



# The Nature of Predictions

**Negative Feedback Loops  $\wedge$  P.I.D Controllers**

*Internal Training Session*

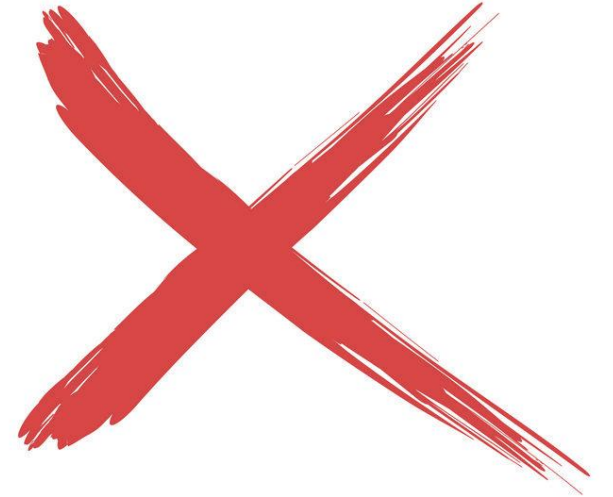
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“The purpose of a prediction is to help with planning and decision-making in the present by anticipating possible future developments.”

*Gemini*



Too restrictive  
Too imprecise

# Predictions are everything in life (and in other places)

## Who predicts?

- Bacteria
- Rabbits
- Humans
- Societies

## What do we predict?

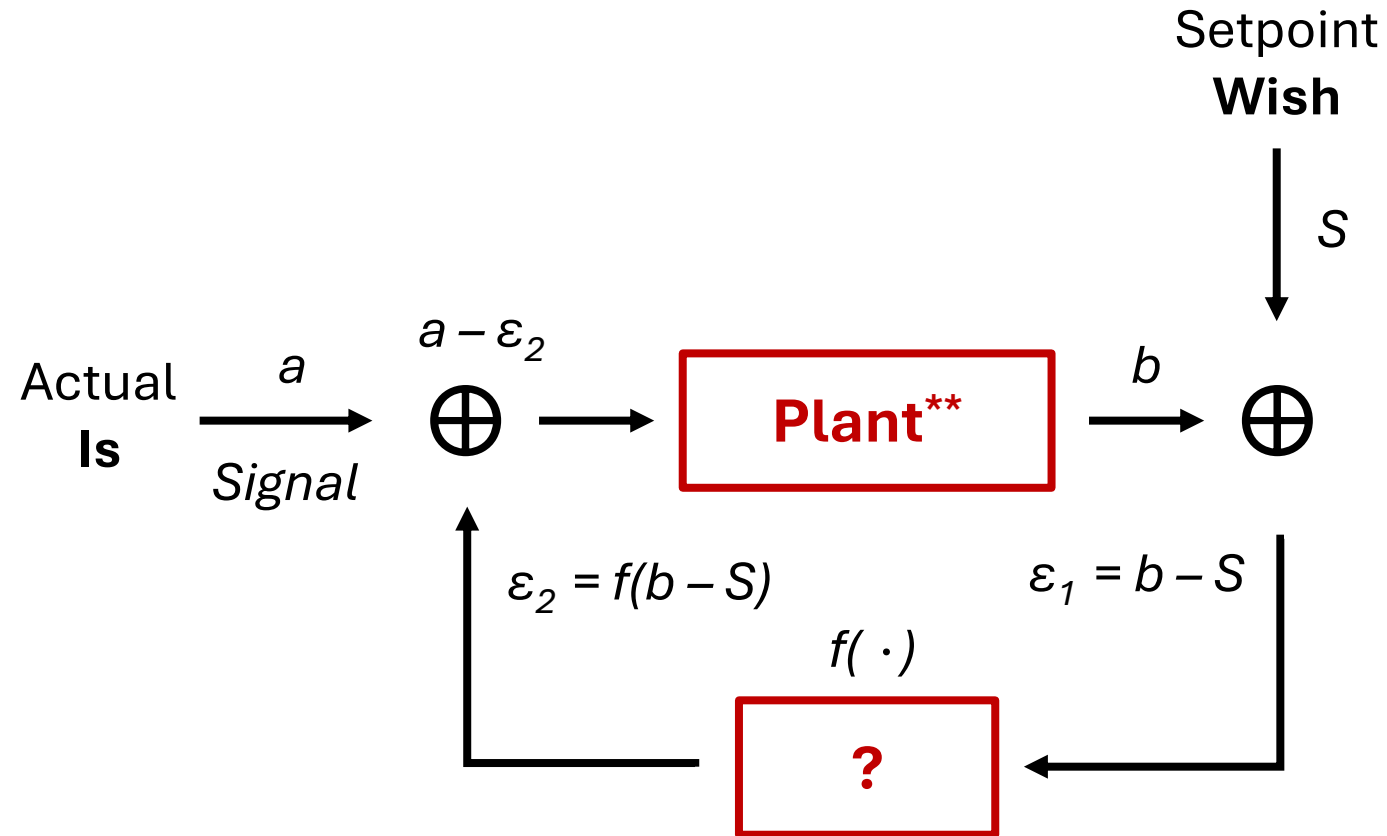
- Where to find heat
- Where to eat safely
- How long is today's commute
- How much taxes will we raise

**But how do they happen?**

# The negative feedback loop makes life possible

## Control Theory\*

- Human thought
- Stereo amplifiers
- AI & LLM



What is the question mark?

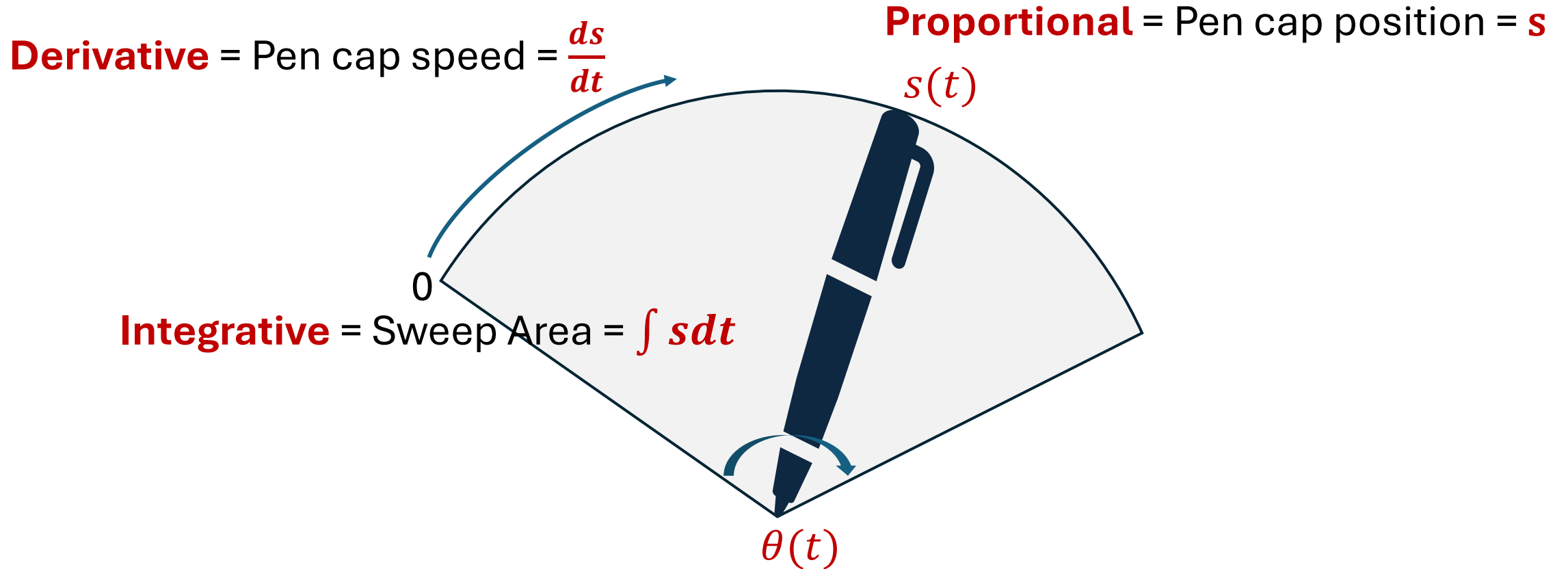
\* See, e.g., [Simrock](#)

\*\* Control theory term. A process (a brain, a brake...) that takes  $a$  and modifies it into  $b$

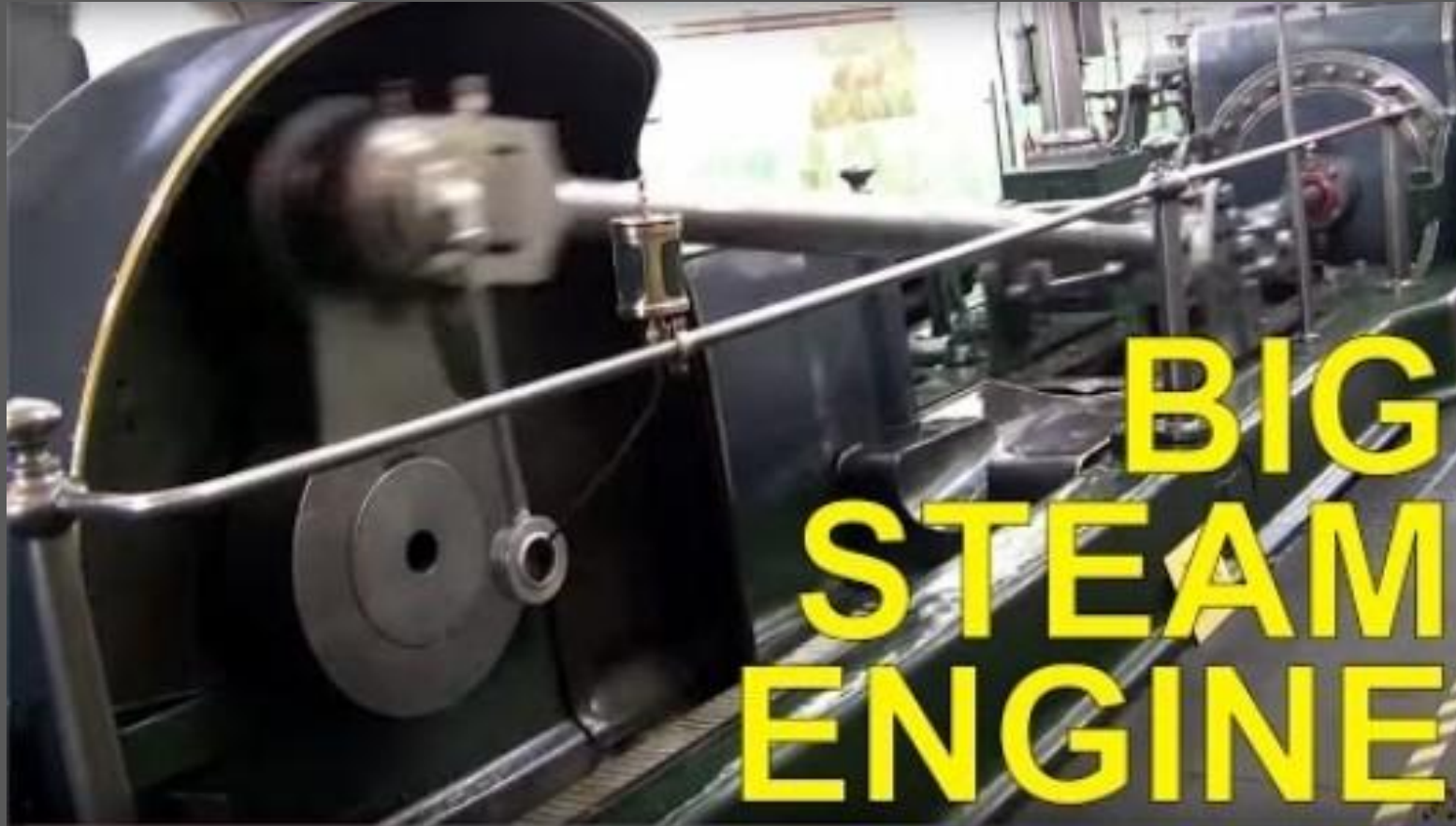
**Demo**

# The ? is a P.I.D controller

*Example: Imagine a pen sweeping around the nib from left to right*

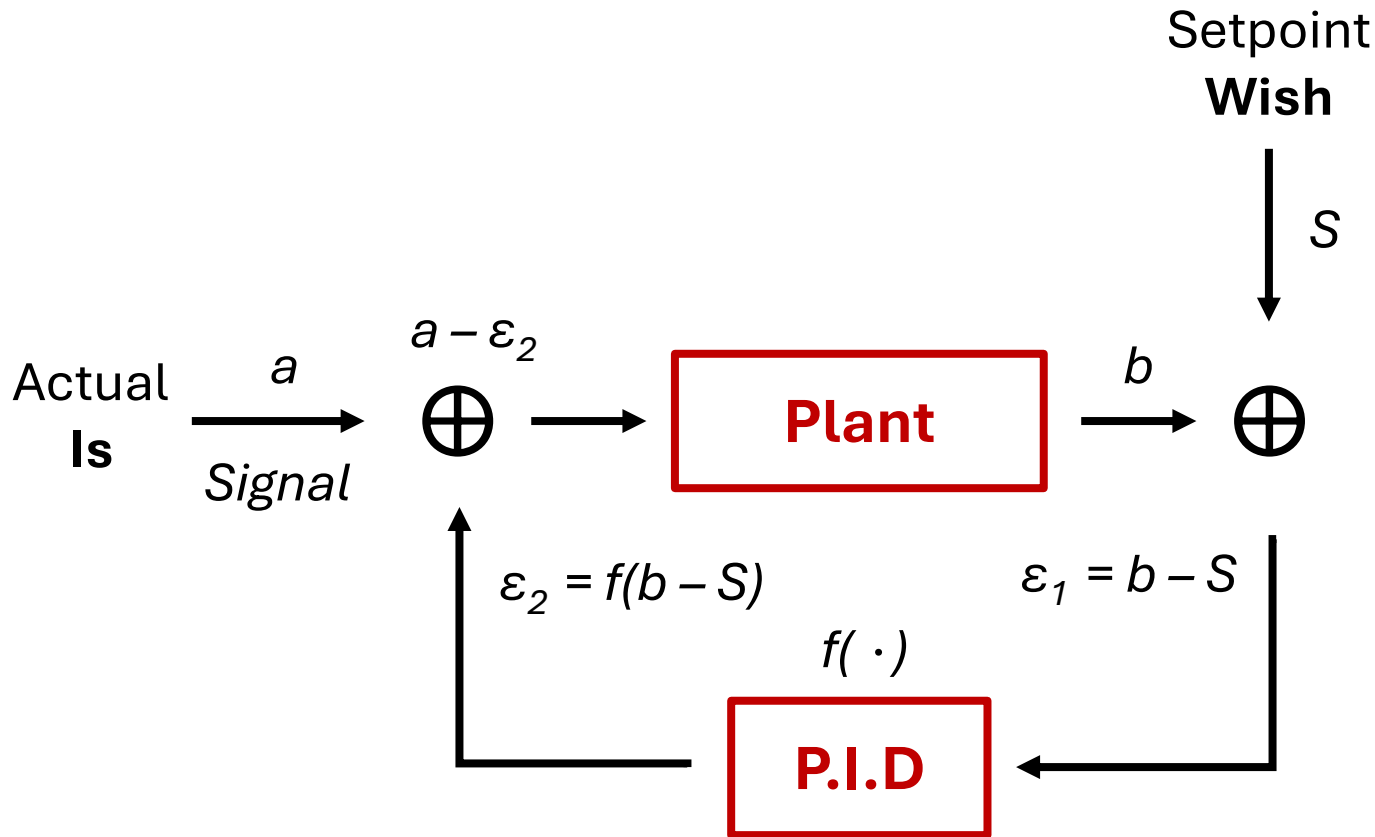


*Shown like this to correspond to the live demonstration*



Steam engine with P.I.D controller (the vertically rotating part seen at 49s)

# Predictions are negative feedback loops governed by P.I.D controllers



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1. Movements
  2. Instincts
  3. Reasoning
  4. Consciousness

Similar to **Backpropagation** in AI

# How does Tellusant use this?

- **Data harmonization**

- They usually put in the data as-is without harmonizing between datasets. This is an **open loop** system without **NFL**
- Tellusant makes sure the data is harmonized so the end point of the first data set matched beginning point of the second dataset. This is **NFL** with a P regulator

- **Short-term statistical models**

- We, as everyone else, uses a with a P.I.D regulator

- **Long-term forecasting**

- We use mainly a P regulator, but there are opportunities to work with P.I.D

- **Recession nowcasts**

- Federal Reserve uses NFL with P
- Our innovation is NFL with P.I.D

**We will increasingly use the NFL / P.I.D logic in most things we do.**