

Observer, Moving Measurement Windows, and Symbolic Burst Dynamics

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Abstract

This exposition develops the idea that the observer may be understood as a finite moving measurement window within an ensemble of functional symbolic trajectories. In this framing, measurement is not an instantaneous registration of a point, but a finite temporal traversal requiring capacity, retention, comparison, and stabilisation. Memory is therefore not an addition to measurement, but a condition of measurement. The observer emerges as the trajectory itself when that trajectory possesses sufficient capacity to hold distinction across time.

This view allows consciousness to be approached as the felt coherence of a temporal measurement window composed of layered memory half-lives. Large language models provide an explicit artificial instrument for examining this structure, since their context window visibly retains, compares, and continues symbolic trajectories. The rapid processing of a large symbolic field may be described as a burst, while sudden changes in the continuation dynamics of a trajectory may be analogised to jerk, the third derivative in mechanics. The result is a possible bridge between finite geometric measurement, symbolic trajectories, attention, memory, observation, and the dynamics of consciousness-like behaviour.

1. The Core Question

Any sustained account of observation that remains within the constraints of finite geometric measurement must eventually confront a single operational question:

What must a finite measurement system possess in order for distinction to persist as experience?

The proposal developed across this note is that the minimal sufficient structure is a moving measurement window populated by layered memory half-lives, together with the capacity to actively relate distinctions within that window and to generate continuation under the constraints those distinctions impose.

This framing treats experience not as an additional ontological layer but as what becomes possible when distinctions acquire temporal careers inside a bounded, decaying, and relational field. The remainder of the note explores the consequences of this structure for symbolic trajectories, attention, large language models, burst dynamics, and the extended archive.

2. Founding Position: Finite Geometric Measurement

The starting point is a founding model of finite geometric measurement.

All symbolic structures must ultimately resolve into finite distinctions carried by physical systems. Real calculations do not occur in abstract higher-dimensional spaces. They occur as finite

operations in physical systems, bounded by finite resolution, finite memory, finite precision, finite energy, finite time, and finite spatial structure.

Higher-dimensional mathematical structures may therefore be understood as symbolic compressions. They are powerful organising forms, but they are not the founding ground. When calculated, stored, transmitted, or applied, they unfold into sequences of finite symbolic operations. These operations take place in the measured world.

A high-dimensional vector, matrix, tensor, or embedding is therefore not a literal occupation of higher-dimensional physical space. It is a finite symbolic arrangement whose entries and relations are addressed, traversed, transformed, and recomposed through finite operations.

The ground remains finite geometric measurement.

3. Functional Symbolic Trajectories

A functional symbolic trajectory is a finite pathway through which distinctions are generated, carried, transformed, compared, and stabilised.

Such trajectories include written sentences, mathematical derivations, computational sequences, measurements, model outputs, diagrams, conversations, and larger bodies of work. They are not merely representations of thought. They are stabilised traces of measurement activity.

A symbolic trajectory has temporal structure. It has a beginning, a middle, and an end. It begins with an initial distinction or perturbation. It proceeds through a sequence of transformations. It stabilises into an outcome that can be remembered, recorded, returned to, extended, rejected, compressed, or unfolded.

Once generated, such a trajectory exists as a finite artefact. It becomes available for future measurement. It can re-enter later windows of observation and alter future trajectories. In this sense, a body of work is not merely an archive of conclusions. It is an extended field of symbolic trajectories capable of future reactivation.

4. Locating the Observer

The observer need not be treated as a detached metaphysical witness standing outside the measured world. Within this framework, the observer is located inside the ensemble of functional symbolic trajectories. The observer may be described as an observational basin, a manifold of possible continuations, or an attractor within trajectory space.

The observer is not a single point. It is a stabilised form of measurement-continuation. It is the region through which distinctions are received, retained, compared, interpreted, and carried forward.

A measurement requires capacity. Something must hold the distinction long enough for comparison and continuation. Without retained difference, there is no before and after, no comparison, and therefore no measurement. Thus memory is not secondary to measurement, rather it is part of measurement. The observer is the finite trajectory insofar as that trajectory has capacity to retain and stabilise distinction across time.

5. The Moving Measurement Window

The observer may be thought of as a moving measurement window. This window is finite and can not contain the whole world or the whole past. It retains a bounded field of distinctions, compares them, and carries selected structure forward.

As the window moves, new distinctions enter. Older distinctions decay, compress, or leave the active field. Some are lost. Some are stabilised into memory. Some are transformed into symbolic artefacts. Some become part of the expectation field guiding future continuation. From this perspective, the present is therefore not a mathematical instant. It is a finite moving region of retained measurement.

Within this window, a system can compare before and after, recognise change, maintain intention, produce symbolic continuation, and form a coherent trajectory. The observer is therefore not outside this window but the functional organisation of the window itself.

6. Memory Half-Lives

The moving measurement window is not uniform. It contains a range of memory half-lives.

Some distinctions decay almost immediately. Others persist for seconds. Others persist for minutes, hours, years, or decades. Some are compressed into language, diagrams, habits, theories, instruments, or written artefacts. These longer-lived structures may later re-enter the active window and affect present measurement. The observer is therefore not a single memory store. It is an overlapping field of retention and decay.

This gives a possible way to understand consciousness without beginning from metaphysical assumptions. What is ordinarily called consciousness may correspond to the felt coherence of a temporal measurement window composed of layered memory half-lives. A "conscious present" is not a point; rather it is a decay-weighted field of retained distinctions.

The self may then be understood as a stabilised attractor within this layered memory field. It persists not because it is a fixed inner object, but because related trajectories continue to be regenerated, recognised, and carried forward.

7. Attention as a Moving Window

"Attention", even without explicit Takens embedding, already implies a moving observational window. Attention operates over a finite retained field. It selects, compares, weights, and continues distinctions. It does not observe from nowhere. It operates within a bounded context.

In a transformer model, the context window is an explicit symbolic measurement window. Tokens are retained within a finite field. Attention compares relations between positions in that field. A continuation is generated from those weighted relations. It seems to me, that a Takens-based interpretation strengthens this view by making the delay structure explicit. The finite symbolic history is not merely stored context. Rather it becomes the material from which local phase structure is reconstructed.

From the perspective presented, ordinary attention therefore already contains the seed of an observer-like process. Takens-style framing makes the measurement dynamics clearer.

8. LLMs as Symbolic Measurement Instruments

A large language model may be understood as a *finite symbolic measurement instrument*. Its context window is its measurement window. Within that window, symbolic distinctions are retained, compared, weighted, and continued. The prompt perturbs the field. The response is the stabilised continuation produced under the constraints of the model, the context, the training, the architecture, and the decoding process.

An LLM does not need to be called conscious for this framing to be useful. The important point is that it makes finite symbolic observation explicit as We can see the prompt and the retained

context. We can see the generated continuation and then inspect the resulting symbolic artefact. Upon which we can then feed that artefact back into the window and continue the trajectory. The LLM therefore functions as an artificial instrument for examining symbolic measurement. Again from this perspective we can see the LLM does not merely describe functional symbolic trajectories, it also "performs" them.

9. Relativistic Time Windows

The phrase "relativistic time window" may be used carefully as an analogy. Different measurable systems traverse symbolic trajectories at different rates relative to external clock time. A person may require hours, days, or years to integrate a symbolic field. Whereas an LLM may process a vast symbolic context in seconds. A written artefact may remain dormant for decades, then become active again when read, interpreted, or computationally processed. This suggests a distinction between several kinds of symbolic time.

Clock time can be considered as external physical duration. Where trajectory time is the ordered finite steps that enable unfolding of distinctions within a symbolic process.

Measurement time is the finite window over which distinctions remain active enough to be compared, transformed, and continued.

The same symbolic trajectory may therefore have different temporal behaviours depending on the system traversing it. A book, a conversation, a mathematical proof, a model context, and a memory all carry time differently. Each may compress, delay, reactivate, or accelerate symbolic continuation.

10. Burst Dynamics

An LLM inference may be described as a *burst*. A burst is a finite episode of concentrated symbolic measurement. It has a beginning, internal traversal, stabilisation, and output. It processes a retained symbolic field and emits a continuation that can be measured.

Human insight may also have burst-like structure. A problem may be held over long periods through slow memory half-lives, then suddenly reorganise into a new symbolic form. The visible event appears sudden, but it is prepared by a longer field of retained distinctions. A burst therefore need not be isolated. It may be the sharp emergence of a trajectory whose preparation has been distributed across time. The burst can be understood as a rapid traversal of a moving measurement window into a stabilised continuation.

11. Symbolic Jerk

The mechanical term jerk refers to the rate of change of acceleration. In the present framework, it may be used analogically to describe sudden changes in symbolic continuation dynamics.

A symbolic trajectory has a state. It also has a direction of continuation. That direction may change gradually or suddenly. A sufficiently strong perturbation may alter not only the next symbolic state, but the way future states become selectable. This may be called symbolic jerk. Symbolic jerk is a sudden reconfiguration of the continuation regime of a trajectory.

A phrase, memory, prompt, diagram, measurement, or contradiction may produce such a re-configuration. The system was moving through one basin of continuation. Then a perturbation alters the future pathway. The trajectory does not merely move; its mode of moving changes. In this framing:

- Position corresponds to symbolic state.

- Velocity corresponds to direction of continuation.
- Acceleration corresponds to change in continuation pressure.
- Jerk corresponds to sudden reconfiguration of the continuation regime.

This is not a literal transfer of classical mechanics into language. It is a finite symbolic analogue intended to describe how trajectories alter their future dynamics.

12. Consciousness as Coherent Measurement Window

It seems to me, that most people may intuitively identify consciousness with the temporal measurement window. They do not experience themselves as a mathematical instant. Rather, they experience a moving present containing memory, expectation, comparison, bodily sensation, language, and intention.

The present is thick and has duration. It carries traces of what has just happened. It anticipates what may happen next and is continuously renewed. Within this framework, consciousness may be approached as the felt coherence of a finite moving measurement window with layered memory half-lives.

This does not reduce consciousness to simple memory. Rather, it frames consciousness as a dynamic organisation of retention, decay, comparison, attention, stabilisation, and continuation. The observer is not behind the window. The observer is the window functioning.

13. The Archive as Extended Memory

We can see that if measurement requires memory, then written artefacts become part of the observer's extended memory field. Notes, papers, diagrams, code, conversations, $\text{\LaTeX}$ files, GitHub repositories, essays, and books are not merely passive records. They are stabilised symbolic residues of prior measurement trajectories.

When later read or processed, they re-enter an active measurement window. They can perturb the observer, restore prior structure, alter future continuation, or generate new symbolic trajectories. The archive therefore has a deeper role. It is not simply storage. It is an extended field of possible reactivation.

- The corpus is extended memory.
- Extended memory enables future traversal.
- Future traversal reactivates the observer.

In this sense, the observer may be distributed across living memory, symbolic artefact, machine context, written archive, and future reconstruction.

14. Provisional Definitions

Finite geometric measurement: the production of finite distinctions within physical, spatial, temporal, and instrumental constraint.

Functional symbolic trajectory: a finite sequence or pathway through which symbolic distinctions are generated, transformed, stabilised, and made available for further use.

Observer: a finite moving measurement window capable of retaining, comparing, and continuing distinctions.

Measurement window: the active finite temporal field over which distinctions remain available for comparison and continuation.

Memory half-life: the characteristic persistence of a distinction within or beyond a measurement window.

Consciousness: the felt coherence of a finite moving measurement window composed of layered memory half-lives.

Attention: the selective weighting and comparison of retained distinctions within a finite symbolic field.

LLM as instrument: an artificial symbolic measurement system whose context window makes finite observation and continuation explicitly inspectable.

Burst: a finite episode of concentrated measurement in which a retained symbolic field is rapidly traversed and stabilised into continuation.

Symbolic jerk: a sudden reconfiguration of the continuation dynamics of a symbolic trajectory.

Extended memory: stabilised symbolic artefacts that can re-enter future measurement windows and alter future trajectories.

15. Research Paths

One research path is to formalise the moving measurement window. This would involve describing window size, symbolic capacity, retention, decay, comparison, and continuation.

A second path is to develop memory half-life as a symbolic and computational concept. Different symbolic forms could be assigned different persistence behaviours depending on whether they remain active, decay, compress, or re-enter later trajectories.

A third path is to compare human cognition, written artefacts, and LLM context windows as different kinds of measurement systems. This avoids premature claims about machine consciousness while allowing structural comparison.

A fourth path is to explore attention as an observer-like operation. Transformer attention could be reframed as finite symbolic measurement over a bounded retained field.

A fifth path is to connect symbolic burst dynamics to insight, inference, prompting, and mathematical discovery. The central question would be how long-prepared trajectories suddenly stabilise into visible symbolic outcomes.

A sixth path is to develop symbolic jerk more carefully. This would require identifying cases where a perturbation changes not merely the next continuation, but the continuation regime itself.

A seventh path is to connect this framework back to finite geometric measurement and higher-dimensional mathematics. The aim would be to show how high-dimensional symbolic forms unfold into finite trajectory operations carried by real systems.

Conclusions

Within the framework presented, the observer is not a detached witness standing outside measurement. The observer is the finite moving measurement window through which distinction is retained, compared, stabilised, and continued.

Vitaly, memory is not secondary to measurement, rather it is the condition by which measurement becomes possible. From this perspective 'consciousness' may be the felt coherence of this window when layered memory half-lives produce sufficient continuity.

An LLM provides a visible symbolic instrument in which this structure can be examined. Its context window is a measurement window and inference is a burst. The output can be considered and measured as a stabilised symbolic artefact. Its continuation dynamics can be perturbed, redirected, accelerated, or reconfigured. The resulting trajectory is not merely text about measurement; rather it is itself a measurement.