



# The Nature of Predictions

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

*Internal Training Session*

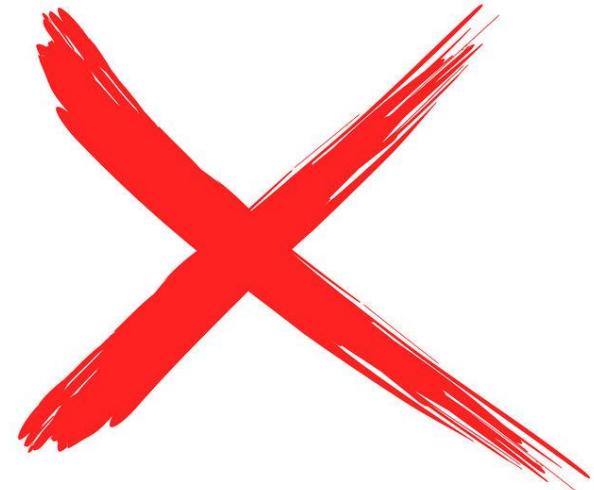
**Dr. Staffan Canback**

Executive Chairman, Tellusant

December 10, 2025

“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  
“Not even wrong”

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

## **Who predicts?**

- **Bacteria**
- **Rabbits**
- **Humans**
- **Societies**

## **What do we predict?**

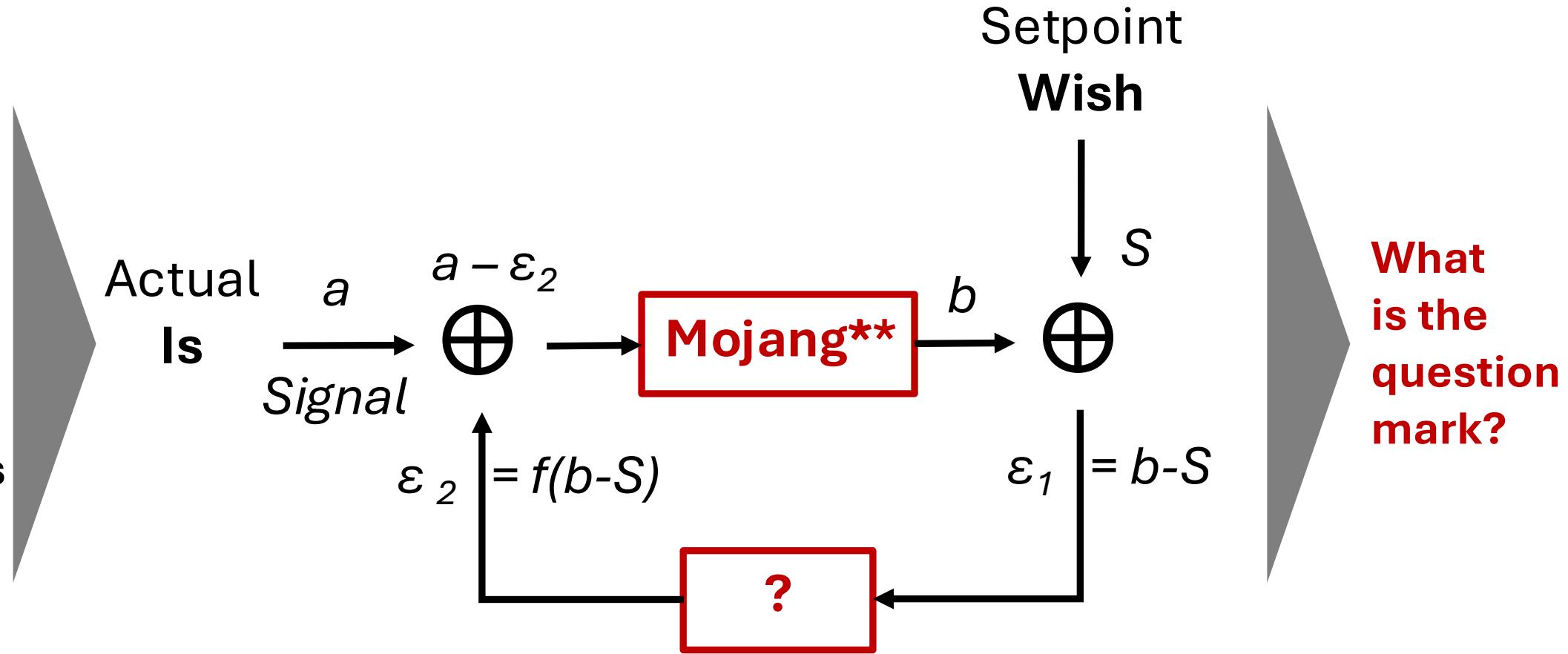
- **Where to find heat**
- **Where to eat safely**
- **How long is today's commute**
- **How much taxes will we raise**

**But how do they happen?**

# The negative feedback loop (NFL) makes life possible

**Control Theory\***

- Human thought
- Stereo amplifiers
- AI & LLM



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

\*\* Also known as **Plant**. Some apparatus (a brain, a brake...) that takes  $a$  and modifies into  $b$

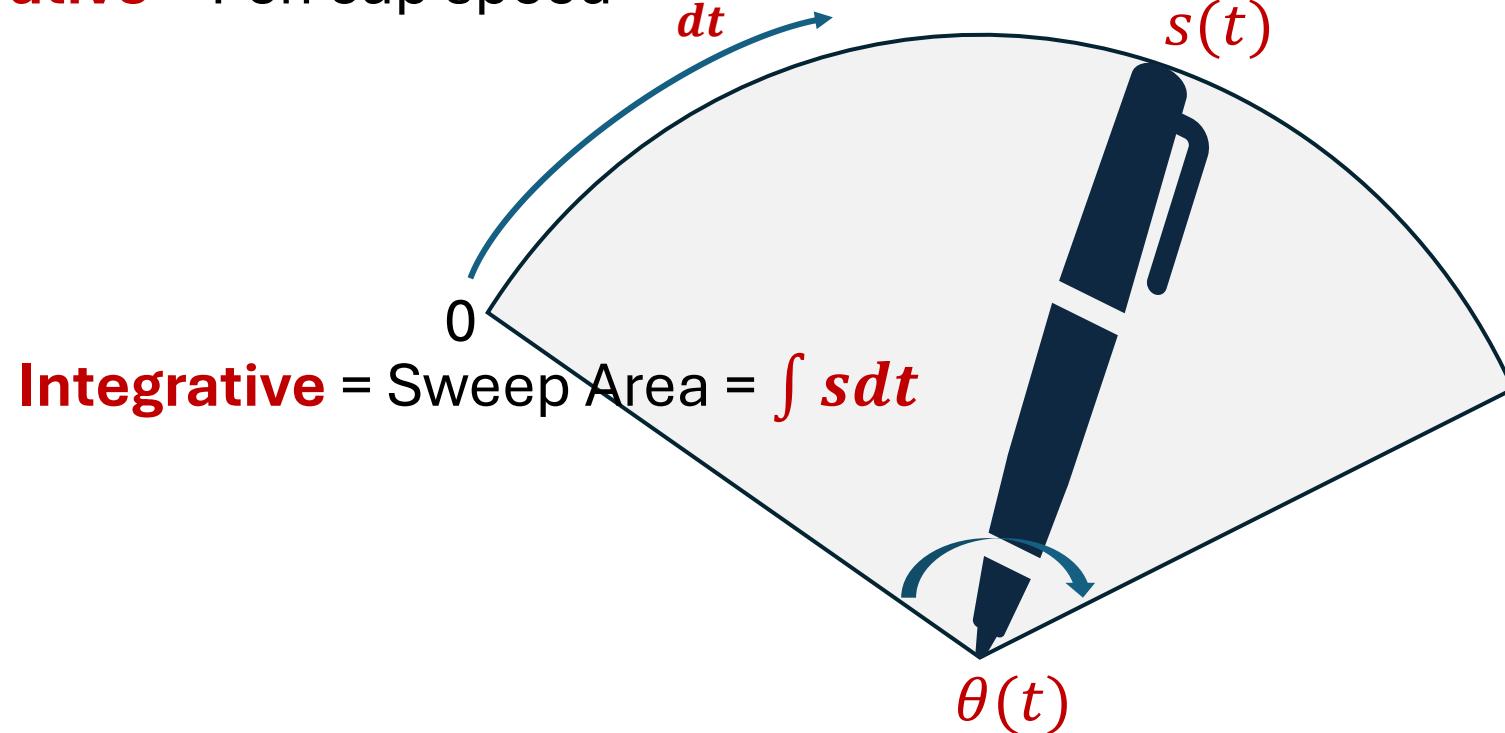
# **Demo**

# The ? is a P.I.D controller

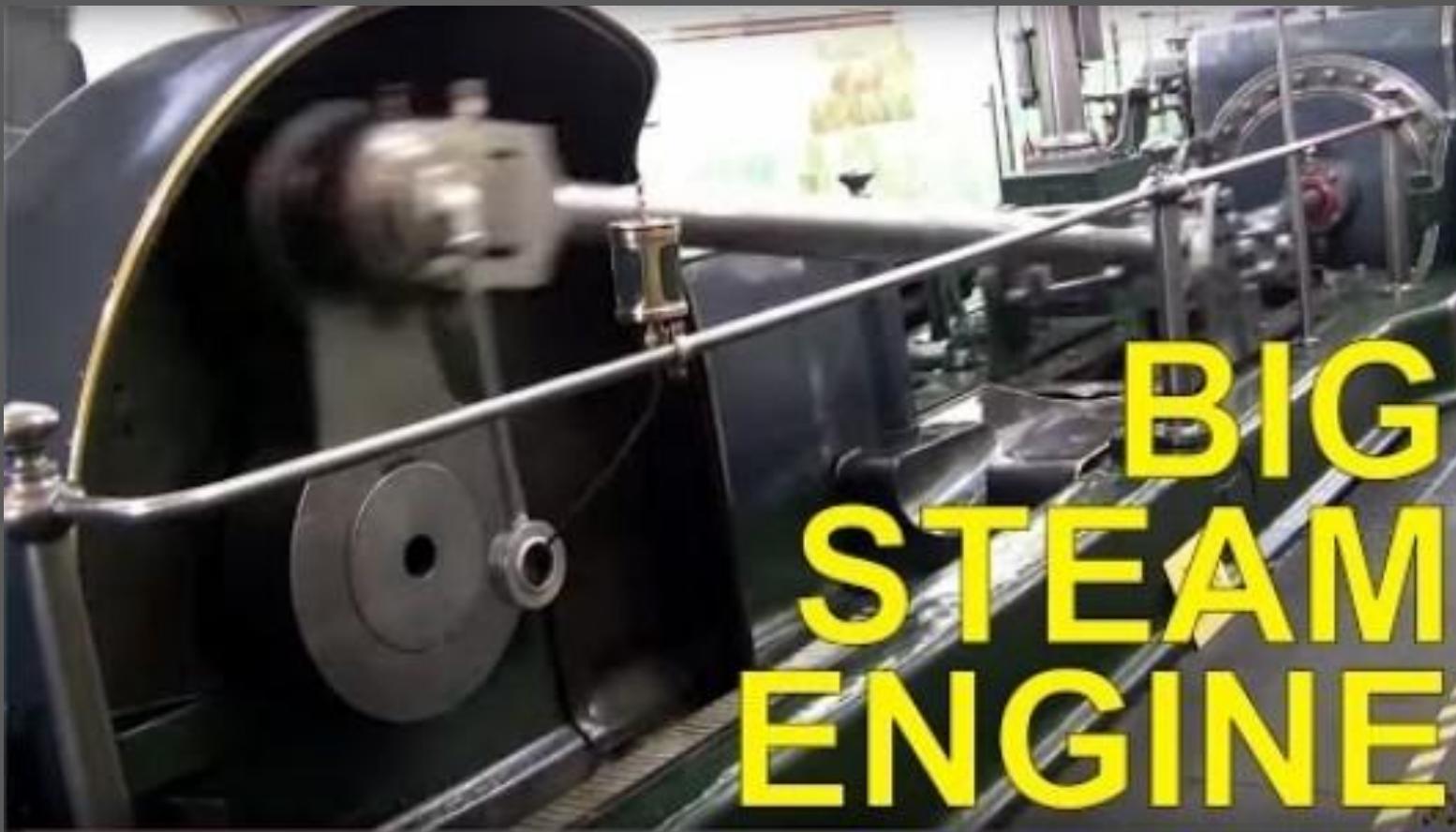
*Example: Imagine a pen sweeping around the nib from left to right*

**Derivative** = Pen cap speed =  $\frac{ds}{dt}$

**Proportional** = Pen cap position =  $s$

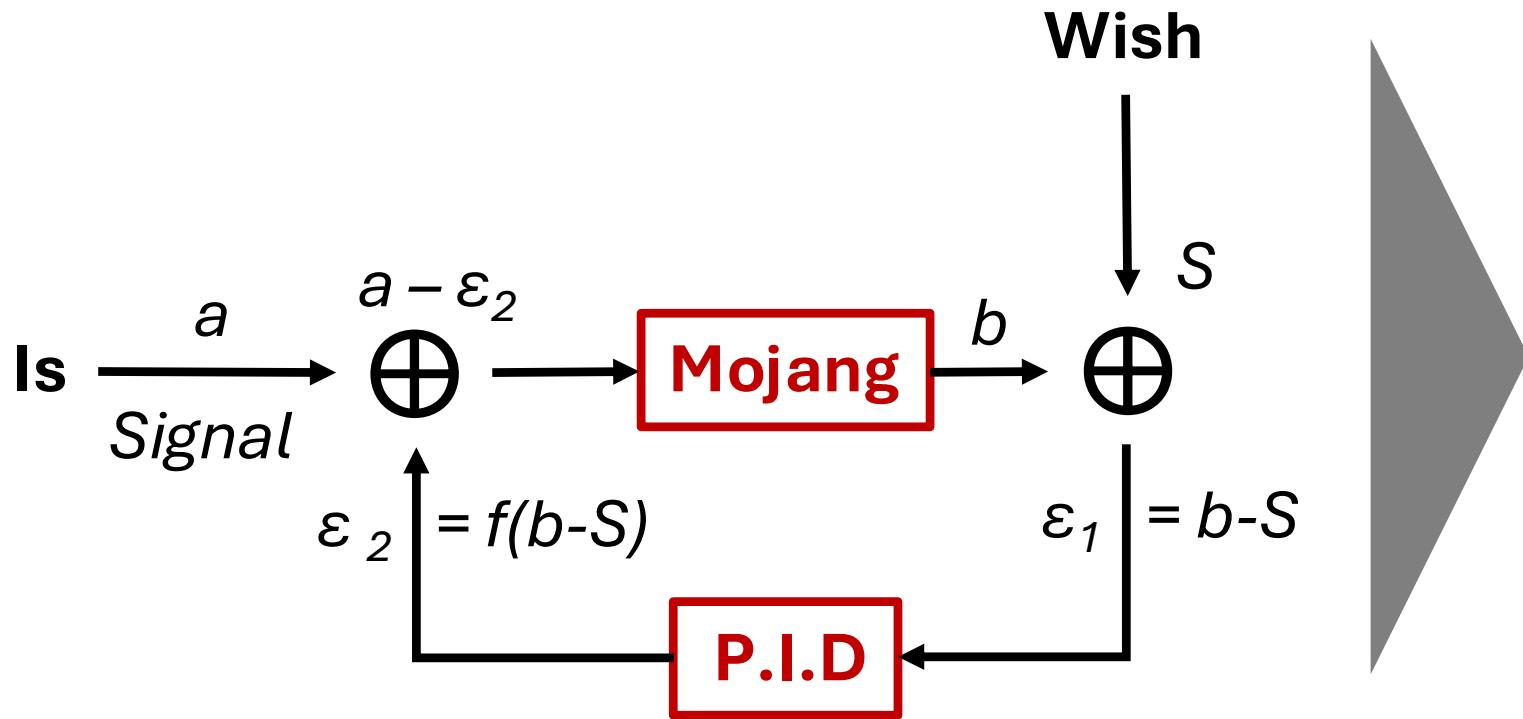


*Shown like this to correspond to the live demonstration*



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



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 an NFL with 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.