Change and the Present

Working document v1.0. The first of two documents covering Virtualism's account of the temporal arc and the production of reality. This document develops the quantum side of change — intrinsic values leaping to wherever they can, the photon-Arc as transaction, the wave function as fact governing reality, and the present as intrinsically overdetermined reality. The companion document, Past and Machian Gravity, develops the extrinsic side — when one changes, all change — and the emergence of time and gravity from the propagating consequences of Arcs.

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1. The temporal arc and the determination architecture

There is a temporal arrow. Things are different now from how they were yesterday. We have memories of last week that we do not have of next week. Whatever else is true of time, this much is given.

There is also an arrow of *production*. The present did not spring fully formed into being; it was produced. Something made this Now out of whatever the previous Now was, and the next Now will be made out of this one. This too is given.

Virtualism's claim about time is that these two arrows, although they run in the same direction at the level of immediate experience, are not the same arrow. They are the two faces of a

single underlying cycle of emergence. The temporal arrow is the reader's everyday vocabulary: distant future, imminent future, present, past. The production arrow is the architectural vocabulary: how an Existence with the structure Virtualism describes generates itself moment by moment.

This document develops the first half of the cycle — from the distant future through to the produced present. The companion document develops the second half — the past that streams away from the present, and the Machian feedback by which that past constrains what the next imminent future can become.

1.1 Parts and wholes — a foundational note

Before the temporal architecture, one structural observation.

In Virtualism, *parts are real, while wholes are facts*. This is foundational. The macroscopic furniture of the world — tables, chairs, planets, persons — is *wholes*: factually structured unities that emerge from the relations of their constituent parts. The parts are real (they have boost, intrinsic overdetermination, the anchors that make things reality-rather-than-fact). The wholes are factual (they are the relational structures that the parts maintain, considered as unities at a level of emergence above the parts themselves).

This has a paradoxical character that runs through everything: *any whole may be a part of a greater whole*. An electron is a whole at its own level, real in its boost-bearing facts; it is also a part of an atom, which is a whole at its own level. The atom is also a part of a molecule, a molecule a part of a cell,

a cell a part of an organism, an organism a part of a community, and so on without obvious upper or lower bound. There is no absolute partness or absolute wholeness; both are relational designations within levels of emergence.

A further paradox: *any whole defines a centre that is both the whole and the heart*. The Earth's centre of gravity is the Earth's centre as a whole-fact, and it is also the heart of what the Earth is doing as the integrated effect of its parts. The centre is virtual (a fact-about-the-parts, not itself a part) and yet it is what the whole *is* in its capacity as a whole. The heart is what the centre amounts to from the inside; the centre is what the heart looks like from the outside.

This parts-and-wholes structure runs through everything the document will develop. Photons, electrons, particles in general are *parts* — real, boost-bearing, the foundation. The classical macroscopic world is *wholes* — fact-bearing, *as-if* in its mode of unity, structured by the relations of the parts that constitute it. The present itself is structured this way: the foundational layer of fact-plus-boost is the *parts* level, and what we encounter as the world we walk around in is the *wholes* level masquerading, *as if*, as the kinds of things their constituent parts are. The masquerade is not deception; it is what emergence at every level structurally *is*.

1.2 The four determination conditions

The architecture proper begins with the fourfold determination taxonomy developed in `paradox_and_emergence_v003.md` §3.

Existence is made of facts; facts hold relationships; and any given relationship-set is in one of four conditions:

- **Non-determined** — empty of any determining facts. A void. Defined only by what it could contain. Not yet anything in particular, but already capable of being made into something.

- **Under-determined** — some determining facts but not enough to fix a unique outcome. Many possibilities are compatible with what is so far given. The hypodox condition.

- **Over-determined** — too many determining facts. More conditions hold than can be jointly satisfied. The paradox condition. Resolves by producing new emergent structure that satisfies what could not be satisfied at the previous level.

- **Fully-determined** — exactly enough determining facts to fix one settled outcome. No paradox, no possibility, no ambiguity. Settled truth.

These four conditions appear and reappear at every level of the architecture. The Alethiogram framework (`mandala_framework_v004.md`) gives them their colour-coded face: yellow as overdetermined, blue as underdetermined, green as non-determined, red as fully-determined. The same fourfold runs through determination, element, relationship-type, and the cycle of emergence.

At the level of the present moment, the four conditions map onto the temporal arc as follows:

| Temporal position | Determination condition |

|---|---|

| Distant future | Non-determined |

| Imminent future | Under-determined |

| Present | Over-determined |

| Past | Fully-determined |

This is the surface vocabulary. The reader can read forward along the temporal arrow — distant future, imminent future, present, past — and pick up the determination conditions in order. The cycle of production runs in the same direction at this level: from the void of possibility, through the dice of probability, through the produced reality of Now, into the settled facts of what has been. The temporal arrow and the production arrow align here.

They will *not* align in the companion document. The past, once produced, falls away from the cycle as completed truth; meanwhile the cycle itself turns on, fed by the constraints that the past imposes via Machian gravity on the next imminent future. There the temporal arrow points backward (the past is *behind* us) while the production arrow points forward (the past *feeds* forward into the next turn). That tangle is the companion document's. Here the two arrows run together.

1.3 Intrinsic and extrinsic overdetermination

The four-condition table above gives a true picture of the temporal arc but understates what is structurally distinctive about the present. Over-determination is not just *more determination than under-determination*. There are two kinds.

Extrinsic overdetermination. Too many facts about the *relationships* of a thing to other things. The thing is positioned by what it differs from, by where its parts stand in relation to other parts elsewhere. When these external relata multiply faster than they can be jointly satisfied in the available dimensions, overdetermination is extrinsic.

Intrinsic overdetermination. Too many facts about the *internal arrangement* of a thing. The thing is structured by its own parts standing in their own paradoxical configuration. When these internal relata multiply faster than they can be jointly satisfied in the available dimensions, overdetermination is intrinsic — and the resolution is the emergence of a new internal dimension capable of carrying the surplus.

The imminent future is *extrinsically* overdetermined. It holds all the facts of the present except boost, plus all the dimensional facts of possibility — every direction the next present could take, every configuration compatible with the present-as-given. These are not under-determined in the sense of having too few constraints; they are over-determined in the sense of having too many ways to be, each consistent with its own subset of the facts, but no way to hold all of them at once.

The present is *intrinsically* overdetermined. Real things have internal structure that holds together in ways flat Euclidean space cannot accommodate. The resolution is boost — rotation into an imaginary dimension that exists *only* as the resolution of intrinsic overdetermination. Where the imminent future is extrinsically loaded, the present is intrinsically loaded; and the dimension of boost is what intrinsic loading produces.

This is the structural distinction that makes the present *the present*. The present is not the imminent future with one possibility actualised; it is the imminent future plus boost. And boost is not a property the imminent future fails to have; it is a dimension the imminent future *cannot* have, because boost is the resolution of intrinsic overdetermination and the imminent future is overdetermined extrinsically. The two are different conditions, not two levels of the same condition.

What this means for the rest of the document, and indeed for Virtualism's account of reality: the difference between possibility and actuality is not a difference of *how much* is determined. It is a difference of *which kind* of determination holds. The imminent future is fully determined extrinsically — every possibility is laid out, every weighting accounted for — and lacks only the intrinsic anchor of boost. The present is fully determined intrinsically — boost holds it in one configuration of mass and movement — and inherits exactly one extrinsic configuration from the imminent future. The selection event is the swap: extrinsic-overdetermination-without-boost gives way to intrinsic-overdetermination-with-boost. One possibility falls; the rest persist as ghosts.

1.4 What the document covers

The document moves through the arc in stages. First, the Arc itself as the engine of the cycle (§2). Then the imminent future as extrinsically overdetermined possibility-space (§3). Then the wave function as the factual form taken by that possibility-space (§4). Then the photon-selection mechanism by which the

imminent future's extrinsic overdetermination resolves into the present's intrinsic overdetermination (§5), with the anti-observer position (§6). Then the present as intrinsically overdetermined reality — space as numerical difference, mass and momentum as facets of boost, the geometry of relativity reframed (§7). The remaining material — entanglement positioning, the forward pointer to the companion document, the close — is shorter.

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2. The Arc: selection as the cycle's drive

What turns the imminent future into the present? Why does any new present occur at all? The standard answer in physics is that the wave function evolves smoothly until something — variously identified as a measurement, an interaction, an observer's act, or nothing at all — causes it to collapse. Virtualism's answer is sharper. The imminent future is not stable. Its extrinsic overdetermination, without the intrinsic anchor of boost, is a house of cards. It must fall. The only questions are *which way* and *when* — and the *which* question is what the photon does.

2.1 The arc named

For working purposes the document refers to this whole transition — from imminent future, through quantum event, to produced present — as **the Arc**. The Arc is the cycle's drive: the selection mechanism that converts extrinsic-overdetermination-without-boost into intrinsic-overdetermination-with-boost, one possibility at a time, one quantum event at a

time.

The Arc is *not* a moving spotlight on a pre-existing manifold. There is no future-region with the next present waiting in it for the spotlight to arrive. The Arc is *productive*: each quantum event takes the present's extrinsic configuration plus some piece of imminent-future possibility, and produces a new present that did not exist a moment ago. The metaphor is closer to a wave breaking than a hand on a dial. The imminent future piles up; eventually it falls; the falling is the Arc; what falls is the new present.

2.2 Selection, not measurement

The standard vocabulary for what happens at this point is *measurement*. Virtualism rejects the word. *Measurement* carries with it, by inheritance from Copenhagen, the assumption that something has to be doing the measuring — an apparatus, an observer, a mind. Whatever does it, the word marks the moment at which the indefinite becomes definite, and the marker carries an implicit subject.

The Virtualist position is that nothing measures, because nothing needs to. The imminent future is unstable as a matter of its own structure. Selection occurs because selection *must* occur: the house of cards cannot stand. There is no measurer; there is only the falling. The word *selection* names what happens — one possibility from many — without importing a selector. The word can carry the structural content of *one from many* without dragging the metaphysics of *picked by whom*.

The document uses *selection* throughout for this reason. Where engagement with the standard literature requires it, the words *measurement* and *collapse* appear in flagged form — *what is conventionally called measurement* — but they are not the working vocabulary.

2.3 The photon as the selecting object

What does the selecting work, if not an observer? The carrier particle. The photon, paradigmatically. The corpus's strongest statement is from Diary 064B (15 May 2026):

> The photon is the only means of measurement because the
> photon is the only thing to reach the speed of light, you
> could even call it the speed of measurement, because the
> photon is not really there due to its 100% commitment to
> space, and 0% commitment to time. Nothing else has this, so
> nothing else can break uncertainty and pinpoint position as
> a classical property.

Three claims about the photon are entangled here, and they want separating before the mechanism comes clear.

The photon is 100% spatial. It exists, but it does not endure. It has no temporal extension, no rest, no internal energy of its own. It is purely spatial in being-there and nothing-temporal in lasting-through. This is what *100% commitment to space and 0% commitment to time* means structurally: not that it is everywhere, but that all of what the photon is, is spatial; none of it is temporal.

The photon is intrinsically two-dimensional. Its content as an object — its energy — has the dimensional character of a square. A photon transfers energy from one place to another by subtracting at one end and adding at the other; the quantity transferred is, as energy, two-dimensional. The inverse-square character of how this transferred energy distributes is the characteristic signature.

The photon's path is three-dimensional but virtual. When a photon is exchanged from Alice to Bob, there is an apparent 3D path between them. The photon does not actually travel along this path. The path is a virtual 3D construction *from Alice and Bob* — their positional difference, their relation as emitter and receiver — and is post-fixed onto the quantum event that connects them. The photon itself, considered as the thing that the event consists of, is two-dimensional. The implied third dimension is an artifact of Alice's and Bob's situatedness in 3D space.

These three claims are not three competing dimensionalities. They are three statements about three different aspects of what the photon is: its dimensional commitments as an existing object (100% space), its dimensional content as an energy-bearer (2D), and its dimensional appearance to other things in 3D space (3D path, virtual). Each does its own work.

2.4 Why the photon can break uncertainty

The uncertainty principle holds — to anticipate §7 — because position and momentum are not two separate things the present

must choose between but two facets of the same intrinsic boost-content. The imminent future, as extrinsically overdetermined possibility-space, contains every configuration the next present could take. The present's boost carries one specific configuration; what the photon-Arc does is fix the *extrinsic* positional content of that configuration, while the *intrinsic* boost-shape determining future motion (momentum, which the companion document develops as the same thing as gravity) is fixed by other Arcs of a different kind.

The photon can break uncertainty because the photon's dimensional profile matches what the breaking requires. The selection has to convert one extrinsic-or-intrinsic configuration of possibility into a definite 3D-or-boost arrangement of reality. The selecting object must therefore be something that can engage with the imminent future without itself carrying the imminent future's temporal extension. A massive particle cannot do this work: massive particles have boost, and boost belongs only to the present; a massive particle crossing the boundary would already be a piece of the present being asked to act as the boundary itself. The photon, having no rest and no temporal extension, is the only candidate. It exists as a purely spatial event — there for an instant, nowhere in between — and so it can be the event that converts possibility into reality without being either.

This is what *the photon is the speed of measurement* means. The speed of light is not a velocity in the ordinary sense. It is the ratio at which possibility converts to reality. The photon does not travel *at* this speed; the photon *is* this conversion, and the speed is the rate at which the conversion

propagates through the surrounding 3D structure. The full treatment of why the propagation has this particular rate — inertia as the rate-limiter on change — belongs in the companion document.

2.5 What the Arc produces

The Arc produces a new present. What this means structurally:

1. One possibility from the imminent future becomes the new present's extrinsic configuration.
2. The other possibilities cease to be possibilities and become the ghosts of paths not taken — facts that did not happen, but were once factual possibilities. They will stream into the past as those ghosts, as discussed in the companion document.
3. The new present acquires the intrinsic dimension of boost, anchoring the selected extrinsic configuration in mass-and-movement.
4. The imminent future, having lost its previous content to the new present, reconstitutes itself around the new present's constraints. New probabilities, new loaded dice, the next Arc waiting to happen.

This is one turn of the cycle. The universe is constantly performing it, at every quantum exchange, everywhere. Each photon transfer is one Arc; each gravity-Arc (the companion document's subject) is another, in which whole masses are repositioned by the same subtract-and-add mechanism that the photon performs on energy; each quantum decay anywhere is the falling of one extrinsically overdetermined possibility-set

into one intrinsically overdetermined reality. The cumulative effect of all the Arcs occurring everywhere at once is what we experience as the world going on.

> *A note on the two kinds of Arc.* This document develops
> photon-Arcs (energy-transfer events). The companion document
> develops gravity-Arcs (mass-repositioning events). The two
> are structurally the same kind of operation — extrinsic
> subtract-and-add via virtual paths between positions — but
> differ in what is subtracted and added. The propagating
> consequences of all Arcs, and the inertia-paced rate of that
> propagation, are the companion document's central subject.
> Here the focus is the photon-Arc itself as the conversion
> event from possibility to reality.

The Arc named, the structural distinction in place, the document can now move to what the imminent future is, before its Arc falls.

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3. The imminent future as extrinsically overdetermined possibility-space

What is the imminent future? Not a region of a block universe waiting to be visited. Not a stretch of time that has not yet become the present. The imminent future is, structurally, the configuration of all dimensional facts compatible with the present-as-given, *minus boost, plus the dimensions of possibility*. It is real as fact and ghostly as anything else. It is what the next quantum event will fall out of.

This section develops the imminent future against the picture inherited from Everett — the Many Worlds reading of quantum mechanics — and corrects the picture in a specific way: the Many Worlds are not many actual worlds. They are the dimensional content of one possibility-space, virtual throughout, and only one of them ever becomes real.

3.1 The Everett picture absorbed and demoted

Hugh Everett, faced with the apparent oddity of wave function collapse, proposed that there is no collapse: every quantum outcome occurs, in a separate branching world, all of them equally real. The picture has been influential because it respects the unitary evolution of the wave function and removes the awkward measurement event. It has also been criticised because it commits the universe to an explosively multiplying plurality of actualities that no observer can perceive, an ontological extravagance that pays no theoretical dividend proportionate to its cost.

Virtualism's position is that Everett was half-right. The wave function does describe many possibilities, and the possibilities do all exist *as possibilities*. What Everett got wrong is the ontological status of those possibilities. They are not many parallel actualities. They are the dimensional content of one possibility-space — the imminent future — and only one of them becomes the next actuality. The rest are real as facts of possibility, but they are not real as things-in-3D. They never were. The branching is not a branching of worlds; it is the branching of probability within a single underdetermined-but-overdetermined imminent future, of which one branch is selected

and the rest become the ghosts of paths not taken.

This absorbs what Everett got right (the wave function genuinely describes a plurality) while rejecting what Everett got wrong (the plurality is not a plurality of real worlds). The move costs Virtualism nothing and gains it the freedom from Everett's metaphysical extravagance.

The diary's clearest single statement of the move is from Diary 063A:

> Many Worlds were not in fact worlds, but possible futures —
> each a microscopic step that may have been, but only one of
> which actually happened. Of those that didn't happen, they
> remain like ghosts around the past facts of what did happen,
> each microscopic, each virtual, and each invisible to history.

The companion document develops the *ghosts* — what becomes of the unactualised possibilities after the Arc falls. Here the point is: there are not many worlds *being lived in parallel*. There is one world being lived in, with the possibility-space of its imminent future containing many possibilities at any moment, only one of which is selected as the next present.

3.2 The distant future as constrained void

Before the imminent future there is the distant future. The distinction is important because the two are not stages of the same kind of thing.

The distant future is *non-determined*. It is empty of any

specific facts about how things will be — but it is not empty of all facts. The classical wholes of the present (planets, stars, nations, persons) cast their shapes forward as constraints. The orbit of the Earth around the Sun is a fact of the present that constrains what the distant future can become in respect of Earth's position; the structures of nations constrain what the distant future can become in respect of human affairs at large scales. These are not predictions, in the ordinary sense. They are dimensional constraints: the distant future cannot contain configurations incompatible with the persisting facts of present wholes.

The distant future is therefore not a faceless void. It is a void with outlines. The outlines are the shapes of present wholes projected forward as the constraint-space within which imminent futures can develop. The distance of the future is not a measure of length; it is a measure of *detail*. Near to the present, the imminent future has fine-grained probabilistic detail about which specific quantum events might next occur. Far from the present, the distant future has only the coarse-grained outlines of the wholes that will still be persisting. What lies between is filled in turn-by-turn as each Arc completes and the next imminent future organises itself around the new present.

The corpus statement (this document's author):

> Where the distant future is constrained emptiness, the
> imminent future is loaded dice.

The structural relation is one-way. The distant future

constrains the imminent future (its possibilities cannot violate the persisting facts of present wholes). The imminent future does not constrain the distant future (the specific Arc that falls in the next moment does not change what wholes will be persisting in a century). The distant future feeds the imminent future its outlines; the imminent future organises its probabilities within those outlines; the Arc selects one probability; the present is produced; and the cycle turns again with the distant future's outlines unchanged by the particular Arc that just fell.

> *Note on cosmology.* This is the structural position. It does
> not entail that distant-future configurations are
> deterministic; only that the constraints projected by present
> wholes hold across the whole forward arc. Within those
> constraints there remains an essentially unbounded
> probabilistic space which the imminent future organises in
> detail and the distant future leaves implicit.

3.3 Why the imminent future is extrinsically overdetermined

This is the structural heart of the section. The imminent future holds:

- All the facts of the present *except boost*.
- All the dimensional facts of possibility — every direction the next present could take, every configuration compatible with the present-as-given.

It does not hold the intrinsic anchor that the present has. It has no boost, no rest mass acting through the imaginary

dimension, no internal arrangement that holds it in one configuration. What it does have is *external* — relational, positional, extrinsic. And there is too much of it. Every possibility-dimension contributes its own configuration of relata. The dice are loaded by the present's facts; the dice are also stacked with all the ways they could fall.

This is the extrinsic overdetermination of the imminent future. It is not under-determination of the kind that would mean *not enough facts to fix anything*. It is overdetermination of the kind that means *too many compatible configurations to hold in one settled state without the intrinsic anchor of boost*. The imminent future cannot hold itself together. It must fall.

The standard reading of the uncertainty principle — that position and momentum cannot be simultaneously known — is better read in this frame as: position and momentum cannot simultaneously be *real*. Both exist as facts of the imminent future. Position is the configuration of extrinsic relata that *would* freeze into the present's 3D space if selected by a photon-Arc. Momentum is the configuration of *intrinsic* boost-arrangement that *would* lopside into the present's mass-shape if selected by a gravity-Arc (developed fully in the companion document). The imminent future contains both, as possibility. The present can carry one or the other, but not both, because the present's intrinsic overdetermination — boost — bears the load of one configuration only. The uncertainty principle is the trace, in the structure of the imminent future, of this either/or about how each Arc will fall.

This is a structural reading of Heisenberg, not an operational

one. The principle holds not because some apparatus disturbs the measured system, and not because some epistemic limit forbids the knowing of both, but because both cannot *simultaneously be real*. They can both be possibilities; only one can be a fact of the produced present.

3.4 What the imminent future is *not*

To finish the section: a series of clarifications about what the imminent future is not, in case the reader has imported pictures that the structural account would resist.

It is not a region of spacetime that lies ahead. There is no spacetime in Virtualism's frame; what there is, is space (the extrinsic configuration of the present) and time (the emergent appearance of accumulated change, developed in the companion document). The imminent future is not a part of spacetime because there is no spacetime to be a part of.

It is not a manifold of equally real possible worlds. Everett has been answered. The possibilities are dimensional content of one possibility-space, virtual throughout, real only as facts of possibility.

It is not an apparatus-dependent epistemic blur. The possibilities are facts of the universe's structure, not artefacts of human ignorance. They would be there if no apparatus existed.

It is not the present *minus information*. There is no present-state-with-more-detail that the imminent future is a coarser

approximation of. The imminent future is structurally different from the present, not informationally poorer than it.

It is not destined to become any one specific present. The loading of the dice may make some outcomes overwhelmingly likely, others vanishingly unlikely, but the selection event that produces the next present is genuinely a selection. The universe is not determined in the strong sense; it is constrained, loaded, weighted — and then, at each Arc, the dice do fall, and what falls becomes real.

The imminent future, then, is loaded dice on the brink of falling. The dice do not roll *in* time, because time is something the present produces, not something the imminent future is in. They roll, the wave function describing how they are loaded ceases to apply because what it described has come to pass, and the new present is one face up. The next set of dice — newly loaded by the new present — assembles. The Arc completes.

What that wave function is, between dice-loadings, is the subject of §4.

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4. The wave function as fact governing reality

The imminent future has a mathematical form. That form is the wave function. Standard quantum mechanics treats the wave function as either a real physical object that genuinely evolves

in time (the ontic reading), or as a representation of the observer's knowledge that updates when new information arrives (the epistemic reading). Virtualism takes neither position.
Both readings begin from the wrong question. The wave function is not a real object, and it is not an observer's representation. The wave function is *fact*.

4.1 What it means to call the wave function fact

The categorial scheme developed in `foundations_v001.md` §7 distinguishes between *real* and *factual*. Real things are subject to change as their relationships change. Real things have position in 3D space, mass-as-boost, the capacity to be encountered as stuff. Factual things are eternal in the sense that once a relationship has emerged it does not stop existing; facts do not change once they are facts. Numbers are factual; the relationships between them are factual; the structural consequences of those relationships are factual.

The wave function lives in the factual category. It is not a real object — there is no stuff that the wave function is — but neither is it a fiction or a mere book-keeping device. It is the factual structure that the imminent future has, given the present's reality and the constraints projected by the distant future. It is the *fact about how the dice are loaded*.

The corpus statement (Diary 063B, 5 February 2026):

> If we think of the wave function as an unreal, abstract
> thing, a calculation that needs no calculator, but just
> happens due to the values involved, we could view it as not

> even existing until the configuration of reality is ready to
> receive it somewhere, which is exactly a measurement.

A calculation that needs no calculator. The phrase deserves holding. It captures what is at stake: the wave function is *structure*, not *content*. There is no calculator computing it, no apparatus instantiating it, no mind tracking it. It is the factual relations that obtain among the present's constraints and the imminent future's possibilities, holding by their own structure without anything having to maintain them.

4.2 Fact governing reality

The corpus's most compressed formulation (Diary 063B, 6 February):

> The Wave Function is just fact governing reality, or to put
> it another way, truth overcoming difference.

This is what the wave function does. It is the fact about how the imminent future's overdetermination is distributed across possibilities. The distribution does not determine which possibility selects; it determines the *weights* on the dice. When the Arc falls, it falls in a direction consistent with the weights — the more heavily loaded possibilities are statistically the more likely outcomes — but no individual Arc's outcome can be deduced from the wave function alone. The wave function is the loading, not the falling.

This is why the wave function "governs" reality without being real itself. The next present is constrained by the wave

function's loading but is not determined by it. The reality produced at each Arc is consistent with what the wave function factually said about the imminent future; but the wave function, as fact, persists unchanged by the particular outcome that fell. After the Arc, the wave function that *was* the imminent future is no longer the wave function of anything; a new imminent future has formed around the new present, with a new wave function loading new dice for the next Arc.

4.3 The post-fix character of the wave function's "history"

This is a delicate point and one that the standard treatment misses. Richard Feynman described particles as following the sum of all possible paths — every quantum object, in transit from emission to reception, in some sense takes every available trajectory. Virtualism's position is more radical. The corpus statement (Diary 063B, 5 February):

> I claim that the path does not exist for quanta, that the
> path which includes the wavelength and so energy of the
> particle, is actually a post-fix consequence of the collapse
> of the wave-function on 'measurement'.

The path is not a real trajectory taken by a real object through real space. The path is what the post-Arc structure of present + photon-event *implies in retrospect*. Alice and Bob, both real, exist in 3D space at the moment the photon's Arc completes. The Arc subtracts energy from Alice and adds energy to Bob. *After* the event, the 3D positions of Alice and Bob, together with the energy transferred, allow the construction of an apparent path between them — a virtual 3D

line, with apparent wavelength, energy, and direction. None of this existed during the Arc itself, because the Arc was not durative and the photon had no real position to be at.

This is what distinguishes Virtualism's reading from Feynman's sum-over-histories. Feynman has the particle actually take all paths, with a probability amplitude for each, and the observed behaviour emerging from interference among the amplitudes. Virtualism has the particle take *no* path; the Arc is direct, without intermediate steps; what looks like interference is the structural consequence of the wave function being a fact about multiple possibilities simultaneously, not a sum over things that happen one at a time. The two-slit experiment is not the photon going through both slits, because the photon does not exist between emission and reception. The two-slit experiment is the wave function structure of the imminent future, in which two-slit reception is consistent with two slit-passages of equal weighting, producing the characteristic interference pattern when many Arcs accumulate.

4.4 The universal-but-regionalised wave function

There is a longstanding debate in physics about whether there is one wave function for the whole universe or many local wave functions for individual systems. Sean Carroll's QFT-based account leans toward a universal wave function; other readings treat the wave function as a local object that exists for particular subsystems and combines when those subsystems interact.

Virtualism's position: in principle there is one wave function,

which is the fact of the universe's structure of possibility. There are no absolute boundaries to it. But its structure includes the facts of classical relativity, which are themselves factual, and those relativistic facts impose effective regional isolation. Regions of the universe can be cut off from each other not by an absolute wall but by an attenuation of the probabilities of interaction. Where the probability of interaction falls below the Planck threshold, the regions are, for all practical purposes, factually disconnected — not because there is no wave function connecting them, but because the wave function's structure makes their interaction effectively zero.

This absorbs the universal-wave-function picture without committing to a single block that ignores relativistic constraint. The wave function is one in principle and regional in practice, with the regionalisation falling out of the classical-relativistic facts that are part of the wave function's own factual content. The speed-of-light limit appears here not as a hard wall but as the rate at which probability-of-interaction propagates through the present's 3D structure; regions separated by more than light-travel-time-equivalent distances have probability-of-interaction effectively at zero.

The position has the further advantage of explaining the locality-from-non-locality phenomena that show up in entanglement experiments. Entangled particles share the same wave function fact, no matter how separated they are in 3D space; their correlation is not transmitted through space but is the structural consequence of their shared facthood. The

fuller treatment of entanglement is in §8 and the companion document, but the universal-but-regionalised wave function is the framework within which entanglement becomes intelligible.

4.5 What the wave function is for

Three things, in summary, that this section has established about the wave function:

It is *fact*, not real and not fiction. A calculation that needs no calculator. The factual structure of the imminent future, holding by its own structure without anything having to maintain it.

It is *governance*, not determination. It loads the dice that the Arc rolls, but it does not roll them. Each Arc's outcome is consistent with the wave function's loading but is not deducible from it; the loading describes possibilities and weights, not events.

It is *one in principle and regional in practice*. The wave function of the universe is one fact; the regional isolation imposed by relativistic constraint is part of that fact; what looks like locality from inside a region is the structural consequence of the universal wave function's relativistic content.

What does the wave function do, then? It does not collapse; it gets superseded. When the Arc completes, the wave function that described the imminent future is no longer the wave function of anything in particular — a new imminent future

forms around the new present, with new probabilities, new loadings. The old wave function's content has been spent. What collapses, in the standard reading, is the *applicability* of the old wave function to anything still becoming; the function-as-fact persists as the factual structure of *that imminent future at that moment*, which is unchanged because facts do not change. After the Arc, that fact is no longer governing anything because there is no longer the imminent future it governed.

The wave function, then, is what the photon's Arc converts into reality. The next section takes up the conversion.

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5. Photon-selection: the mechanism in detail

This is the structural heart of the document. Everything to this point has been preparation. The imminent future is extrinsically overdetermined possibility-space, the wave function is the fact governing that possibility-space, and the Arc is the selection event by which one of the wave function's possibilities becomes the next present's actuality. What this section now develops: the *how* — the structural mechanism by which the photon does the selection work.

5.1 The photon as the only candidate

The corpus's clearest statement is the Diary 064B (15 May 2026) passage already quoted in §2:

> The photon is the only means of measurement because the
> photon is the only thing to reach the speed of light, you
> could even call it the speed of measurement, because the
> photon is not really there due to its 100% commitment to
> space, and 0% commitment to time. Nothing else has this, so
> nothing else can break uncertainty and pinpoint position as
> a classical property.

The mechanism comes into focus once it is asked: *what would a selecting object have to be?* The selecting object has to engage both with the imminent future (which is extrinsically overdetermined possibility-space, without boost) and with the present (which is intrinsically overdetermined reality, with boost). It cannot itself have boost, because boost belongs only to the present; a massive particle attempting to act as the selector would already be on one side of the boundary it was being asked to constitute. The selecting object must therefore have *no* intrinsic content of its own that would tie it to one side. It must be purely *extrinsic*: pure spatial difference, pure transaction.

This is what the photon is. The photon has no rest mass, no internal parts, no temporal extension, no enduring identity. It exists for the duration of the Arc and not before or after. It is a subtract-here, add-there transaction; the transaction is all there is of the photon. By having no intrinsic content, the photon can do what no other object can: it can be the Arc itself, the event that converts possibility into reality without being on either side.

The diary's clean statement of why the photon has no internal

parts (Diary 044, 20 June 2021):

> Really, mass is a function of energy, so we should think of
> at rest energy, which of course does not apply to the
> photon, because it is never at rest. What do we mean by at
> rest? Properly this is internal energy, the energy of the
> parts that form the whole. Hence, we may conclude that the
> photon has no internal parts.

A particle with internal parts has internal facts that boost into the imaginary dimension to resolve their internal overdetermination — that *is* what mass is. A particle with no internal parts has no internal overdetermination to resolve and therefore no intrinsic boost. The photon's lack of internal parts is the structural reason it has no rest mass; its lack of rest mass is the structural reason it can act as the selecting object.

> *Note on extrinsic boost.* While the photon has no intrinsic
> boost (no rest mass), its *as-if* journey from Alice to Bob
> confers energy equivalence on the system, contributing an
> *extrinsic* boost when the photon's energy is absorbed by a
> mass-bearing receiver. The distinction matters because it
> explains why energy and mass are interconvertible without
> the photon itself having to be massive. The photon mediates
> boost transfer without carrying boost in its own right.

5.2 The three dimensional claims separated

§2.3 of this document already separated three dimensional claims about the photon and noted that they are not three

competing claims about the same dimensionality. This section develops the distinction in more detail because it is doing real mechanical work in the selection account.

The photon is 2D as an energy-carrier. Energy, in this frame, has the dimensional character of a square. The inverse-square law of how energetic effects fall off with distance is the visible signature; the photon's role as the carrier of energetic transactions is the structural fact behind the signature. A photon transferring energy from Alice to Bob transfers a *square* quantity. The square character of the energy transferred is what produces the inverse-square character of the resulting gravitational change (developed in the companion document); here the point is just that the photon's content, considered as an energy-bearer, is two-dimensional.

The photon is 100% spatial in its commitments. The photon exists, but it does not endure. It has no rest, no internal energy, no temporal extension. *100% commitment to space and 0% commitment to time* means structurally that the photon's existence-as-an-object consists entirely of being-spatial; none of it consists of lasting-through-time. The photon is there for the duration of the Arc and nowhere in between, because there is no in-between — no in-between in space (the photon takes no path) and no in-between in time (the photon has no temporal extension).

The photon's path is 3D and virtual. When Alice transfers energy to Bob via a photon, an apparent 3D path exists between them after the event — Alice's position, Bob's position, the spatial direction from one to the other. This 3D path is *not*

the photon's. It is a virtual construction from Alice and Bob's positional facts. The photon itself, considered as the mechanism of the transaction, is 2D; the apparent third dimension is Alice's and Bob's positional difference appearing as the photon's direction. Other observers reconstructing the event from their own positions will reconstruct an apparent path with apparent direction; the path is real to those reconstructions, but it is not where the photon was, because the photon was nowhere in between.

These three dimensional facts — 2D content, 100% spatial commitment, virtual 3D path — work together in the selection mechanism. The 2D content is what gets transferred (the square energy quantity). The 100% spatial commitment is what allows the photon to be the Arc without being on either side of it. The virtual 3D path is what the surrounding present-3D structure constructs from the transaction after the fact, and is what gives apparent speed-of-light propagation its appearance.

5.3 Why the photon can break uncertainty

The structural reading of Heisenberg uncertainty was given in §3.3. Position and momentum are not two separate present-states the universe must choose between, but two facets of the present's single boost-load — the *extrinsic* aspect (position, frozen into 3D space) and the *intrinsic* aspect (momentum, the lopsided boost-shape that determines further motion under gravity, developed in the companion document).

The photon can break uncertainty because the photon's

dimensional profile matches what the breaking requires. The photon is a transaction — pure energy-square subtraction-and-addition. When the transaction completes, it has produced a specific change in the extrinsic relations between Alice and Bob: Alice now has less energy, Bob now has more, and the boost-shapes of both have shifted to absorb the change. Considered as the breaking of uncertainty: the photon's energy-square transfer fixes the positional facts of the event (Alice was here, Bob was there) because energy transfer requires positional difference, and the positional difference is what the transaction expresses. Momentum is not fixed by this particular Arc — it is the *other* aspect of the present's boost-load, fixed by gravity-Arcs of the kind the companion document develops.

This is what *the speed of measurement* means, structurally. The speed of light is not the velocity of a fast-moving object but the rate at which the conversion between extrinsic possibility and 3D actuality propagates through the present's spatial structure. Each photon-Arc is one local instance of the conversion. The propagation of consequences from that conversion — the rippling Machian rearrangement that other parts of the present must undergo to maintain consistency — is what travels at the speed of light. The photon does not travel at speed *c*; *c* is the rate at which what the photon did propagates outward.

5.4 The Arc as instantaneous transaction

A consequence of the above: the photon's Arc itself takes no time. There is no duration between Alice's emission and Bob's reception. The photon is the transaction, and the transaction

is the Arc, and the Arc is not durative because the photon has no temporal extension. The propagating consequences of the Arc — what other observers see, what Bob receives when Philip arrives — belong to the extrinsic side of change and are developed in the companion document. Here the structural point is that the Arc itself is instantaneous; whatever takes time is the propagating-consequences side of one change, not the change itself.

The diary statement (Diary 063A, 27 January 2026, paraphrased): the photon does not exist before, during, or after the transaction in any temporal sense. It exists *as* the transaction. Before the Arc there is the imminent future's possibility-structure that includes a photon-transaction-being-loaded; during the Arc there is the transaction itself, instantaneous; after the Arc there is the new present and the classical Machian rearrangement propagating outward at *c*. The photon is the Arc; nothing else of the photon is.

5.5 What the Arc does not do

Three negatives, to complete the section:

The Arc does not move the photon through space. There is no spatial motion of the photon, because the photon is not in any particular place between emission and reception; there is only the transaction connecting Alice's loss to Bob's gain.

The Arc does not cause the wave function to collapse, in the sense of changing the wave function's content. The wave function described the imminent future; the Arc selects one

possibility from what the wave function described; the wave function does not change because it described what it described and continues to describe it as a fact. What changes is that the imminent future the wave function described no longer exists, because a new imminent future has formed around the new present. The applicability of the wave function lapses, not its content.

The Arc does not require an observer to occur. This is the subject of §6.

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6. The anti-observer position

Quantum mechanics has lived for a century with an awkward question: *what makes a measurement?* The various proposed answers, all of which Virtualism rejects, fall into three broad camps.

The Copenhagen camp says that a measurement requires a classical observer, where *classical* is left undefined or is defined operationally as *whatever produces definite outcomes*. The camp has historically struggled with where to draw the line between quantum and classical, leading to the Heisenberg cut problem and the Wigner's-friend paradox.

The decoherence-without-collapse camp says that what looks like measurement is just the entanglement of a quantum system with its environment, producing apparent classicality without genuine selection. The camp's difficulty is explaining why we

experience definite outcomes at all if no selection ever genuinely happens.

The consciousness-causes-collapse camp says that measurement requires a conscious observer. The camp's difficulty is that the universe was producing definite quantum outcomes for thirteen billion years before any conscious mind existed.

Virtualism's answer is none of these. The universe selects at every Arc, without requiring anything classical, without merely appearing to select, and without involving consciousness. The selection mechanism is structural: the imminent future's extrinsic overdetermination forces selection, and the photon's dimensional profile makes it the object that does the selecting. No observer at all. The diary's compressed statement (Diary 059B, 21 March 2025):

> Does it really need an observer to make a quantum function
> collapse? No, all it takes is secondary change. In this
> regard, the secondary change is a change to the heart of the
> entire Universe, a classical shift, and when that shift
> alters the probabilities of the wave function, hey presto!
> Collapse occurs. You never need an observer because the
> Universe itself is observing, at all times.

This section develops the position against the standard objections.

6.1 The thirteen-billion-year argument

The simplest point. The universe was producing definite quantum

outcomes long before there were any minds in it. Photons were being emitted and absorbed for billions of years before the first nervous system. Quark transitions were happening, stars were burning, atoms were forming and dissociating, all in absence of any conscious observer. If selection required a conscious observer, none of this would have happened, and we would not now exist to ask the question.

The corpus statement (Diary 060A, 11 April 2025):

> Wigner interprets everything as involving consciousness,
> which has to be nonsense, because the Universe definitely
> existed before consciousnesses, unless one takes a very
> strange view of what consciousness is.

The point is decisive but not entirely satisfying on its own, because the consciousness-causes-collapse camp has responses (the universe is in superposition until a consciousness comes into being and retroactively determines outcomes; or the present moment is the only moment and all of cosmic history is a retroactive construction). These responses are baroque, and the principle of parsimony rules against them; but they exist in the literature.

The stronger argument is structural: the selection mechanism *is* the photon's dimensional profile. Whatever consciousness is, it is not the photon. The photon's 100% spatial commitment and 0% temporal commitment are features of what photons structurally are. They are not features minds confer. To demand a conscious observer in addition to a photon is to double-count the selection mechanism: the photon already does

the work; consciousness would have to do it again, redundantly.

6.2 The Heisenberg cut dissolved

The Heisenberg cut problem is: where in nature does the classical/quantum boundary fall? At the level of the atom? The molecule? The cell? The brain? The whole observing organism? Each candidate has counter-examples; the boundary keeps shifting; the problem has no settled answer.

Virtualism's position dissolves the problem. There is no classical/quantum boundary, because there is no permanent quantum domain on one side and permanent classical domain on the other. Every quantum event is an Arc, and every Arc converts extrinsic possibility into intrinsic actuality, and every conversion is therefore the quantum-to-classical transition. The transition happens at every Arc, everywhere, all the time.

The diary's worked challenges to the cut (Diary 063B, 7 February 2026, the Google AI dialogue): individual electrons absorb and emit photons; *that* is an observation event. Individual silicon atoms in a solar panel perform the photo-electric effect; *that* is an observation event. There is no principled stopping point above the electron where measurement suddenly requires something else. Every quantum interaction selects; what makes a "measurement" in the textbook sense is just the cumulative classical signature of many such selections correlating into a macroscopic record.

The Wigner's-friend paradox, in this frame, is not a paradox.

Wigner's friend observes a particle inside a box; Wigner observes the friend-and-box system from outside. The standard treatment asks whether the wave function collapses when the friend looks or only when Wigner looks. The Virtualist answer is: it collapses neither time, because there is no collapse. There is a photon-event between the particle and the friend's apparatus; that is one Arc. There are subsequent photon-events between the apparatus and the friend's eye, between the eye and the brain, between the brain and Wigner's eventual reading of the friend's report; each is its own Arc. The Wigner's-friend setup is a chain of Arcs, each instantaneous, each producing its own selection. There is no superposition waiting for Wigner; there is a record of completed Arcs that Wigner reads after the fact.

6.3 What the universe-observing-universe statement means

The Diary 059B statement *the Universe itself is observing, at all times* is the corpus's most striking formulation of the anti-observer position. It is worth unpacking what it does and does not commit to.

It does not commit to the universe being conscious. There is no claim, in the corpus or in this document, that the universe has experience, intentionality, or any other property associated with consciousness. The universe is not a giant observer in the Wigner sense. It is, instead, the *structural* fact that selection events happen continuously: every quantum exchange anywhere is an Arc, and the cumulative effect of all the Arcs happening everywhere is the universe's ongoing self-update.

The universe observes itself in the sense that quantum events

are the universe's mechanism of producing one self-consistent present after another. There is no external vantage from which the universe is observed; there is only the universe, doing the photon-Arc work that maintains its own consistency. Whatever *observation* in the conscious-witness sense is, it happens much later in the architecture and is itself made of photon-Arcs the way everything is.

This is why the photon-Arc mechanism makes consciousness unnecessary at the structural level *without making consciousness impossible at higher levels of emergence*. The structural account explains how reality is produced; what minds do to and with reality is a separate question that Iconism handles. The Tier 1 claim is just that the structural account does not need minds to do the selection work. Minds, once they emerge, can engage with the structures the structural account describes, in ways Iconism develops.

6.4 Position and momentum as emergent in relation

A subsidiary point worth registering. The corpus statement (Diary 060A, 15 April 2025):

> Position and momentum: You can't measure both. I interpret
> this as being that the particle has neither, but that either
> can emerge from whatever the particle does have. Another way
> to put this is that the particle has its own properties, but
> that position and momentum only emerge in relation to other
> particles, and it is other particles that must be observers.

This is consistent with the structural anti-observer position

and refines it. The particle's intrinsic content — its number-content, its rest-mass facts, its internal structure — does not include position or momentum as possessed properties. Position and momentum are *relational* facts that emerge when the particle's intrinsic content engages with other particles via the Arc mechanism. *Other particles must be observers* in the sense that the relational facts are co-constituted by what the particle is and what the other particles it engages are. No conscious observer is required; what is required is the relational structure of multiple particles' intrinsic contents meeting via Arcs.

This puts the final piece in place. *Observation* as the emergence of position or momentum in relation is the structural co-constitution of relational fact by multiple particles' intrinsic contents meeting via the photon-Arc mechanism. It is structural, relational, and not phenomenal. It is what the universe does at every Arc. No observer in the Copenhagen sense is required, demanded, or even intelligible at this level.

6.5 The position summarised

Six points compress §6:

1. Selection occurs at every Arc, everywhere, continuously. No special class of events called *measurements* distinct from ordinary quantum exchanges.

2. The selection mechanism is the photon's dimensional profile, not any observer's act. The photon's 100% spatial commitment is what allows it to be the Arc.

3. Consciousness is unnecessary for selection at the structural level. The universe selected for thirteen billion years before any consciousness existed.

4. The Heisenberg cut problem dissolves because there is no classical/quantum boundary; every Arc is the transition.

5. The Wigner's-friend paradox dissolves because the chain of observations is a chain of Arcs, each instantaneous, each producing its own selection. No superposition is waiting at the end of the chain.

6. *Observer* in the Copenhagen sense names the relational structure of multiple particles' intrinsic contents meeting via Arcs. It does not name a special class of entities with privileged epistemic powers. Other particles are observers in this purely structural sense.

The reader who has stayed with the argument has now seen the imminent future, the wave function, the photon-selection mechanism, and the anti-observer position laid out. What remains is the destination of the Arc: the present itself, as intrinsically overdetermined reality. That is §7.

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7. The present as intrinsically overdetermined reality

The Arc completes. What it produces is the present. This

section develops what the present is, structurally — what it contains, what it lacks, what it adds to what came before, and why it has the geometry it has.

The cardinal point, repeated against the grain of inherited language: *reality emerges from fact, not the other way around*. Standard intuition treats real things as the primary furniture of the world and treats facts as descriptions of those real things. Virtualism reverses this. Facts are primary. Reality is what facts become when intrinsic overdetermination produces boost. Numbers, and pure facts — including the distant future, the imminent future, and the past — all share the category fact-without-boost. The present has the extra novelty: the dimension of boost, the intrinsic anchor that makes fact-plus-boost into something we can call real.

This makes the present *thin*. The present is fact-plus-boost, and that is all the present is. Everything within the present — the apparent reality of the macroscopic furniture of the world — is *as-if* emergence resting on that thin layer. Tables, chairs, planets, persons: all real in being fact-plus-boost at the foundational level, and all *as-if* classical at the level we walk around in. The *as-if* is not a defect; it is what emergence *is*, from the classical fully-determined past, an *as-was*, through the overdetermined *as-if* of the present, the underdetermined *as-may-be* of the imminent future, to the *as-could-be* of the distant future. These are all parts masquerading as wholes.

7.1 Space as the difference between points

Begin with the spatial content of the present. What is space?

In Virtualism, space is not a container, not a manifold, not an arena in which things are placed. Space is the structural consequence of facts holding different positions. The corpus statement (Diary 060A):

> Space is the difference between points.

This is not a metaphor. It is the definition. There is no space prior to the points whose differences constitute it; there is no space separately from the relations of positional difference that hold between particular facts. *Space is the relational structure of positional difference, considered as an emergent whole.*

The points themselves are of many kinds, forming many kinds of space, but themselves formed from number. Different kinds of number behave in different ways — primes likely define difference on a single dimension only, defining linear sequence rather than space proper; other kinds of number, when combined, produce the multi-dimensional differences that constitute space as we encounter it. The full account of how numerical structure gives rise to different kinds of difference belongs to numerogenesis (`numerogenesis_v003.md`); here it is enough to note that space-as-we-know-it is the product of multiple numerical facts combining into structures rich enough to support 3D differences.

The points themselves are of two kinds.

Virtual points are positionless facts — bundles of numerical values with no rest mass, no intrinsic boost, no extrinsic anchor. The classic example is the centre of mass of an extended object: a perfectly real fact about the object, with completely defined properties, but with no occupied position in 3D space because it is not the kind of thing that occupies position. The Earth's centre of gravity is a virtual point. So is the centre of any classical whole. Virtual points are facts about other facts, not directly occupants of space.

Real points are facts with rest mass and therefore with intrinsic boost. They have intrinsic overdetermination resolved into the imaginary dimension, and as a consequence they occupy position in 3D space — they are *somewhere*, where *somewhere* is constituted by their differences from other real points.
Real points are what occupies space; virtual points are what space contains as facts-about-its-structure without being occupants of it.

The corpus statement on the distinction (Diary 060A):

> Taken alone, the parts of a point may not have what would be
> considered spatial dimension, and when combined they form a
> point that itself may not have spatial dimension, or which
> may, depending on the nature of the numeric facts of the
> point.

A point's having spatial dimension is not its default condition; it is what some configurations of numerical facts produce when the configuration includes the boost-condition. Without boost, a point is a fact-bundle that does not occupy space. With boost,

the same fact-bundle is now a real point occupying position by virtue of its differences from other real points.

This is the cleanest possible statement of what space *is*. It is the structural consequence of having real points — boosted fact-bundles — at all. Space is not added to the universe; it is what the universe has insofar as the universe contains things with rest mass.

7.2 Particles as bundles of numbers

The point-as-fact-bundle picture generalises to the standard furniture of physics. Particles, in this frame, are bundles of numerical values with certain internal arrangements. The corpus statement (Diary 060A):

> Particles are then just bundles of numbers, or perhaps we
> should say numbers divided into bundles, with certain
> internal values that define the nature of the particle.

There is no further fact about what a particle is *made of*, beyond the numerical facts that constitute it. The standard question — *what is an electron really?* — does not have a deeper answer in Virtualism's frame, because the standard question presupposes that there is some non-numerical substance that the electron is. There is not. The electron is its numerical facts, including its mass facts, its charge facts, its spin facts, and whatever further numerical facts its complete characterisation requires.

This may sound deflationary — *the electron is just a bunch of

numbers* — but the picture has the same content as the standard picture insofar as physics is concerned. The standard picture characterises the electron by its numerical properties and treats those properties as what physics has to say about electrons. Virtualism takes this characterisation at face value and refuses to add a further substantial layer underneath. The numbers are the electron; the electron is its numbers; there is nothing more to say structurally, though there are many further numerical facts to discover.

The diary's stronger statement (Diary 048):

> There is nothing more that we can say of an electron, say,
> than that it has certain numerical properties, many of
> which are uncertain, that is they don't properly exist until
> looked for.

The *don't properly exist until looked for* part is the imminent-future point made earlier: many of the electron's numerical properties exist as facts of the imminent future (possibilities) but not as facts of the present (actualities) until a particular Arc resolves the possibility into one actuality. Position and momentum are the standard examples; spin along a particular axis is another; many others apply at different levels of structural specification.

7.3 Mass as boost into the imaginary

The defining feature of the present, the *one extra novelty* that fact-plus-boost has over fact-alone, is boost. Boost is the intrinsic-overdetermination-resolution dimension. It is

what makes the present *the present* rather than just another configuration of imminent-future possibility.

The corpus's foundational statement (Diary 047, 14 February 2022):

> Mass being equivalent to energy has to be taken, not just
> seriously, but literally… both energy and mass produce the
> same thing, a change in position into the imaginary, which
> we can call a boost, that is no other than a mathematical
> rotation from plainness to Lorenz transformed.

$E = mc^2$ is read here not as a quantitative equation linking two otherwise separate properties, but as a structural identity. Mass and energy *produce the same thing*: a rotation into an imaginary dimension. The dimension is imaginary in the mathematical sense (it involves the square root of negative one as a structural feature) and emergent in the Virtualist sense (it appears as the resolution of intrinsic overdetermination, not as a pre-existing feature of the universe). It is what *boost* names.

The mass of an object is its degree of rotation into the boost dimension. A massive object has internal numerical facts that require resolution into the imaginary axis; the resolution is the object's boost-rotation; the amount of boost-rotation is what we measure as mass. A massless object — the photon being the principal example — has no internal numerical facts requiring resolution, and therefore no intrinsic boost.

The *as-if* journey of the photon confers energy equivalence,

i.e. extrinsic boost, on the mass-bearing receiver. The photon itself does not carry boost; what it does is transfer between mass-bearing objects the energy-equivalent quantity that modifies the receiver's boost-shape.

The corpus's stronger statement on what this means for the present (Diary 062A, 24 November 2024):

> What it means to exist as something real is to have 3D
> position, NB not 4D, not 3+1D, but 3D — time is not a
> factor here. But, mass is a factor — to have mass is to be
> rotated into an emergent dimension, giving a relativistic
> boost, i.e. a la Einstein and GR.

This is the clean statement. Real existence is 3D space *plus* boost. The fourth dimension that distinguishes real existence from mere possibility is *not* time. It is the boost-rotation from rest mass. Time, whatever it is, is not a structural feature of the present's geometry. The present is 3D-plus-boost; the fourth coordinate, when we write things in 4D notation, is the boost dimension; and what mainstream physics has long treated as time in that fourth slot is, in Virtualism's reading, a misidentification.

7.4 Boost as the dimension of presentism

This is the deepest structural point §7 makes, and it is what justifies presentism in Virtualism's frame.

The standard objection to presentism — that only the present exists — is that it cannot accommodate special relativity, which

treats time as a dimension on a par with space and which has events at different points in 4D spacetime existing equally. The block universe is the standard relativistic ontology and presentism appears to contradict it.

Virtualism's answer is that the fourth dimension of 4D relativistic geometry is not time. It is boost. And boost exists *only* in the present as an intrinsic property of objects. There is no real extended boost-as-property running through past, present, and future. There is only the present's boost, which is what makes the present present. The block universe is correct that there is a 4D structure; it is wrong that the fourth dimension is time. The fourth dimension is boost, and boost is the dimension of presentism — the dimension that exists if and only if reality is happening *now*.

This is what Diary 048 (4 May 2022) is doing when it says:

> In GR and QED, Time is seen as the same as imaginary boost,
> only in Loop Quantum Gravity does Time disappear to be
> replaced by the shape of quantized space. In Emergent Time
> there is no conflation of Time with Space, nor any other
> thing.

The conflation of time with imaginary boost is GR's and QED's mistake. Imaginary boost is real; the conflation with time is not. Once the conflation is cleaned up, GR's geometry stands — the 4D structure, the Lorentz transformations, the curvature-of-spacetime mathematics — but its interpretation changes. The fourth dimension is the dimension of *being present at all*, and what shifts when we Lorentz-transform between frames is the

distribution of how the present's boost manifests, not how events are located in a pre-existing 4D manifold.

Boost, as a dimension, is orthogonal to the present, it is orthogonal to the past, and it is orthogonal to any kind of future. But only in the present is it an *intrinsic property of objects*, thereby making them real. The dimension as such is universal; the property-bearing instantiation is exclusive to the present.

The companion document develops the geometry of this in detail — in particular the 4D-hypersphere structure with Dave-as-timelike-centre that the corpus develops in Diary 060A and elsewhere. Here it is enough to land the structural claim: *boost is the dimension of presentism, the fourth coordinate is not time, and the present is the only place where boost exists as an intrinsic property of real objects*.

7.5 Mass, momentum, and what the present carries

§3 and §5 set up the position/momentum case as the structural reading of Heisenberg uncertainty. This subsection resolves it on the present side, and in resolving it makes a structural identification that the standard treatment misses: *mass, momentum, and gravity are the same intrinsic content viewed from three angles*.

Rest mass is symmetrical boost. A particle with rest mass has its intrinsic numerical content resolved into the imaginary dimension as a balanced, symmetrical rotation. The rotation has no preferred direction; the boost-shape sits evenly with respect

to its surrounding structure. This is what rest mass *is* — not a quantity additional to the particle's facts but the symmetrical resolution of those facts into the boost dimension.

Momentum is lopsided boost. A particle with momentum has *the same intrinsic boost-content*, but resolved asymmetrically. The same rotation that gives rest mass, now skewed so that the particle's relations to other masses become unbalanced. Momentum is not an additional property of the moving particle; it is the particle's own boost-content under a different shape. The lopsidedness causes greater change in relation to other objects than balanced boost would, and that differential change is what momentum makes available.

Gravity is the process of unbalancing or rebalancing boost. Gravity-Arcs (the companion document's subject) repose mass-bearing objects by altering their external relationships. The process is structurally the same kind of operation as the photon-Arc — extrinsic subtract-and-add via virtual paths — but instead of energy-square subtracted from Alice and added to Bob, it is the mass-position itself being subtracted from one place and added to another, by alteration of external relationships. Gravity-acceleration is the rate at which the lopsidedness is being added; what we call accelerated motion is the cumulative effect of multiple gravity-Arcs uneven-rotating the intrinsic boost.

So *mass, momentum, and gravity* are not three separate things the universe has but one structural identity viewed from three positions:

- *Symmetrical boost* = rest mass.
- *Lopsided boost* = momentum.
- *The process of unbalancing or rebalancing* = gravity.

The same boost-rotation under three descriptions. Mass is what the symmetrical version *is*; momentum is what the asymmetrical version *is*; gravity is what the *process of making one into the other* is. None of these requires the particle to be doing anything beyond its intrinsic boost-rotation; what varies is the shape of the rotation and what process is currently changing it.

This is significantly different from the standard picture in which momentum is mass times velocity and velocity is a separate kinematic fact about the particle's motion through space. In Virtualism, there is no separate motion; there is only the lopsided boost, which when expressed in classical 3D terms looks like motion. The companion document develops the full geometry; here the structural point is that *mass and momentum are the same intrinsic content, with momentum being mass under asymmetrical rotation*.

This refines the Heisenberg reading. Position is the configuration of extrinsic relata frozen into 3D space — the positional facts that the photon-Arc fixes when it completes. Momentum is the lopsided-boost configuration that determines how mass moves in relation to other masses — the intrinsic configuration that gravity-Arcs fix when they complete. The two are not competing present-states; they are different aspects of the present's boost-load, each fixed by a different kind of Arc.

> *A note on momentum as a transitional quality.* What
> philosophers sometimes call momentum-as-tendency-to-motion is,
> in this frame, the lopsided boost's *as-if* pressure toward
> the next imminent-future configuration. The present's lopsided
> boost is already determined; what it *does* by being lopsided
> is push the imminent future toward asymmetrical possibilities
> rather than symmetrical ones. Momentum thus links the present
> to the imminent future in a way symmetrical mass does not.
> Position, by contrast, links the present to the past — it is
> the post-Arc positional configuration that streams away as
> classical fact. Mass alone links the present to itself —
> intrinsic, balanced, the present's own anchor.

Why not both position and momentum *fully* at once? Because the present's intrinsic overdetermination — its boost — is what carries the load. The boost-dimension can express its rotation as either symmetrical (mass with definite position) or asymmetrical (mass with definite momentum-shape determining further motion), but the dimension cannot bifurcate into maintaining both expressions simultaneously. The Arc that produces the present resolves the imminent-future under-determination by selecting which expression the boost-rotation will take, and the un-selected expression remains in the imminent future as a possibility that did not fall this time.

This is also why Heisenberg's principle is not a measurement limitation but a structural feature of what the present *is* and what the imminent future *is*. There is no measurement disturbance making both unknowable. There is the structural fact that the present's single boost-dimension can express itself in one rotational configuration at a time, and that the

universe alternates which expression it carries depending on which kind of Arc engages a given particle. Photon-Arcs fix the position-side; gravity-Arcs fix the momentum-side. The universe at no point has both as facts of the present at once, because the present cannot hold both.

The aphorism candidate the corpus supplies (Diary 060A, 9 April 2025):

> Heisenberg's uncertainty principle only applies to objects
> with energy, i.e. mass equivalent rotation. Virtual objects,
> particularly centres, aka wholes, of objects without mass,
> i.e. facts, do not fall into this category.

Virtual points — centres of mass, factual wholes — have no intrinsic boost and therefore no uncertainty. The Earth's centre of gravity is exactly where it is; there is no fact-of-the-imminent-future about its position that the present has not yet resolved. Virtual points exist purely as factual structure without intrinsic overdetermination to resolve; the uncertainty principle does not bind them because there is no boost-load to distribute. Uncertainty is the signature of mass-bearing real things, not of virtual factual structure.

7.6 The unboosted and boosted accounts of position

A subsidiary structural point that bears on the connection to gravity, which the companion document develops, but which needs stating here because it falls out of the boost picture directly.

Every real object has *two* positional descriptions in the

present. The corpus statement (Diary 060B, 19 May 2024):

> All real objects have a spatial position that has two
> connected values; the unboosted Euclidean value, that
> disregards mass and the gravitational curvature of space;
> and the boosted non-Euclidean value, that is the former plus
> the effects of gravitational boost of every cause.

The first description is the Euclidean position — where the object would be if its boost did nothing to its spatial relations, the position it occupies considered as pure positional difference from other real points without regard to mass effects. The second description is the actual position — where the object *is*, given that boost interacts with the boost of every other mass-bearing thing in the universe and produces what Einstein called the curvature of spacetime.

Both are facts. The unboosted Euclidean position is a fact because it is what the object's pure positional content would imply ignoring mass. The boosted non-Euclidean position is a fact because it is the actual configuration the object's mass imposes on its spatial relations. Mainstream physics deals exclusively with the boosted picture, because that is what is measurable; Virtualism distinguishes the two because the distinction is structurally important.

The distinction matters here because it clarifies what space *is*. Space is the unboosted-Euclidean structure of positional difference — the bare relational geometry between real points considered without their mass-effects. Gravity is what mass does to that structure — the boost-rotations that warp the

Euclidean structure into the curved non-Euclidean structure that we actually observe. The companion document develops gravity in this frame in detail. Here the point is just that the present has both: a Euclidean spatial structure and a boosted modification of it, with the modification being gravity's signature on space.

7.7 The present as thin and the as-if as classical

The structural points compress into a single picture.

The present is fact-plus-boost. *Just* that. Fact provides the extrinsic-relational structure — the positional differences, the numerical content of particles, the configuration of the universe's facts at this moment. Boost provides the intrinsic anchor — the imaginary-axis resolution of intrinsic overdetermination, the dimension that makes facts into real things by giving them position-in-3D-by-virtue-of-boost-relations. That is the whole of what the present is, considered structurally.

Everything else is *as-if*. The tables and chairs and planets we walk around in are *as-if* classical emergences from the fact-plus-boost foundation. They are real in the sense that their constituent facts have boost; they are classical in the sense that their internal configurations are fully-determined and stable across many Arcs of quantum exchange; they are *as-if* in the sense that what we encounter as macroscopic stuff is the emergent appearance produced by relations among the underlying fact-plus-boost structure, not a separate substantial layer of reality. *Parts are real, while wholes are

facts*: every macroscopic whole is a fact about its parts, *as-if* itself an entity at its own level of emergence while being structurally a relation among its constituent parts.

The as-if-ness is not a defect. It is what *classical* means. The classical world is the fully-determined emergent layer where the constituent quantum-level overdetermination has already resolved into stable patterns that behave reliably as things. Classical simply means that its actuality has been fully determined, and is true. The most recent classical position is also identical with the truth of the present, but the reality of the present is just that layer of fact-plus-boost; reality emerges from fact, not the other way around. Pure fact is closer in nature to that of number, and reality has an extra feature — a novelty called boost.

This is the Virtualist picture of the present in full. Mainstream physics has the same picture insofar as it concerns the actual mathematics and the observable phenomena; what Virtualism adds is the structural reinterpretation: the fourth dimension is boost not time; reality emerges from fact rather than facts being properties of pre-existing real things; the present is thin and the macroscopic world is *as-if* classical; mass and momentum are the same intrinsic content under different rotational symmetries; position and momentum cannot both be carried at once because the boost-dimension can express itself in only one rotational configuration at a time.

The reader who has stayed with the argument now has the positive picture of what the imminent future is, how the Arc converts it to the present, and what the present consists of.

What remains is the entanglement positioning and the close.

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8. Entanglement positioning

Entanglement is the phenomenon that historically forced the quantum/classical debate into its present form. Bell's theorem showed that no local hidden variables theory can reproduce the quantum predictions for entangled systems, and experimental violations of Bell's inequalities have confirmed the quantum predictions over and over again. The standard interpretive options have been: non-locality (the universe has spooky action at a distance), super-determinism (everything was set up in advance), or denial of realism (the entangled properties do not exist until measured).

Virtualism's position is none of these. It says: entanglement is exactly what is to be expected once one understands that locality is emergent rather than fundamental. The Bell test result, taken in this frame, is not a paradox demanding a strange interpretation. It is a positive datum supporting the emergence-of-locality picture that Virtualism already holds.

This section states the position briefly. The full development of entanglement-and-time belongs in the companion document, because the mechanism of how entanglement-events do not produce the Machian rearrangement that photon-events do — and therefore do not produce apparent time-passage in the same way — is part of the time-as-emergent story. Here the goal is just to position

Virtualism on entanglement and to clarify what distinguishes entanglement-Arcs from photon-Arcs.

8.1 The Bell test as evidence, not paradox

The corpus statement (Diary 064B, 5 May 2026):

> The Bell test is the key that releases us into a landscape
> of Freedom.

This is the corpus's most dramatic formulation, and it captures the structural point. The Bell test result is liberating, not puzzling. It releases physics from the block-universe-cum-locality picture that mainstream interpretation has assumed and shows that the universe's structure is something other than that picture allows.

What Bell's theorem proves is that no theory which combines *local* dynamics with *classical realism about properties* can reproduce the quantum predictions. Mainstream physics has typically responded by giving up classical realism (Copenhagen) or by giving up locality (de Broglie-Bohm) or by giving up single-outcome-ness (Everett). Virtualism gives up something different: the *fundamentality* of both locality and classical realism. They are both emergent in Virtualism's frame; neither needs to hold at the level where Bell's theorem operates; therefore Bell's theorem's exclusion of theories combining them is not a constraint on Virtualism.

Locality is emergent in Virtualism because space itself is emergent. Space is the structural consequence of facts holding

different positions, where the holding-different-positions is itself produced by the boost-dimension's resolution of intrinsic overdetermination. There is no fundamental space prior to the facts whose differences constitute it; there is therefore no fundamental locality. What looks like locality from inside the present's 3D structure is the structural consequence of how boost-relations resolve to a stable 3D configuration. Two particles described as far-apart in 3D are not, at the structural level, separated by anything fundamental; their 3D-spatial-difference is the emergent expression of the universe's overall fact-structure as it manifests in space.

So when entangled particles produce correlated outcomes regardless of 3D-spatial separation, Virtualism does not need to explain this by either spooky action across space, or pre-arranged hidden variables, or many-worlds branching. The correlation is the structural fact of the entanglement; the 3D-spatial separation is an emergent matter that the correlation does not need to traverse, because the correlation holds at the level of the universe's fact-structure, which is prior to the emergence of space.

The Bell test as evidence: the universe in fact behaves as if locality is emergent rather than fundamental. This is what Virtualism predicts. Bell's theorem is not a puzzle for Virtualism; it is confirmation. The Bell test stands as a proof-point that supports Virtualism without depending on it — it is a standalone empirical result that any non-fully-classical account of nature must accommodate, and Virtualism happens to accommodate it cleanly.

8.2 What distinguishes entanglement-Arcs from photon-Arcs

The structural difference between these two kinds of Arc is important and underlies why time-appears-to-pass for the photon case but does not for the entanglement case.

A photon-Arc transfers *energy* — a square quantity, two-dimensional in content. The energy transfer requires positional difference between emitter and receiver, and the transfer produces a corresponding change in the boost-shape of every other mass-bearing thing in the universe (which the companion document develops as the Machian rearrangement that emerges as time).

An entanglement-Arc, by contrast, transfers *spin* or some other purely *informational* property. There is no energy transfer. The corpus statement (Diary 059B, 24 February 2025):

> The photon case causes time to emerge through energy
> transfer. Entanglement does not, because spin is not
> gravitational.

Spin is informational without being energetic. An entanglement-Arc — the moment one of two correlated particles is brought into some specific configuration of its spin facts — propagates the correlated spin facts of the other particle without any energy transfer between them. There is no Machian rearrangement, no boost-shape change in the surrounding universe, no apparent time-passage between the two events. The two particles' spin facts correlate because they share factual structure, not because anything has propagated between them in

3D space.

This is what *spookiness* gets at. The entanglement events look spooky because they do not exhibit the time-passage signature that energy-transferring photon events do, and the absence of that signature is misread as instantaneous-action-at-a-distance. The Virtualist reading: nothing acts at a distance because there is no fundamental distance; what happens is that shared factual structure expresses itself simultaneously in emergent 3D space when the structure is engaged at either end. The two ends are not separated by anything that propagation would have to traverse; their 3D-separation is an emergent appearance whose underlying factual structure connects them directly.

8.3 What this section claims and what is deferred

Three things claimed here, briefly:

The Bell test is positive evidence for Virtualism's emergence-of-locality picture, not a paradox demanding strange interpretation, though it stands as evidence independent of Virtualism — it would constrain any account that maintained classical locality.

Entanglement-Arcs differ from photon-Arcs in transferring information rather than energy, and this difference is why photon-events produce apparent time-passage and entanglement-events do not.

The correlations observed in entanglement experiments are the

structural consequence of shared factual structure, not the propagation of influence through emergent 3D space.

Three things deferred to the companion document:

How exactly the Machian rearrangement following a photon-Arc produces what we measure as time. This requires the full emergent-time mechanism, which is the companion document's central subject.

How the speed-of-light constraint applies to one but not the other. The propagation rate that gives the apparent past-of-Alice that Bob sees when Philip arrives belongs to the photon-side story; the entanglement-side story has no analogous propagation because no Machian rearrangement is occurring.

How the corpus engages with specific philosophical positions on entanglement (the Builes & Impagnatiello critiques of presentism, the Wigner's-friend and EPR thought experiments). The companion document picks these up because it has the time-machinery to address them.

The reader now has the present document's full positive picture. What remains is the close.

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9. Forward pointer and close

The present document has developed the change-side of the quantum/Machian distinction — intrinsic values leaping to

wherever they can, one Arc at a time, producing one new present at each Arc. The mechanism: photon-selection. The structural backdrop: extrinsic overdetermination of the imminent future, intrinsic overdetermination of the present. The fourth dimension: boost, not time. The wave function: fact governing reality without being real itself. The selection event: no observer required, no consciousness involved, no mystery about who or what does the work. The universe selects at every Arc, structurally, by virtue of the photon's dimensional profile.

The other side of change — when one changes, all change — remains to be developed. It is the subject of the companion document, *Past and Machian Gravity*. That document picks up where this one leaves off and develops:

- The propagating consequences of each Arc, expressed as Machian rearrangement of everything in the present that bears the constraint of the new Arc.
- What Bob sees when Philip arrives — the apparent past of Alice, the speed-of-light propagation of consequences, the past as factual signature received late.
- Time as the visible signature of Machian-inertia-as-applied-paradox. *Inertia is being unable to race ahead.* What clocks measure: accumulated paradox-resolution, the rate at which value-differences propagate their consequences.
- Mass, momentum, and gravity worked out as the same intrinsic content in three guises. Gravity-Arcs as the mechanism of rebalancing boost. Acceleration as the rate of un-balancing.
- The past as factual but not real. The classical waterfall of fact streaming away from the present. Pure facts persisting

after the realities they were facts about have demerged.

- The fire-to-earth-to-air-to-water completion of the Mandala cycle at the level of reality-production. How the past's facts constrain the next imminent future via Machian feedback.
- The deeper question that quantum-side and Machian-side together address: *what is time, really, given that the Arc itself takes no time?*

The two documents together constitute Virtualism's account of the temporal arc and the production of reality. They cannot be read in isolation — the quantum side and the Machian side are two inextricable aspects of one change — but they can be developed sequentially, with this document the first half and the next document the second.

9.1 The position summarised

Eight points compress what this document has done.

1. The imminent future is extrinsically overdetermined possibility-space: all the facts of the present *except boost*, plus all dimensional facts of possibility. It is loaded dice on the brink of falling.

2. The wave function is the factual structure of the imminent future. A calculation that needs no calculator. One in principle, regional in practice via the relativistic constraints built into its own factual content.

3. The Arc is the selection event by which one possibility

from the imminent future becomes the next present's actuality. The photon is the structurally unique object capable of acting as the Arc, by virtue of its 100% spatial commitment and 0% temporal commitment.

4. No observer is required at the structural level. The universe selects at every Arc continuously, has been doing so for thirteen billion years, and would continue to do so if no consciousness ever existed.

5. The present is intrinsically overdetermined reality: fact-plus-boost. The fourth dimension that distinguishes the present from possibility is *not* time. It is boost.

6. Space is the difference between (real) points. Reality emerges from fact, not the other way around. The macroscopic world we walk around in is *as-if* classical emergence on top of the thin fact-plus-boost foundation — *parts masquerading as wholes*.

7. Mass, momentum, and gravity are the same intrinsic content under different rotational symmetries: symmetrical boost, lopsided boost, and the process of unbalancing or rebalancing. Heisenberg uncertainty is the structural signature of the present's boost-dimension being able to express itself in only one rotational configuration at a time. Virtual points (factual wholes without intrinsic boost) are not bound by uncertainty.

8. Entanglement is positive evidence for the emergence-of-locality picture. Bell's theorem is not a paradox but a

confirmation. Entanglement-Arcs differ from photon-Arcs in transferring information rather than energy; the difference is why one produces apparent time-passage and the other does not.

9.2 Aphorism candidates

Drawn from the corpus and the developing argument, candidates for placement in a final close, the Acta paper, or other publication-ready material:

> Many Worlds were not in fact worlds, but possible futures.
> *(D047)*

> The future cannot change, because it has nothing to change
> from. *(D063B)*

> Now is the measurement that confers reality. *(D063B)*

> The Wave Function is just fact governing reality, or to put
> it another way, truth overcoming difference. *(D063B)*

> A calculation that needs no calculator. *(D063B)*

> The photon is the only thing to reach the speed of light,
> you could even call it the speed of measurement. *(D064B)*

> You never need an observer because the Universe itself is
> observing, at all times. *(D059B)*

> The Bell test is the key that releases us into a landscape

> of Freedom. *(D064B)*

> Where the distant future is constrained emptiness, the
> imminent future is loaded dice. *(this document, §3.2)*

> Reality emerges from fact, not the other way around.
> *(this exchange)*

> Overdetermination is creative of objective states.
> *(this exchange)*

> Parts are real, while wholes are facts. *(D060A)*

> Existence is as if. *(asif.vision — and throughout
> Virtualism)*

9.3 Close

Existence is *as if*. The universe is real, fully, in being fact-plus-boost; the universe is also *as if*, throughout, because what fact-plus-boost produces at higher emergent levels is the classical world we walk around in, and the classical world is the *as-if* layer on top of the foundational fact-plus-boost. Reality and *as-if* are not in tension; they are the same situation viewed from different structural levels. Parts are real; wholes are facts; the wholes we encounter as the world are parts masquerading as wholes at their own level of emergence.

The present is real because it has boost. The imminent future is factual because it has the wave-function structure of

possibility. The past — the subject of the companion document — is factual because the truths produced by completed Arcs persist as the facts of what happened, without continuing to be real because they have lost the present's boost. These three modes of existence are not separate kinds of being. They are the three aspects of the cycle of reality-production: what is imminent, what is real, and what has been; what loaded the dice, what fell on this Arc, and what remains as the record of this and all previous Arcs.

This document has developed the first two: what is imminent and what is real, and the Arc by which one converts to the other. The companion document picks up what has been, and develops what time is, and what gravity is, and what the cycle's other half looks like once seen properly. Together they are the Tier 1 account of how reality works in Virtualism: not a block, not a flow, not a sequence of frozen moments, but the continuous production of one new present after another by the Arcs that the universe's own overdetermination requires.

End of v1.0. Document consolidated from working drafts v0.1, v0.2, and v0.3, incorporating author edits and the mass-momentum-gravity-as-same-thing refinement from the consolidation exchange. Companion document `handover_to_gravity_doc.md` records material flagged for development in the next document.