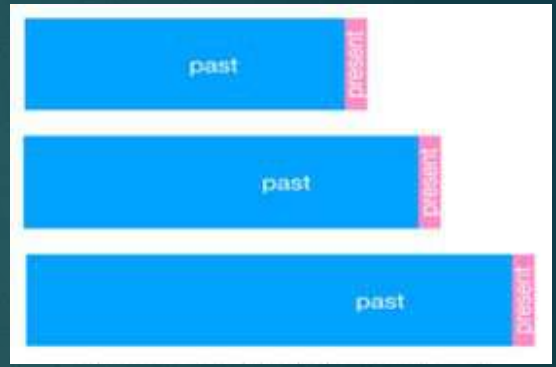
Perdurantist GBT:

- If I am a perdurantist, to say I was once five-feet tall is to hold that I have a temporal part which is five-feet tall in the past, and to say that *I am* six-feet tall is to hold that I have a temporal part which is six-feet tall in the present. Both the eternalist perdurantist and the GBT perdurantist can agree on this.
- But what the perdurantist growing blocker *can also say* is that 'I was five-feet tall' is a tensed truth of the world, because the temporal part of me which is five-feet tall *was once present*, and at that point in the block's history I did not have any temporal part which is six-feet tall. But now that I do have such a temporal part, in the present, it is now a tensed truth of the world that *I am six-feet tall*. I have changed because I have gained 'new' temporal parts which are qualitatively different than those which already exist in the block.



Exdurantist GBT:

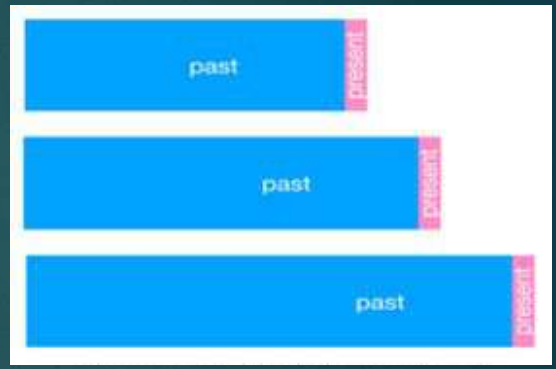
- If I am an exdurantist, to say that I was once five-feet tall is to hold that I am some instantaneous stage which bears a temporal counterpart relation to some instantaneous stage in the past which is five-feet tall, and to say that *I am* six-feet tall is to hold that the stage I am *is six-feet tall*.
- But what the exdurantist growing blocker *can also say* is that is that 'I was five-feet tall' is a tensed truth of the world, because the stage that I am is temporally counterpart related to a stage which is five-feet tall *which was once present*. And it is now a tensed truth of the world that I am six-feet tall, *simpliciter*, because the stage I am is six-feet tall and *is present*. I have changed because the five-foot stage I am temporally counterpart related to is no longer present, but the stage I am now is, and that stage is qualitatively different from that earlier stage.



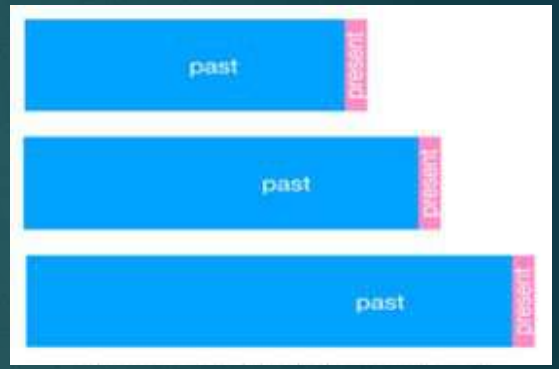
Objection: Some four-dimensionalists might be four-dimensionalists because they are B-theorists, and therefore to make sense of an object changing in a eternalist world – while dealing with the problem of temporary intrinsics – we need to hold that objects have temporal parts. 'Substantial' change in an object is impossible, which is why we need temporal parts.

Response: I concede, if a four-dimensionalist is utterly convinced that eternalism is the correct theory of time, they are not likely to be swayed by my argument. However, there is still strong motivation to accept four-dimensionalism even if one is not inclined towards eternalism. Such as…

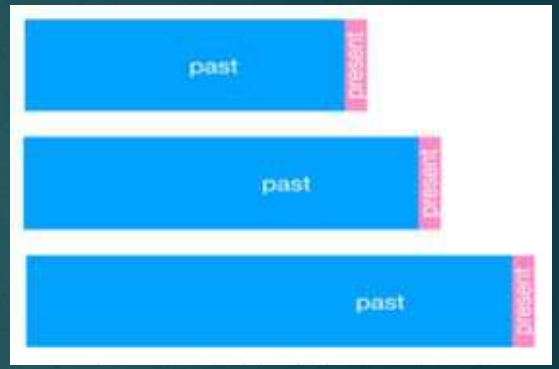
- The Argument from Vagueness
- Puzzles of Persistence such as Tibbles the Cat



It is clear that by embracing GBT, the four-dimensionalist would have an appealing account of change, which is more substantial than merely having qualitatively different temporal parts. Both perdurantists and exdurantists who accept GBT can hold change involves the accumulation of new temporal parts, and that material objects can have their monadic properties *simpliciter* by them having – or being identical to – some present temporal part. There is strong motivation, then, for four-dimensionalists of both stripes to accept GBT. But is GBT compatible with four-dimensionalism? I'm going to argue that the answer will be no, if one is a perdurantist, but yes, if one is an exdurantist.



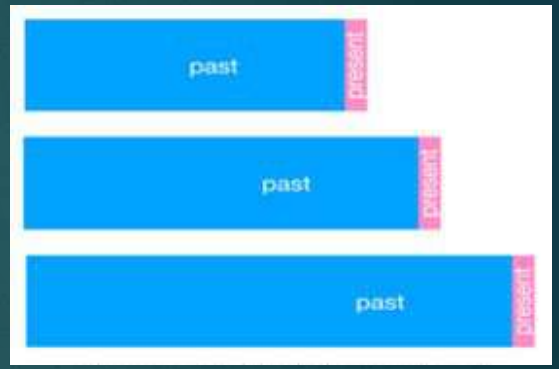
So let us now turn to my case against perdurantist GBT. Perdurantists think we can give a determinate answer as to how many continuants there are in puzzle cases of coincidence and persistence. But in accepting GBT, it will turn out that perdurantists will often not be able to give a determinate answer as to how many continuants there are. It will be *ontically vague* as to how many continuants there are.

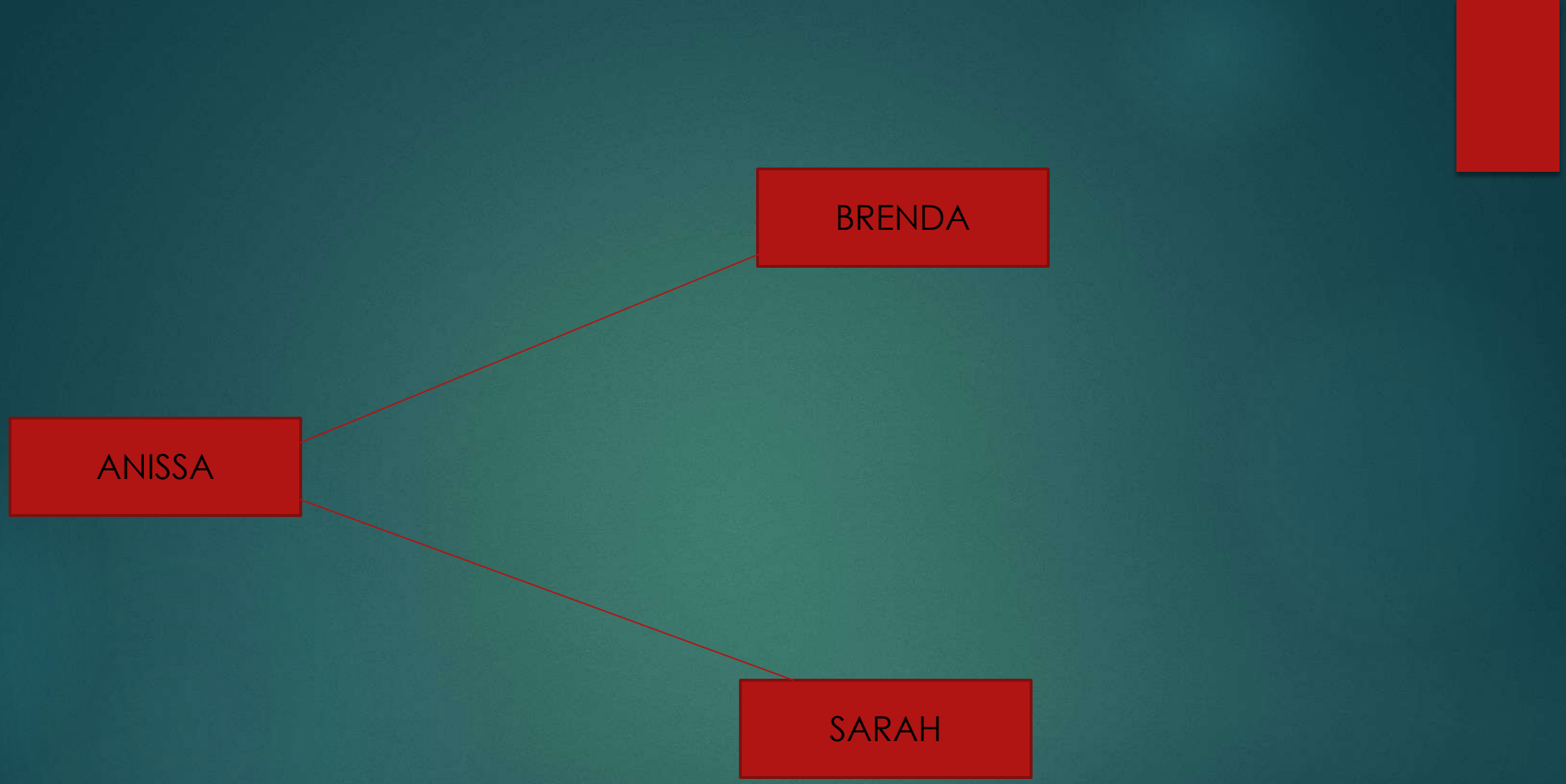



KANT

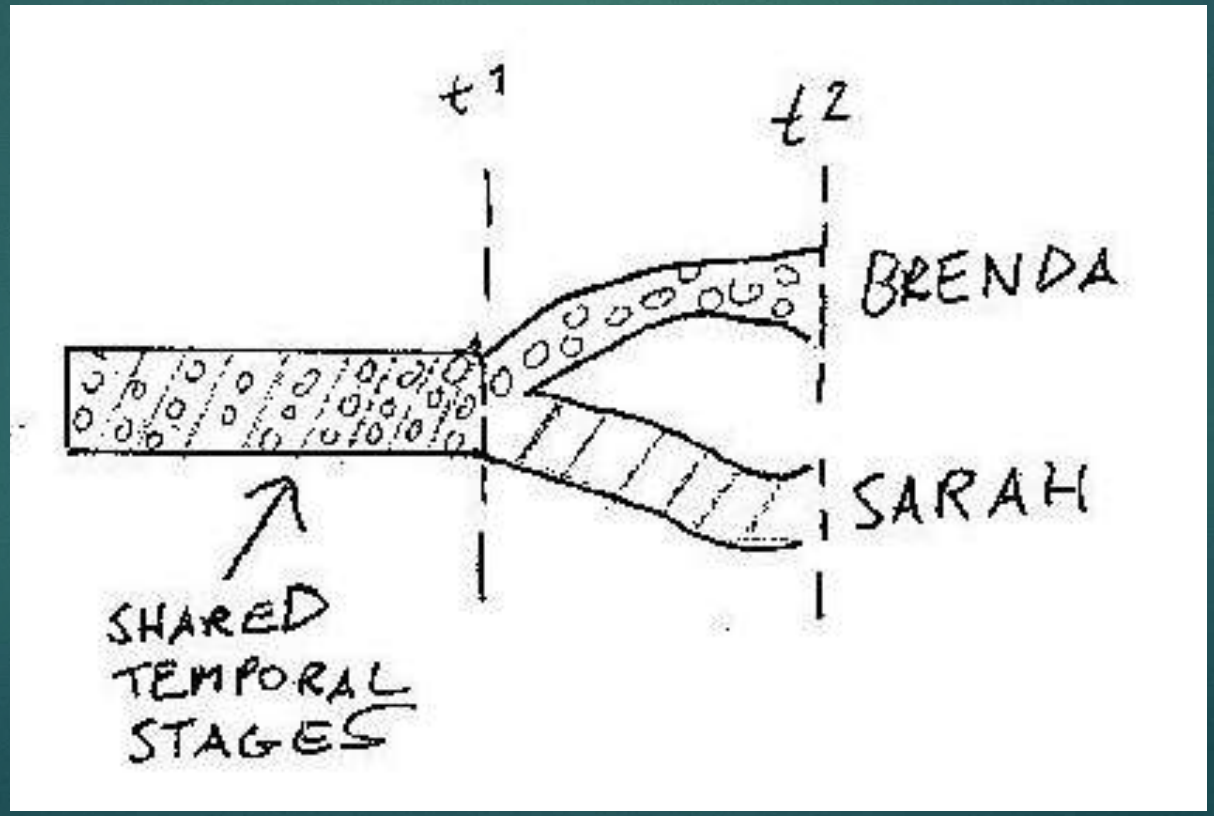
According to Perdurantists, whether the statue of Kant and the lump of clay it is fashioned out of are the same object or not will depend on whether they have the same temporal parts throughout their history or not.

Problem: If GBT is true, however, a perdurantist may well be unable to give a determinate answer to the question of how many objects there are in this puzzle case. For if both the lump and statue came into being at the same time, then whether they are the same object or not will depend on the occurrence of some future event when the block has grown further enough along. Therefore, it will be *metaphysically indeterminate* as to how many objects there are.



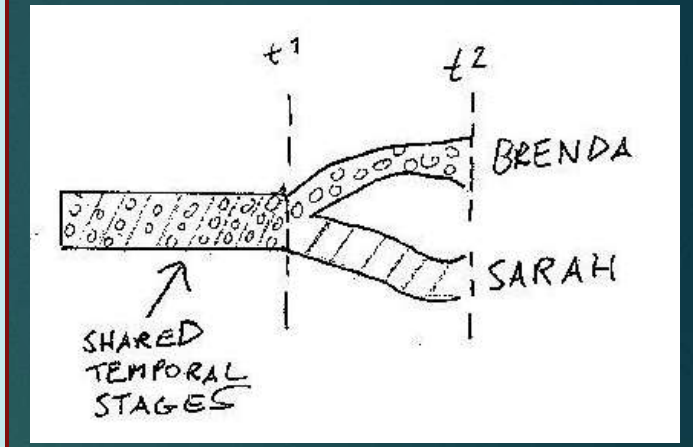

BRENDA
ANISSA
SARAH

The perdurantist, however, thinks they can solve the problem of fission by holding that Brenda and Sarah shared temporal parts prior to the fission taking place….

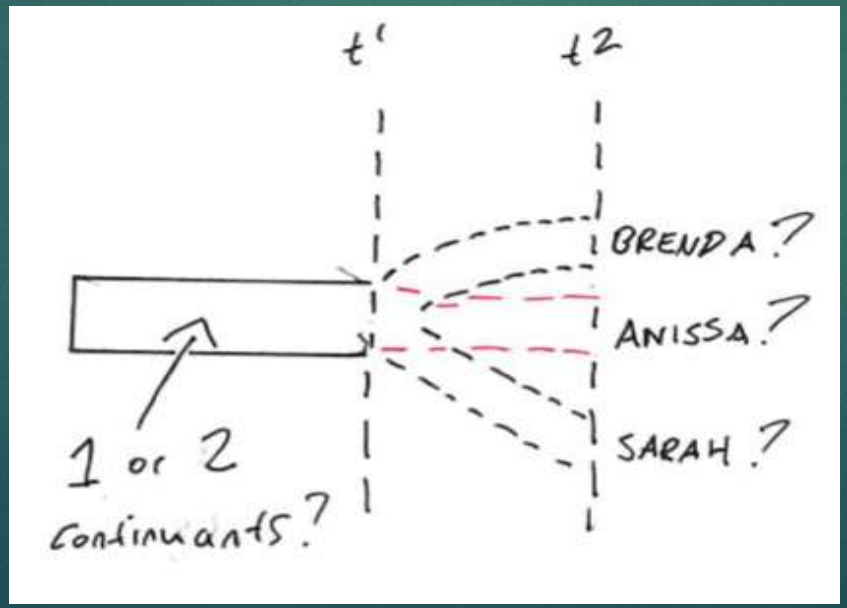


- Prior to the operation at *t1*, Brenda and Sarah 'share' their temporal parts. Any temporal part of Brenda prior to *t1* is also a temporal part of Sarah, and vice versa. The mistake we made, the perdurantist insists, is that we supposed that Brenda and Sarah did not exist prior to completion of the operation at *t2*, and that there was only one person prior to *t1*. We incorrectly supposed that one person – Anissa – became two people, when in reality there were *always two people all along*.

- According to David Lewis (1983, 60), persons are *maximal R-interrelated aggregates of person stages*. As the stages which we thought composed Anissa are not a maximal R-interrelated aggregate – given that 'Anissa' is a temporal part of both Sarah and Brenda – there never was a single person to begin with prior to the operation. Instead, there had always been two, which just happened to initially share their temporal stages. The stages which existed prior to *t1* are R-related to stages at *t2*, and both sets of stages are temporal parts of some continuant person, hence some person at *t1* will be identical to a later person at *t2*. Thus, identity *does matter* to a person undergoing fission.

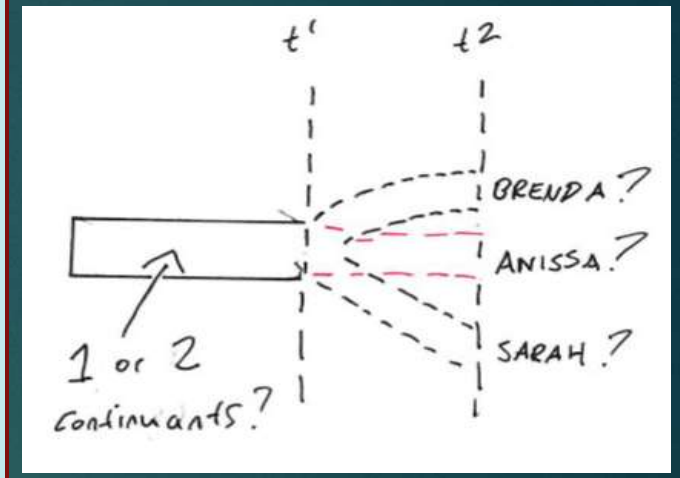


But what if the perdurantist accepts the growing block theory of time? Let us imagine that *t1* is the present moment, and the surgeon is just about to begin the operation. He is, however, having potential second thoughts about whether to go through with the operation, and is considering just letting Anissa go. If we assume the world they are in is indeterministic, there will be no fact of the matter yet as to whether the operation occurs. What does this mean, then, for Anissa, Sarah, and Brenda? Consider the figure below…



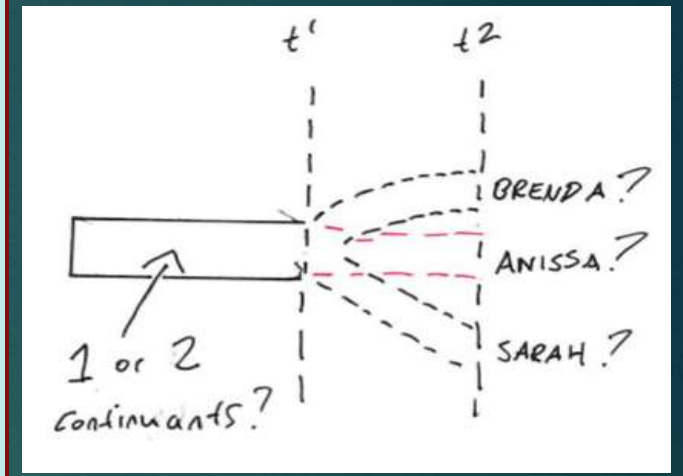
- Because when *t1* is present it is unclear whether the temporal stages belong to a single person or two, it is *metaphysically indeterminate* as to whether there are one or two persons prior to the operation. It is not yet determinate as to whether the temporal stages prior to *t1* belong to two distinct but overlapping persons – which depends on the operation going ahead – or if they only belong to only one. In accepting GBT, the perdurantist then would not be able to give us a determinate answer "how many people existed before the operation?" until after the operation is complete at *t2*. But this just looks bizarre.

- Now, Lewis (1983, 65) does say that it will be ambiguous prior to the fission as to whether – in thinking we were referring to a single person – we are referring to a person or a temporal part of two distinct persons; but this will be an *epistemic* ambiguity, not a metaphysical one. Surely there are a determinate number of people which exist prior to the operation, and why should the number of people prior to the operation be determined by a future event – the operation – which *does not even exist*.



- My concern here is not necessarily scepticism about whether there can be ontic vagueness in the world. Rather, it is that much of the appeal behind the perdurantist solution to fission cases was that they could provide a *determinate metaphysical answer* as to how many continuants there were. It is an important desiderata of any solution to fission cases that it should always be able to tell us how many people exist prior to the fission. If they accept the existence of future entities, the perdurantist is always capable of telling us how many there are, but this is not so if – given GBT – they reject the existence of future entities.

- Furthermore, the GBT perdurantist now seems to have a theory of personal identity which is in conflict with the notion that the existence or non-existence of a present object should not be dependent on the *non-existence* of a future event/object. By accepting future entities, the (eternalist) perdurantist avoids this problem by holding it was always determinately the case Anissa did or did not exist. But if – per GBT - it's indeterminate at *t1* as to whether she exists, then whether she *currently exists* will depend on the existence of some future entities extrinsic to her: Brenda and Sarah. And this just looks bizarre. How can whether a person currently exists depend on some future objects, extrinsic to them?

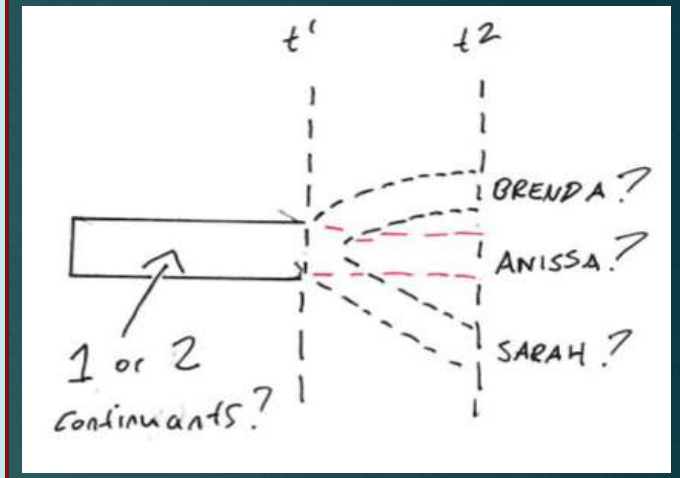


- **Reply One:** The GBT perdurantist could just abandon the idea that persons are maximal R-interrelated aggregates of person stages. This would allow us to say there is a determinate person prior to t1, even though it's not determinate as whether that person – Anissa – is a temporal part of any other persons - i.e. Brenda and Sarah.

- **Problem 1:** Still means a perdurantist can't give a determinate answer to how many people there are in fission cases.

- **Problem 2:** Violates the 'only x and y' principle as it makes the existence of Anissa, Sarah, and Brenda contingent on there *not being any stages of some other person*.

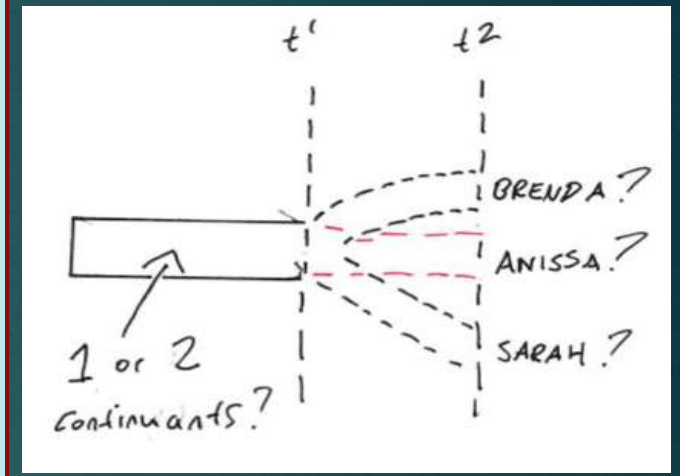
- **Problem 3:** This solution would do nothing to help the GBT perdurantist overcome their issues with the statue and lump puzzle case.



Reply Two: The GBT perdurantist could argue that the number of continuants there are 'at a time' can change as the block grows. That is, the growth of the block can literally bring about a change in what is true of the past.

- Imagine then when *t1* is present, the Kant statue and the lump come into being. As the statue and lump share all the same temporal parts, the GBT perdurantist will identify the two as the same object. But suppose at *t2*, the statue is smashed and the lump is rearranged to constitute a new statue. According to the GBT perdurantist, the statue and lump should now be recognised as having been distinct objects all along, and it is now true of the past time *t1* that there are two continuants – and not one – where earlier in the block's history there was one.

- As for fission, when *t1* is present, there is a single continuant Anissa, as she is not a proper part of any other person(s). However, when *t2* becomes present and the fission occurs, the GBT perdurantist will now state there have been *two continuants all along*, as the person stage at *t1* – Anissa – is a proper part of two persons: Brenda and Sarah. It is now true of *t1* there were two continuants there, even though earlier in the block's history there was only one. The lesson, then, the perdurantist will say we should take from this is that if GBT is true past truths about how many continuants there were can change.



- If this is the cure for perdurantist GBT, then I suspect it is worse than the illness. How can smashing a statue or performing a surgical operation on someone change the past? It seems somewhat incredible to believe that a contingent action I can perform in the future can change what is true of a past time in the block. Past entities and events in the block can be more no more affected by things in the present than I can causally influence things which are outside my light cone.

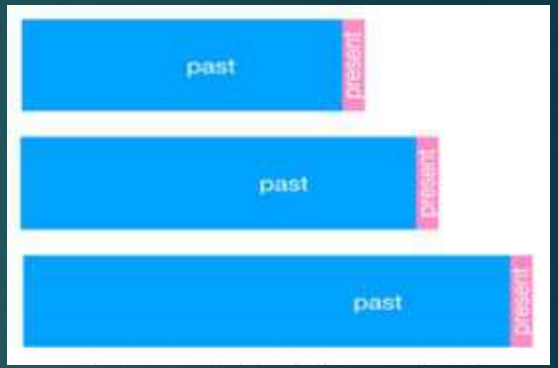
- Even if time travel is metaphysically possible, this surely doesn't seem to be a case of it. Performing a surgical operation or destroying statue does not look like a case of any entity travelling through time.

The 'Curious Case of Winston Churchill': It seems that how far certain objects and events are away from the edge of the block is something that is always changing. When the 24th January 1965 was present, the event of Winston Churchill's death was present at the edge of the block. But now that 2022 is the year present at the block's edge, his death is now fifty-seven years 'away from the edge of the block'. How far Churchill's death is away from the block is fact about a past time which is constantly changing.

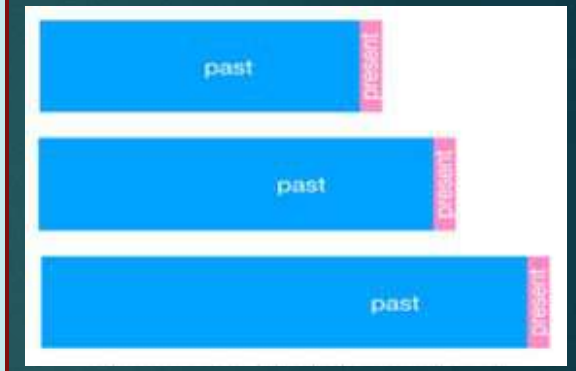
Reply: I do not think such a change, however, is analogous to a change in how many continuants there are at a time. For how far the time at which Churchill's death occurred is from the edge of the block is an *extrinsic* fact about the time his death is located at. How far a time is away from the present is a fact which supervenes on something which may be distinct to that particular time. The time at which Churchill's death occurred was once present, but it is an obvious consequence of GBT that as the block grows that time will cease to be present, and thus how far away it is from the present will continuously change. This does not seem true of continuants at a time. 'There are *n* continuants' appears to be an intrinsic property of a time. If there are two continuants at some spatial region at *t1* when that time is present, then there will be two continuants at that region when *t1* ceases to be present. That there can be extrinsic changes to past times in GBT does not, then, give us any motivation to think there can be *intrinsic* changes to past times in GBT.

Exdurantist Growing Block Theory: As exdurantists believe continuant objects are stages rather than worms they can give the same account of persistence regardless of whether they are eternalists or growing block theorists.

The Statue and the Lump: According to the exdurantist, given that ordinary continuants are stages, there is a single object here which is both the statue and the lump. If the matter it is constituted out of ceases to constitute a statue in the future, then it will be temporally counterpart related to a lump of clay which is not a statue (Sider 2001, 200). If GBT is true, the core of the exdurantists' account remains intact: there is a single continuant where the statue and lump are, and that continuant will be temporally counterpart related to an object which is both a statue and a lump, or is just a lump. The only difference is, that this stage will only become temporally counterpart related to the future lump stage when that stage 'comes into being' at the edge of the block. And the original stage, for instance, will have the property will gain the property of 'continuing to exist as a lump in the future' in-virtue-of now being lump counterpart related to the future lump stage.

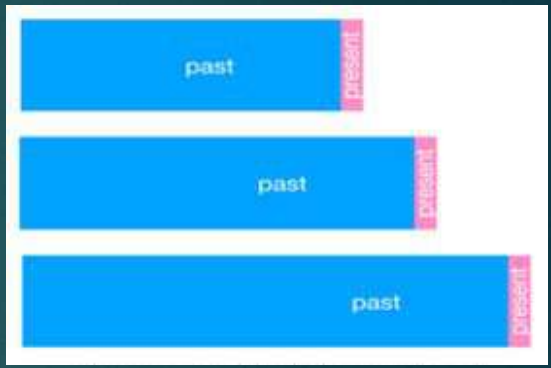


Fission: How many persons exist at *t1* according to the GBT exdurantist? It will be the same as the eternalist exdurantist: one, as there is still only one person stage at *t1*. And this stage *will be* person counterpart related to two future continuants if the operation occurs, but if it doesn't will only be person counterpart related to one future continuant. The only difference being the person stage at *t1* will only become temporally counterpart related to the future person stage/stages when they 'come into being' at the edge of the block. And if the operation occurs, the stage at *t1* will have the property of 'surviving as Brenda' and the property of 'surviving as Sarah', in-virtue-of being person counterpart related to these two future stages.

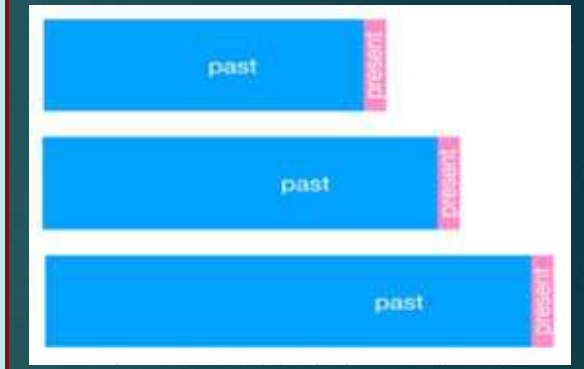


Objection: I imagine that someone might object to exdurantist GBT by arguing that it has the same problem as the GBT perdurantist's second reply: it involves changes occurring to past times on the block. For as we've seen, upon the fission occurring, the person stage, Anissa, will become temporal counterpart related to two future continuants, which it was not counterpart related to when *t1* was present. So, there has been a change to a past time in the block.

Reply: This change, however, will be an *extrinsic* change and not an intrinsic change, as none of Anissa's intrinsic properties are changed by Brenda and Sarah coming into being. Anissa becoming temporally counterpart related to Brenda and Sarah is an extrinsic change, and extrinsic changes are common and innocuous in GBT. If we think changes in how far a time is away from the edge of the block are innocuous, then changes in whether something is temporally counterpart related to a future continuant should also be considered innocuous.



Conclusion: In this paper, I initially argued four-dimensionalists should accept GBT over eternalism, as this would enable them to have an attractive account of change, which will involve the *accumulation of new temporal parts*. But, as we have seen, GBT and four-dimensionalism are compatible only if one is willing to be an exdurantist. For in accepting perdurantism and GBT results in the perdurantist often being unable to give a determinate answer to the question of how many continuants there are at a time. Exdurantism's account of how many continuants there at a time, though, is not undermined by them accepting GBT, given exdurantists hold that continuants are stages and not worms. Therefore, not only is there strong reason for four-dimensionalists to accept the growing block theory of the time, but in doing so they ought to be exdurantists.



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