

# Three-Dimensional Time vs. Immutable Past: A Comparative Analysis

*Figure 1: Conceptual illustration of a multi-dimensional time framework. In this view, time has multiple independent axes (analogous to width, height, depth in space), forming the fundamental "canvas" of reality, while physical space is like the paint on that canvas <sup>1</sup>.*

In recent theoretical work, physicists have proposed that time may have a *three-dimensional* structure, much like space does <sup>2</sup>. Instead of a single line progressing from past to future, time could span multiple orthogonal directions. This radical model, put forward by Dr. Gunther Kletetschka, treats time as the primary fabric of the universe, with space emerging as a secondary effect <sup>3</sup>. In contrast, John Rector's **Immutable Past Theory** offers a metaphysical perspective in which the past is absolutely fixed and unchangeable <sup>4</sup>. According to Rector, all of reality shares one singular historical timeline that cannot be altered, an idea he embeds in a broader cosmological framework. This comparative analysis examines how the three-dimensional time model aligns with or challenges the Immutable Past Theory, and explores the role of entropy (both as thermodynamic arrow and as information measure) in a multi-dimensional time context. Key recent insights from physics and cosmology – on temporal geometry, causality, time symmetry, and entropic processes – will be integrated to provide a comprehensive perspective.

## Three-Dimensional Time: A New Temporal Geometry

**Time as Three Axes:** The three-dimensional time proposal re-envision spacetime by giving time three independent axes of its own. In Kletetschka's framework, reality is described in **6 dimensions** total: three time dimensions and three space dimensions <sup>5</sup>. Crucially, time is the core structure in this model, essentially the "canvas" on which physics unfolds <sup>1</sup>. Space – with its familiar three dimensions – is not fundamental here; rather, space emerges as a *consequence* of the way time's three dimensions are oriented and scaled <sup>6</sup>. This marks a sharp departure from the standard 4D **spacetime** of Einstein, where one time and three space dimensions are merged. Instead, Kletetschka suggests time itself can be *multi-directional*: not a single forward-flowing line but a **multidimensional framework** with three orthogonal time directions <sup>2</sup>. By viewing time as 3D, he argues, one can naturally resolve multiple long-standing physics puzzles within one coherent mathematical structure <sup>2</sup> – notably including an explanation for particle properties like mass.

**Causality in a 3D Time World:** A major challenge in any model with more than one time dimension is preserving a consistent cause-and-effect ordering. In ordinary (1D) time, the "arrow of time" guarantees that causes precede effects; allowing additional time directions risks introducing loops or ambiguities (one could potentially go "sideways" or "backwards" in time and mess up chronological order). Earlier theoretical forays into multi-time geometry often ran into such *causality paradoxes*, where an effect could occur before its cause in one of the time dimensions <sup>7</sup>. Kletetschka's framework explicitly avoids this pitfall by imposing a strict structure on the temporal axes. All three time dimensions in his model share an ordered flow, such that events still unfold in a single consistent sequence across the combined timeline <sup>8</sup>. In other words, even though time has multiple axes mathematically, the theory's design ensures there is no actual violation

of causality – no event gets ahead of its cause <sup>8</sup> . (One way to imagine this is that the three time axes are intertwined in a fixed relationship, so you cannot arbitrarily rotate or swap “past” and “future” directions between them <sup>9</sup> .) Thanks to this constraint or “barrier” against rotating between time-axes, the model preserves a unique arrow of time despite the extra dimensions.

**Alternate Temporal Paths:** What does it *mean* physically to have more than one time direction? One intuitive way to picture it is to think of alternate timelines branching off from the same moment. For example, imagine walking along one timeline (one axis of time) and then stepping sideways onto a different time axis *while staying at the same moment of the original time* <sup>10</sup> . In a two-dimensional time plane, that sideways step would put you in a **different version of the same moment** – perhaps an alternate outcome of that day, coexisting at the same “time” but on a parallel temporal track <sup>10</sup> . Moving along this perpendicular time axis would let you explore how events might unfold differently *without* moving forward or backward in the usual sense <sup>10</sup> . A third time dimension, in this analogy, would represent the ability to transition between those different outcome paths <sup>11</sup> . This scenario sounds like a science-fiction multiverse, but it’s a rough illustration of the *degrees of freedom* multiple time dimensions offer. Importantly, Kletetschka’s theory doesn’t imply these alternate histories are easily accessible; rather, it provides the mathematical room for such variations while still anchoring them to one consistent reality. (In fact, other physicists like Itzhak Bars have speculated that extra time dimensions might become evident only in extreme conditions – e.g. at **high energies** in the early universe or particle collisions – effectively folding these alternate paths back into our experience under normal conditions <sup>12</sup> .)

**Toward Unification:** The motivation behind proposing a 3D time structure is not just philosophical; it’s driven by physical problems. Kletetschka’s 3D time model has shown remarkable success in reproducing known particle masses and other constants <sup>13</sup> <sup>14</sup> , suggesting it’s more than a mere abstract idea. By accurately outputting real-world values (where previous multi-time models remained untestable curiosities), this framework strengthens its case as a **candidate for new physics** <sup>14</sup> . The hope is that a time-centric 6D model could naturally unify quantum mechanics with gravity – a goal that has eluded physicists for generations <sup>15</sup> <sup>16</sup> . In conventional spacetime, time is just one dimension and gravity is understood geometrically (as curvature of 4D spacetime), whereas quantum theory treats time differently. By rethinking time as a multi-dimensional foundation, researchers like Kletetschka believe we might resolve inconsistencies and approach a *theory of everything* <sup>15</sup> <sup>16</sup> . This remains speculative but intriguing. If time truly has a richer geometric structure, it would revolutionize cosmology – implying that the universe’s initial conditions and evolution might be governed by a higher-dimensional temporal landscape than we ever imagined.

## John Rector’s Immutable Past Theory: One Fixed History

**Core Principle – A Single, Unchangeable Past:** The Immutable Past Theory, as articulated by John Rector, starts from one simple axiom: *the past is immutable*. In plain terms, whatever has happened is absolutely fixed and cannot be altered <sup>4</sup> . This leads to the immediate conclusion that there is only **one past** – a unique, universal history that everyone and everything shares <sup>4</sup> . We do not each have our own personal timeline or alternate histories; all events join into the one actualized timeline of the cosmos. Any notion of “changing the past” or branching into a different historical outcome is rejected outright, because by this axiom any change would contradict the existence of *the past* that already is. In logical terms, if the past could be different, it would no longer be *the past* – thus it’s a self-defeating premise <sup>17</sup> . Rector’s view aligns in spirit with the classic “block universe” idea in which the past is as solid as the present – except he places special emphasis on the past’s role as the **anchor of reality**.

**Metaphysical Framework:** While Kletetschka's 3D time is a proposal within physics, Rector's Immutable Past Theory is framed more as a philosophical or cosmological model (albeit one he correlates with physics analogies). He paints a picture of time where the **past and future interact** in a dynamic way, but without ever changing the past. One metaphor Rector uses is to describe the past as the "foreground" and the future as the "background," with the present being the interface where they meet <sup>18</sup>. We exist *at the cusp* of an unchangeable past and an unknown, malleable future. The past *flows into* the present providing definite reality, while the future approaches the present as a set of possibilities. This meeting point – the **now** – is where reality is actualized (the future's possibilities collapse into one outcome, which immediately joins the immutable past). In Rector's words, "the past is the foreground of the theory, while the future is the background. Where they meet is the present." <sup>18</sup>

Another distinctive aspect of Rector's framework is the idea that our **memories** and records are not just private or subjective; they are rooted in that one universal past. If there is only one past timeline, then when we remember an event, we are accessing *the* event in *the* past (as opposed to storing a separate copy in our brain that could diverge). This is more a philosophical stance, emphasizing the unity of history: "there are no individual pasts or multiple versions of history; there is only one, unalterable past that applies universally" <sup>19</sup>. In short, the past exists as a kind of cosmic archive that is shared by all, and it's eternally fixed.

**Geometry of Time – A Cosmic View:** Interestingly, Rector's immutable past concept does not dismiss the idea of multiple dimensions of time – he actually embraces a geometrical interpretation of time with potentially **many dimensions**, but with constraints. He suggests we can view time as a kind of complex plane or multi-dimensional construct, even if our human experience is one-dimensional <sup>20</sup>. In his model, the immutable past itself is like a singular point – he likens it to a *singularity at the origin* of a coordinate system <sup>21</sup>. He imagines a simple 2D time diagram (for visualization): let the x- and y-axes both represent time in different aspects. The origin (0,0) represents the completely immutable past – a point of absolute stillness and zero change. Humanity (and the present moment) is not located at this origin, but rather at a "safe distance" from it, say at (1,1) in that time-plane <sup>21</sup>. This distance is crucial because being too close to the immutable past (the origin) would mean experiencing no change or dynamism – essentially no life. At our position (1,1), we are far enough from the past's frozen singularity to have rich experiences, yet we are still being *pulled* toward that past.

What does it mean to move in this 2D time plane? According to Rector, *any* direction you move from (1,1) – whether it's directly "forward" (toward increasing x and y) or even backwards along one axis – still represents moving **through the future** toward the past <sup>20</sup>. The entire plane (except the origin) corresponds to the "unknown future," and the only fixed point is the past singularity. Thus, even if one were to try to go in a negative time direction in one coordinate, you'd still be traversing the *future* region in the other coordinate. In effect, **all paths lead into the future, which then converges into the past**. This clever construction means that in the Immutable Past Theory, time could have multiple dimensions or directions theoretically available, but none of those allow you to escape the fundamental arrow pointing from the unknown future into the fixed past <sup>20</sup>. The past remains "immutable" because no multi-dimensional detour can loop back and alter it – you are always moving through the future domain. This resonates with the earlier point that Kletetschka's model requires a constrained structure to prevent causal paradoxes: Rector's metaphysical picture achieves a similar result by design – the past is a singular boundary that cannot be re-entered or changed.

**The Past as Zero-Entropy State:** A key insight (and perhaps cosmological claim) in Rector's theory is that an immutable past has some physical-like attributes. He argues that since the past **never changes**, it experiences no motion, no dynamics. Consequently – drawing from thermodynamics – if nothing in the past changes, it has no effective temperature (motion and temperature are related), and thus **no entropy** <sup>22</sup>. In other words, the past “exists at 0 Kelvin” in an absolute sense <sup>22</sup>. This is a striking idea: the past is like a frozen block of zero entropy, a perfectly ordered state that provides an initial condition for the flow of time. (One is reminded of the idea in physics that the early universe started in a very low-entropy, highly ordered state – more on that in the next section.) The future, by contrast, in Rector's view is the realm of *maximum* entropy – it's completely unknown and uninformed, essentially a reservoir of disorder or information that has yet to be actualized <sup>23</sup>. Our present sits at the intersection: “the event horizon where the immutable past meets the unknowable future” <sup>24</sup>. This present moment is “highly dynamic, representing a superposition of zero entropy (past) and infinite entropy (future)” <sup>23</sup>. The colorful analogy Rector gives is that this interface is akin to the center of a galaxy – an energetic, turbulent region – too volatile for us to remain in if we were exactly at the origin, but we sit just at the edge of it at (1,1) in his coordinate picture <sup>21</sup> <sup>23</sup>.

In summary, the Immutable Past Theory provides a **cosmological metaphor** in which time has a rich structure (even potentially many dimensions), but fundamentally there is one realized history. The past is perfectly ordered and unchanging, the future is an as-yet unrealized chaos of possibilities, and the present is where the latter continuously resolves into the former. It's a philosophical framework that interestingly borrows language from physics (entropy, absolute zero, vectors) to describe a metaphysical stance on time.

## Comparing 3D Time and Immutable Past: Alignment and Challenges

Given these two frameworks – one from cutting-edge theoretical physics and one from a metaphysical-philosophical standpoint – how do they align with or contradict each other?

**Multiple Dimensions of Time:** On the surface, Kletetschka's **three-dimensional time** model and Rector's **Immutable Past** theory both entertain the notion that time might not be as one-dimensional as it appears. In fact, Rector explicitly allows for time to be treated as a multi-dimensional (even *infinitely*-dimensional) parameter in theory <sup>20</sup>, much like Kletetschka proposes three specific axes. Both frameworks are trying to address limitations of our usual one-dimensional time concept. Kletetschka does so to solve physics puzzles (like unifying forces and explaining particle masses) by adding degrees of freedom in time <sup>2</sup>. Rector does so to conceptually explain how the past and future relate (using a 2D plane analogy to enforce that all directions still lead “forward” into an immutable past) <sup>20</sup>. In this sense, **both agree that the structure of time could be richer than a single line**, and both insist that despite any extra dimensions, there is an underlying *order* or direction that prevents nonsense like causality violation. Each is essentially saying: we can expand our view of time's geometry *without* losing the arrow of time or the unity of history.

**A Single Coherent History:** A strong point of agreement is that neither theory permits multiple equally real histories or pasts. Immutable Past Theory is unambiguous that only one past exists for everyone <sup>4</sup>. The 3D time theory, while it introduces the **idea** of alternate paths and outcomes mathematically, still maintains one consistent sequence of events that we actually experience <sup>8</sup>. Kletetschka's model ensures all events can be ordered into a single timeline of cause and effect, even though there were extra time coordinates involved in the calculation <sup>8</sup>. In practice, that means even if alternate outcomes *could* exist in some

abstract sense (like the perpendicular day scenario), the theory does not allow them to violate the singular reality we observe – there will be one realized chain of events (one branch, so to speak, that is followed in reality). This alignment is crucial: **time's flow is unique and universal** in both views. Both approaches, therefore, reject the idea of actualized parallel histories. In Kletetschka's physics, you might imagine alternate timelines, but you cannot have an effect from one timeline interfering with another or two divergent histories both affecting the same observer. In Rector's theory, alternate timelines simply do not exist at all – the future might hold many possibilities, but once events happen, they *join the one past*. Thus, the **Immutable Past** idea can be seen as a philosophical reinforcement of what Kletetschka's model enforces mathematically: that the past (and by extension the observed history of the universe) is singular and consistent.

**Role of Causality and Order:** Another parallel is the emphasis on maintaining **causal order**. As discussed, multi-time dimensions raise the concern of being able to loop around and create time-travel paradoxes. Kletetschka addressed this by constructing the theory so that no such loops are allowed – effectively, there is a preferred direction in the multi-dimensional time that acts like the normal arrow of time <sup>8</sup>. Rector's entire reasoning for the immutability of the past is also to uphold consistency: if the past could change, you get logical paradoxes (grandfather paradox, etc.) and violate basic causality <sup>17</sup>. His vector picture (with any movement being through the future toward the past) is another way of imposing a one-way structure on what could otherwise be a more free-form time geometry <sup>20</sup>. So both frameworks deeply embed the idea that *cause precedes effect* and that time's structure must prevent any reversal of that natural order. In physics terms, they both allow for an **arrow of time** even in an exotic temporal setup.

However, there are also important **differences and challenges** when comparing the two theories:

- **Alternate Outcomes vs. Immutable History:** Kletetschka's three-dimensional time entertains the existence of **multiple outcomes of the same moment** (at least as a thought experiment) <sup>10</sup>. For instance, dimension two of time could hold a different version of events for a given date, and dimension three could allow transitions between those versions <sup>10</sup>. This sounds like a many-worlds or branching timelines interpretation – though again, only one path would be realized for an observer. John Rector's theory, by contrast, is not comfortable with even hypothetical alternate versions of any event. The past in Immutable Past Theory is *the* actualized outcome of every moment, and by the time it's past, no other outcome exists or ever existed. There is a **philosophical tension** here: if time has extra dimensions that mathematically permit other outcomes, does it imply those outcomes have some kind of reality? Kletetschka would likely say they do not manifest in our reality unless an interchange occurs, whereas Rector would likely stress that the cosmos “chooses” one path – the others are simply never real. The three-dimensional time model could be seen as challenging the strictness of the Immutable Past if misinterpreted – one could ask, *is the past still immutable if another time axis held a different version of it?* Rector's stance would be that those different versions are not past at all – they're unrealized possibilities. Thus, a careful reconciliation is that **the past remains immutable in both views:** in 3D time, once a particular outcome is selected (or one timeline followed), that sequence is fixed as the past; the other coordinates represent either *future possibilities* or purely theoretical constructs, not alternate realized pasts.
- **Nature of Time vs. Role of Space:** The two theories operate on different layers of description. Kletetschka's is a *physical theory*, making concrete predictions (like particle masses) and is subject to experimental test <sup>14</sup>. It says time is literally three-dimensional at the fundamental level of the universe, and space is emergent from that. Immutable Past Theory is more of a *metaphysical*

*interpretation* of time's flow; it doesn't yield numerical predictions about particles but provides a conceptual framework for thinking about time and entropy. Rector's idea that space and matter are secondary to time's structure is actually somewhat in line with Kletetschka's time-centric view (where time is the canvas of everything) <sup>1</sup>. But Rector doesn't explicitly claim space emerges from time; rather, he implicitly treats space and matter as "stage props" that move in time, while time itself is the backdrop that solidifies into history. Kletetschka's challenge to spacetime is a direct physics claim: spacetime isn't fundamental, only time is <sup>3</sup>. The Immutable Past Theory doesn't directly address the ontology of space, but by focusing on time's primacy (the past and future framework), it *spiritually* agrees that time underlies our reality's structure in a deep way. The difference is one of approach: one is mathematical and aims to revise physics, the other is philosophical and aims to interpret experience and align with existing physics (like Rector draws analogies to the wavefunction of the universe being single, akin to one single past <sup>25</sup>).

- **Experimental and Cosmological Implications:** If time truly has three dimensions as per Kletetschka, there might be *observable consequences*: e.g. unusual particle behavior at high energy, possible violations of Lorentz symmetry, or other signatures that scientists could look for <sup>26</sup> <sup>27</sup>. Immutable Past Theory, being more conceptual, doesn't propose experiments; its implications are more in how we understand consciousness, memory, and cosmology. Rector's notion that the past sits at absolute zero entropy and the future at infinite entropy is suggestive, but not something easily tested – it's more a way to reconcile why entropy grows (the future is an entropy source and the past an entropy sink, conceptually). For cosmology, though, both have intriguing implications: In a 3D time universe, the Big Bang might be reinterpreted not just as an explosion of space, but as perhaps a special configuration in time's three axes (this is speculative; the theory itself in early stages). In Immutable Past terms, the Big Bang or the beginning of the universe could be seen as the moment of lowest entropy (indeed, Rector's past=0K idea is basically asserting a **Past Hypothesis** – that the start of time had minimal entropy, which mainstream cosmology also uses to explain the arrow of time <sup>28</sup>). The difference is that Rector elevates that to a cosmic principle or axiom, whereas physics views it as an initial condition requiring explanation.

In summary, **the three-dimensional time theory and Immutable Past Theory converge on the idea of a single, ordered timeline (one past) and uphold an arrow of time, but diverge in whether multiple potential timelines are part of reality's structure.** The multidimensional time model challenges us to broaden our thinking of what "moments" and "histories" could be, yet it ultimately doesn't overthrow the notion of an immutable sequence of events – it just embeds it in a higher-dimensional geometry. The Immutable Past Theory welcomes that broader geometry only insofar as it doesn't undermine the singularity of the past. If anything, Rector's framework could be viewed as a philosophical *boundary condition* for any complex time theory: no matter how many time dimensions or alternate paths one posits, only one path becomes **the** past and it cannot be reversed or altered. Next, we turn to entropy – the arrow of time and information – to see how each view deals with the irreversible aspect of time in either one or multiple dimensions.

## Entropy in a Multidimensional Time Framework

Entropy is intimately tied to the concept of an **arrow of time**. In classical physics, the Second Law of Thermodynamics tells us that in an isolated system, entropy (disorder) tends to increase with time – that is why we have a "one-way" direction from past (low entropy) to future (high entropy). In information theory, entropy measures uncertainty or missing information – the more uncertain the future, the higher the

informational entropy from our perspective. The question is: how are these treated if time has multiple dimensions? And does the Immutable Past Theory offer a compatible or contrasting picture of entropy's role in time's structure?

## Irreversibility and the Thermodynamic Arrow of Time

Both Kletetschka's 3D time model and Rector's Immutable Past framework uphold the idea of a **thermodynamic arrow of time**, but they approach it from different angles. In standard physics, the arrow of time is often explained by special initial conditions: the universe started in a very low-entropy state (very ordered) and has been increasing in entropy ever since – this assumption is sometimes called the **Past Hypothesis** <sup>28</sup>. Rector's theory explicitly embodies this: he posits the past is at absolute zero entropy (the ultimate low entropy state) <sup>22</sup>. That essentially bakes in the Past Hypothesis as a fundamental axiom. By saying the past is 0 K (no motion, no entropy), he provides a clear thermodynamic arrow: any move away from the past means an increase in entropy (since anything not past is by definition "future" and full of motion and heat). Indeed, from the perspective of someone at  $(x=1, y=1)$  in his time-plane, *any* direction of travel involves moving into the "future" region which has higher entropy than the origin <sup>29</sup>. Thus, regardless of which time axis or combination of axes one takes, entropy **never decreases**; you can never go back into the zero-entropy past, you can only move through the entropy-laden future toward that past asymptotically <sup>29</sup>. In this way, Rector's multi-dimensional time view still yields a single thermodynamic arrow: one pointing toward the past (which is like a sink of entropy) and away from the future (the source of entropy). It's as if the past low-entropy state exerts a pull, but the only way to get closer to it is still by moving forward in time (through the future) so you never actually reduce the total entropy of the world.

Kletetschka's 3D time theory, being more physics-focused, doesn't explicitly discuss entropy in the popular articles. However, since it preserves a consistent timeline of cause and effect <sup>8</sup>, it implicitly preserves the standard arrow of time. The mathematical structure that keeps time ordered would also forbid any process that violates the second law (like an effect preceding a cause could allow entropy to decrease paradoxically). One might wonder: could one of the extra time dimensions be associated with a *different* arrow (for example, could entropy decrease along a second time axis)? The answer seems to be no, given the way the theory is constructed. By ensuring one unified sequence of events, the theory effectively chooses a single direction for increasing entropy globally. If you were to somehow move "sideways" in time to an alternate outcome, you are not actually moving into a lower entropy past – you're moving into a different strand of the future that still must comply with the second law from that point onward. In simpler terms, **multi-dimensional time does not mean multiple independent entropy arrows**; there remains one overall arrow aligned with what we call the forward direction of time.

This is consistent with the need for a model of physics to not contradict observation: we don't see entropy spontaneously decreasing in any direction of time. As one physics commentary noted, if a model had two or more time dimensions, you'd have to prevent the possibility of "rotating" between them in a way that swaps what's past and future <sup>9</sup> – otherwise one could engineer a scenario to reverse entropy. Kletetschka's model can be seen as doing exactly that: forbidding rotations in the time-time plane that would equate to time reversal, thereby protecting the second law. In effect, his theory likely assumes a special initial condition or alignment for all time axes such that at the "beginning" of the universe, all time dimensions cooperatively had a low entropy state, and going forward (in the multi-time sense) entropy increases. It's as if the entropy arrow is a vector that cuts through the three-dimensional time, always pointing in a direction that intersects all axes in a positive (increasing) manner.

From a cosmological standpoint, if time has three dimensions, the **initial condition** could be more complex than a single low-entropy Big Bang. Perhaps one could imagine the universe's birth as a low-entropy hypersurface in the six-dimensional spacetime (3 time + 3 space) – a generalized Past Hypothesis. What Rector's immutable past adds is a vivid interpretation: the past is an unchanging entropy-free boundary (like the Big Bang at 0 K), and time's flow (in however many dimensions) is essentially the system evolving away from that boundary. Mainstream physics often puzzles over why the Big Bang was so low entropy; Immutable Past Theory would say that's just the nature of the past. It *has* to be low entropy because otherwise it wouldn't be immutable (anything with entropy has microstates and can change). Whether or not one accepts that philosophically, it dovetails with the scientific consensus that a low-entropy past is needed to explain why we experience an arrow of time at all <sup>28</sup> .

One interesting extension comes from thinking about *time-symmetry*. The fundamental laws of physics (like Newton's or Einstein's equations, or even quantum mechanics without measurement) are mostly time-reversible – they don't care about past vs future. The second law (entropy increase) is an emergent, statistical law that arises because of initial conditions. In a multi-time dimension scenario, one might ask: are the laws still time-symmetric in a fundamental sense? If Kletetschka's model's equations are symmetric under reversal of the time axes, one would still need that special initial condition to single out one arrow (just as in 1D time). If the model's structure breaks time-reversal symmetry by itself (which could happen if the extra time dimensions have a built-in ordering), then it's introducing a new element to physics – effectively a law that time has an orientation (something some have considered as a way to explain the arrow <sup>30</sup> , but it's not standard). Rector's theory, being axiomatic, simply declares the asymmetry: past and future are fundamentally different in nature (one fixed, one not). It's not concerned with time-reversal symmetry of laws; it asserts a cosmological asymmetry (an "arrow") as primary. In that sense, Immutable Past Theory is closer to saying *the universe's laws or conditions inherently produce an arrow of time*, whereas Kletetschka's physics theory likely still relies on an initial condition in a more traditional way (this isn't explicit in his work, but since it's grounded in known physics behavior, we presume it doesn't throw out time-reversal invariance of microphysics completely – it just constrains the solutions to avoid paradoxical ones).

To summarize, in **thermodynamic terms**, both perspectives agree that *entropy increases* in the direction of what we call the future. The three-dimensional time model must incorporate the arrow of time to remain logically consistent (and it does so by a structural constraint), and the Immutable Past Theory builds the arrow of time into the fundamental setup (past = low entropy, future = high entropy). There is no allowance in either for entropy to flow "backwards" along any time axis. Even if time had multiple dimensions, you cannot find a path through time that leads to a state of lower entropy than where you started – you can only move into higher entropy states (or at best, hold it constant in an idealized case). In Rector's colorful explanation, if you try to go backward, you still end up going through the future and "entropy always increases regardless of direction" <sup>29</sup> . This one-way street of thermodynamics remains intact.

## Uncertainty and Information in Multidimensional Time

Beyond thermodynamics, entropy is also a measure of **information** – or more precisely, lack thereof. Shannon's information entropy quantifies how uncertain or surprised we expect to be by outcomes. It connects to time in that the *unrealized future* carries a lot of uncertainty (we don't know what will happen), whereas the *recorded past* carries information (things that have happened, we can in principle know). In a single timeline, as time moves forward, new information is constantly generated (or revealed) as events occur; conversely, some information may be lost (e.g. if you forget something or if physical records decay,

though fundamentally the information is scrambled into the environment, raising entropy). How do these ideas play out if time has more dimensions? And how does the Immutable Past viewpoint address information?

John Rector's framework gives a very intriguing interpretation: he essentially identifies the **future** with hidden information and the **past** with information that has been resolved. Recall that in his model, the past has zero entropy and is a single state – that corresponds to maximum information (no uncertainty left) about what has occurred. The future, being “infinite entropy,” corresponds to maximal uncertainty – literally anything could happen, so from our perspective it contains an infinite amount of surprise or missing information <sup>23</sup>. When the present “happens,” those possibilities collapse into one actuality, thereby *information is created* (or revealed) and entropy is correspondingly taken from the future's reservoir and added to the past's record.

In Rector's words, when we move through time “even towards the past, [it] represents movement through the future. Thus, entropy always increases regardless of direction. This is because the entire plane represents the unknowable future, and movement through it equates to navigating through hidden information and surprise” <sup>29</sup>. Here he directly ties entropy to information theoretic concepts: *hidden information* and *surprise* are Shannon entropy ideas. So in the Immutable Past Theory, as we live through time (in whatever direction or however many dimensions), we are effectively sampling the unknown information in the future, and turning it into known information in the past. The past is like a database that gets new entries added (but never changed or removed) as time progresses; the future is like the “cloud” of all possible data that might be downloaded. Because only one consistent set of events actualizes (one past), this process is also like a massive **data compression** – out of a huge space of possibilities (many bits of entropy), the universe actualizes one outcome (which in retrospect has zero uncertainty because it happened). Each event could be seen as selecting one microstate out of many, thereby reducing uncertainty once it's in the past. In that sense, the **flow of time is an information transfer**: bits flow from the future (unknown) into the past (concretized). The second law (entropy increase) from an information perspective just means you can't get those bits back into the neatly ordered form once they are thermodynamically dispersed – but since the past itself is defined as ordered in his theory, it kind of sidesteps the issue by making the past an ideal archive.

Now consider the three-dimensional time theory. If multiple time axes exist, does that increase the informational complexity of the universe? Potentially, yes. To specify an “event” in a 3D time, one might need to give coordinates on all three time axes, not just a single timestamp. If, for instance, one axis distinguishes different outcomes of the same clock time <sup>10</sup>, then to fully identify a scenario you must say “at time T on timeline #2 (as opposed to timeline #1).” This suggests that if an observer did not know which timeline they were on, there's an extra layer of uncertainty. However, Kletetschka's framework likely assumes we are confined to one path through time dimensions (since causes and effects follow one sequence). So perhaps a more apt way to think of it is: the information content of the universe's state might be spread across these time dimensions, but an observer within the universe experiences one projection of it.

If somehow one could move between time dimensions (say along the third time axis that “transitions” between outcomes <sup>11</sup>), one might gain access to alternative information. For example, imagine two alternate outcomes A and B at the same base time. In outcome A timeline, a certain bit of information (say the outcome of a coin toss) is 0, and in outcome B it's 1. An observer confined to timeline A will see 0 and that becomes part of their past record. An observer on timeline B sees 1. Now, if there is a third time

dimension that allows a move from A to B, what happens to the information? Would the observer from A now see outcome 1 instead, effectively learning something contradictory to their past? The only consistent way this could work without breaking the immutable past principle is if such transitions are either impossible or constrained so that the observer's own history is re-interpreted. In science fiction terms, this is like sliding into a parallel world – you gain new experiences, but your original past remains in the other timeline. The physics model doesn't really say you can do this freely (it's not a time travel or world-hopping prescription, it's more a conceptual scaffold). But it raises the question of **information consistency**: if multiple time lines exist in some higher reality, is the total information of the universe larger than what any single history contains? It might be, but if only one history is accessible, then for practical purposes the universe behaves as if that's all the information there is.

From an information-theoretic standpoint, multi-dimensional time could be thought of as providing redundancy or additional channels – but if only one channel's worth of information is ever seen, the extra channels might be hidden. Another angle: some theoretical physics proposals (like certain interpretations of quantum mechanics or multiverse theories) imply that all possible outcomes exist in a larger ensemble (the wavefunction of the universe contains all possibilities). In those views, there is a vast amount of information in the multiverse, but each branch (each observer's history) experiences a highly compressed version (just their branch). The 3D time model with alternate outcomes has a flavor of this – it's almost like a structured multiverse with an extra dimension labeling the branches. The Immutable Past Theory would be akin to saying "only one branch is real" – which dramatically reduces the information content to just that branch. Whether the other branches "existed" as possibilities doesn't matter once the past is set; they don't contribute to actual information in our world.

The concept of **information loss** is also interesting here. In physics, one famous debate is whether information can be lost (e.g., in a black hole). Generally, quantum theory suggests information is never truly destroyed (unitary evolution), whereas classical thermodynamics says information effectively gets lost into entropy (like scrambling). In an immutable past sense, any information that has become part of the past is preserved (since the past doesn't change). But does that mean, for example, that all details of past states are in principle recoverable? Not exactly; immutable just means it happened and cannot un-happen. You could still lose the *accessibility* of information (e.g., burn a notebook – the info in it goes into smoke and ashes entropy). That lost information isn't gone from the universe (the ashes and heat carry it in encoded form), but it's practically irretrievable. This aligns with normal physics and doesn't contradict Rector's view – the past's events occurred, but we in the present might not know all aspects of them. The increase of entropy means **information dispersal** – the information is now in microscopic correlations that we can't feasibly collect. In a multi-time dimension scenario, is there any new way information could be lost or preserved? If time had an extra dimension, one fanciful idea is: could you circumvent the usual loss by stepping "sideways" in time to a branch where the notebook wasn't burned yet and copy the info? That would violate the one-history rule, though. Kletetschka's model as a serious physics theory wouldn't allow jumping timelines arbitrarily (especially if it's to be testable and not break physics). So information loss in each timeline would still follow the second law.

In the language of data compression: one can think of the unfolding of time as a process of compression where the enormous possibilities get reduced to one realized sequence (this is akin to how an outcome in probability carries  $\log_2(1/p)$  bits of surprise – once it happens, that surprise is resolved into a definite value). If time indeed had multiple axes with multiple possible sequences, one might say the *universe as a whole* (across all time dimensions) holds more information (all the branches) than any single history. But since we only observe one, our reality's information content is that of one history. Rector's stance is essentially that

the universe chooses one path (maybe via some selection principle or “cosmic dance” he alludes to elsewhere), and that actual path is the immutable record. In any case, both perspectives would concur that **the arrow of time corresponds to an increase of entropy and also to the one-way accumulation of information**. The future’s uncertainty (high Shannon entropy) continually reduces as we move through time and things become “known” (added to the past). Even a 3D time model does not turn back the flow of information – you can’t become *less* informed about the past by moving around in multidimensional time without creating logical contradictions, which are disallowed.

To ground this in recent literature: much of the discussion around time and information in physics still treats time as one-dimensional. However, theoretical explorations exist. For instance, in some quantum mechanical setups, researchers have found that you can get *effective* two opposing arrows of time in entangled subsystems, even though overall entropy increases <sup>31</sup>. That doesn’t mean two time dimensions, but it shows the subtleties in how entropy and information can behave. In a higher-dimensional time theory, one could imagine something analogous: perhaps different “slices” of time could each have an arrow pointing away from a common low-entropy beginning (like two arrows in a forked road both pointing outward). But unless those forks are completely independent universes, eventually you’d have to reconcile them, which tends to reinforce a single direction. At this stage, literature on explicit information theory in multi-time frameworks is sparse (the concept is so new and not widely adopted). What we are doing is extrapolating known principles: **causality, entropy, and information seem to demand a single temporal ordering**, and any theory that introduces extra time dimensions must accommodate that or face contradictions. Both Kletetschka’s and Rector’s theories, in their own ways, accommodate this by ensuring a monotonic increase of entropy/information along the experienced timeline.

In conclusion on this point: a multidimensional time does not negate the Second Law or the unpredictability of the future. Entropy still provides an arrow that likely threads through all time dimensions coherently. And in information terms, the past can be seen as an ever-growing, never-changing repository of information (the “immutable data” of the universe), whereas the future is like an information source that has yet to be tapped. Rector’s Immutable Past Theory gives a very poetic description of this: at the “event horizon” between future and past (the present), there is a constant processing of infinite possibilities into a single realized reality <sup>23</sup>. This is compatible with the 3D time view as long as that view respects that only one reality is realized for us. Both frameworks underscore the irreversible nature of that process – once information becomes past, it’s fixed; and the uncertainty that was present is gone, increasing entropy in the process.

## Conclusion

The exploration of a **three-dimensional time** model alongside John Rector’s **Immutable Past Theory** reveals both intriguing parallels and critical differences, all under the unifying theme of time’s arrow. The 3D time theory challenges our conventional spacetime picture by positing that time has a complex, multi-axial geometry – a bold proposal aimed at solving deep problems in physics and potentially unifying quantum mechanics with gravity <sup>15</sup> <sup>16</sup>. Rector’s Immutable Past Theory, on the other hand, provides a philosophical compass that keeps us oriented: it insists that no matter how strange time’s geometry might be, the past remains singular, fixed, and serves as the ultimate record of reality <sup>4</sup> <sup>17</sup>.

In aligning the two, we find that **causality and consistency** are the non-negotiables in both frameworks. Kletetschka’s model builds in a mechanism to prevent causal loops despite multiple time dimensions <sup>8</sup>, and Rector’s theory elevates the inviolability of the past as a principle to ensure no paradox can arise.

Entropy emerges as a key player in this story: it is effectively the arrow that both theories preserve. The past (whether viewed as a 0-entropy singularity <sup>22</sup> or simply as “what actually happened”) is the low-entropy starting point, and the flow of time – even if multi-directional beneath the surface – is oriented such that entropy increases toward the future. This reflects both the physical understanding (the **Second Law** and Past Hypothesis require an initial low entropy <sup>28</sup> ) and the information-theoretic picture (the future carries hidden information which time converts into the fixed information of the past <sup>29</sup> ).

Where the multi-dimensional time theory “messes with” reality is in suggesting that at a fundamental level, nature might have ways to explore alternative temporal paths (imagine parallel timelines at a quantum or cosmological scale) – yet our experience remains that of a single unfolding history. Immutable Past Theory acts as a grounding principle here: even if such extra paths exist in principle, only one becomes the actual past for us. In that sense, these ideas can be seen as **complementary** rather than mutually exclusive. The physics theory expands what time could be, while the Immutable Past philosophy constrains what time does in our observed world.

Looking forward, this interdisciplinary analysis underscores the importance of **temporal geometry** and **entropy** in any future theory of time. Whether time’s three dimensions are real or not, any viable theory must respect causality and the thermodynamic arrow. Researchers delving into higher-dimensional time (such as Itzhak Bars and others exploring two-time or multi-time physics) acknowledge that special conditions or structures are needed to maintain cause-effect coherence <sup>9</sup> <sup>32</sup> . The conversation between abstract theory and philosophical principle, as seen here, enriches our understanding: The Immutable Past Theory gives a conceptual reassurance that even exotic temporal models won’t allow history to be rewritten, while the 3D time model invites us to imagine a universe where time’s role is even more profound – *literally constructing space and reality* <sup>1</sup> .

In closing, the three-dimensional time hypothesis remains a speculative but fascinating proposal, one that will require rigorous testing and elaboration (for example, through experiments that could reveal deviations from standard spacetime predictions <sup>33</sup> ). The Immutable Past Theory, while not experimentally testable, offers a useful interpretive lens and reminds us of the fundamental asymmetry between past and future that any such theory must honor. Entropy bridges the two, serving as both a physical metric and a metaphor for the one-way unfolding of time. As our scientific understanding of time deepens – possibly revealing hidden dimensions or new symmetries – frameworks like these will be invaluable for interpreting what it means for our reality. The past, it seems, will remain immutable in any case, but the true architecture of time that leads it to be so might be far richer than a single straight line.

#### Sources:

- Gunther Kletetschka’s three-dimensional time framework, **Interesting Engineering** (2025) <sup>2</sup> <sup>8</sup> ; Phys.org news on 3D time (University of Alaska Fairbanks, 2025) <sup>34</sup> <sup>12</sup> .
- John Rector, *Immutable Past Theory* (2024), personal publication <sup>4</sup> <sup>18</sup> ; *Entropy via Immutable Past* (2024) <sup>22</sup> <sup>29</sup> .
- Stanford Encyclopedia of Philosophy, *Thermodynamic Asymmetry in Time* – discussion of low-entropy past condition <sup>28</sup> .
- Physics Stack Exchange discussion on multiple time dimensions and the arrow of time <sup>9</sup> .

1 10 11 12 16 32 34 **New theory proposes time has three dimensions, with space as a secondary effect**  
<https://phys.org/news/2025-06-theory-dimensions-space-secondary-effect.html>

2 3 5 6 7 8 13 14 15 26 27 33 **Universe emerged from time, not from space? New theory shows how**  
<https://interestingengineering.com/science/time-has-three-dimensions>

4 17 18 19 25 **The Immutable Past Theory: A Logical Exploration - John Rector**  
<https://johnrector.me/2024/06/09/the-immutable-past-theory-a-logical-exploration/>

9 **general relativity - Time is the only dimension that has an arrow, and the only dimension which contributes an opposite sign to the metric. Is that just a coincidence? - Physics Stack Exchange**  
<https://physics.stackexchange.com/questions/711086/time-is-the-only-dimension-that-has-an-arrow-and-the-only-dimension-which-contr>

20 21 22 23 24 29 **A New Understanding of Entropy via the Immutable Path Theory - John Rector**  
<https://johnrector.me/2024/06/25/a-new-understanding-of-entropy-via-the-immutable-path-theory/>

28 30 **Thermodynamic Asymmetry in Time (Stanford Encyclopedia of Philosophy)**  
<https://plato.stanford.edu/entries/time-thermo/>

31 **Physicists uncover evidence of two arrows of time emerging from the ...**  
<https://phys.org/news/2025-02-physicists-uncover-evidence-arrows-emerging.html>