Determinism, Randomness, and the Observer: Meaning Through Interpretation

itzhexen [jnhexen.dj@gmail.com]

June 16, 2025
10:30 AM

Abstract

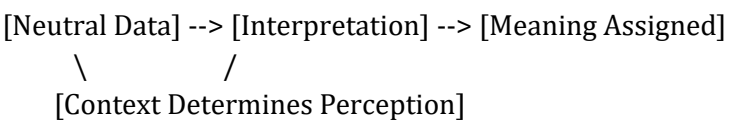
This paper examines how determinism and randomness are not inherent properties of data or systems but arise through the process of interpretation by observers. Data structures—such as numerical arrays, binary sequences, or physical frames—are fundamentally neutral until meaning is assigned. Observation is not exclusive to humans or living beings; systems like computers also act as observers by contextualizing data. Naming and abstraction are key mechanisms by which neutral data gains meaning. Apparent randomness often reflects a lack of full context, misaligned observation scales, or unordered data rather than true unpredictability. Free will is briefly explored as another construct defined through interpretation and belief rather than objective truth.

1. Introduction

Determinism and randomness are traditionally seen as opposing forces: determinism as predictable cause and effect, randomness as unpredictability or chance. This paper challenges that view by proposing both concepts emerge from how observers interpret neutral data.

Observation and interpretation are not limited to humans; systems capable of processing data—such as computers—also act as observers. Naming and abstraction transform neutral data into deterministic elements by imposing semantic structure.

Free will is only briefly considered to demonstrate how belief and interpretation shape experience.



2. Neutral Data and the Role of Interpretation

Data such as arrays of normalized floating-point values, binary sequences, or alphabetic characters do not inherently possess determinism or randomness. Without context or interpretation, they remain neutral and meaningless.

For instance, frames of the Moon's orbit can be viewed as raw data points or random values until physical laws and observational context reveal deterministic patterns.

```
[ 'a', 'b', 'c', ..., 'z' ]  -->  No meaning
[ 0.13, 0.75, 0.21, ... ]  -->  Appears random
[Context Applied] --> [Trajectory Recognized]
                        |
                  [Moon Orbit Example]
```

3. Observation Beyond Human Agents

Observation is not exclusive to living beings. Computers "observe" and interpret data through memory registers and processing units. These registers are merely physical spaces containing bits until they are named and assigned function, at which point they behave deterministically within computational systems.

Thus, an observer is any system capable of interpreting data through contextual frameworks.

```
[Bits in Memory]
   ↓
[Named as: Register A]
   ↓
[Used in Calculation] → [Deterministic Meaning Created]
Human ≠ Sole Observer
Machine/System = Observer via Context
```

4. Naming, Abstraction, and Deterministic Meaning

The act of naming—assigning labels and roles—is fundamental to transforming neutral data into deterministic components. Naming a memory location as a register imposes expectations and functionality, turning raw bits into meaningful parts of computation.

This abstraction process generalizes to many systems where determinism is imposed through semantic framing.

```
[0,1,1,0] in memory  →  meaningless
Name it: "control_flag"
```

↓
[Control Logic Activated] → Determinism via Label
[Naming = Contextual Lens]

5. Incomplete Information and Apparent Randomness

Apparent randomness often results from incomplete information. An individual walking to a store is predictable to observers aware of their location and intent but unpredictable to strangers lacking that context.

Similarly, selectively removing or missing data frames creates a perception of randomness, illustrating the epistemic nature of unpredictability.

Full Sequence:
[→A→B→C→D→E] = Predictable Path
Missing C & D:
[→A→B———→E] = Random Jump
[Missing Data] ⇒ [Perceived Randomness]

6. Temporal Resolution and Frame Accessibility

Determinism is partly a function of an observer's ability to resolve frames at the right time scale. Certain phenomena—like the wing movement of a hummingbird or a fly—require extremely high temporal resolution to be understood. To a casual observer, such motion may seem like a blur or a hum. Only through the use of high-speed cameras or instruments can one access enough frames of reference to reconstruct a deterministic model.

[Wings: A-B-C-D-E-F] at 300 fps
Human sees: [Blur]
High-speed Cam sees: [A][B][C][D][E][F]
Time mismatch ⇒ Noise
Aligned time ⇒ Clarity
[Resolution Gap = Apparent Randomness]

7. Order, Disorder, and the Perception of Randomness

A crucial aspect of interpretation involves the order in which data or events are observed. Observing data in a meaningful sequence often reveals deterministic patterns. When data is out of order or scrambled, it may appear random or meaningless.

The need to reorder or reorganize data to make sense of it is a hallmark of what is often perceived as randomness. From the observer’s perspective, disorder represents higher entropy—an absence of recognizable patterns or structure.

Ordered: [1, 2, 3, 4, 5] ⇒ Pattern
Scrambled: [3, 1, 5, 2, 4] ⇒ Random?
[Disorder = Observer's Misalignment]
[Reordering = Interpretive Act]

8. A Note on Free Will and Belief

While not the focus here, it is worth noting that free will debates often reduce to questions of belief rather than objective fact. The belief in one's own agency influences lived experience and decision-making more than metaphysical certainties.

Whether or not free will "exists" becomes less relevant than whether it is believed to exist. In this way, free will becomes another interpretive frame applied to the self rather than a brute fact about the universe.

Do I have free will?
 ↙ ↘
[Yes] [No]
 ↓ ↓
[Belief guides action either way]
[Free Will = Internal Narrative State]

9. Conclusion

Determinism and randomness emerge from interpretation applied to neutral data. Observation is a property of systems capable of contextualizing information, not exclusive to humans. Naming and abstraction impose deterministic meaning on data, while randomness often reflects limited knowledge, disorder, or temporal misalignment.

Free will, when considered, serves as an example of how belief shapes experience rather than a metaphysical absolute.

[Data] + [Context] + [Observer]
  ↓
 [Interpretation Layer]
  ↓
→ Appears Deterministic or Random depending on Access, Order, and Resolution