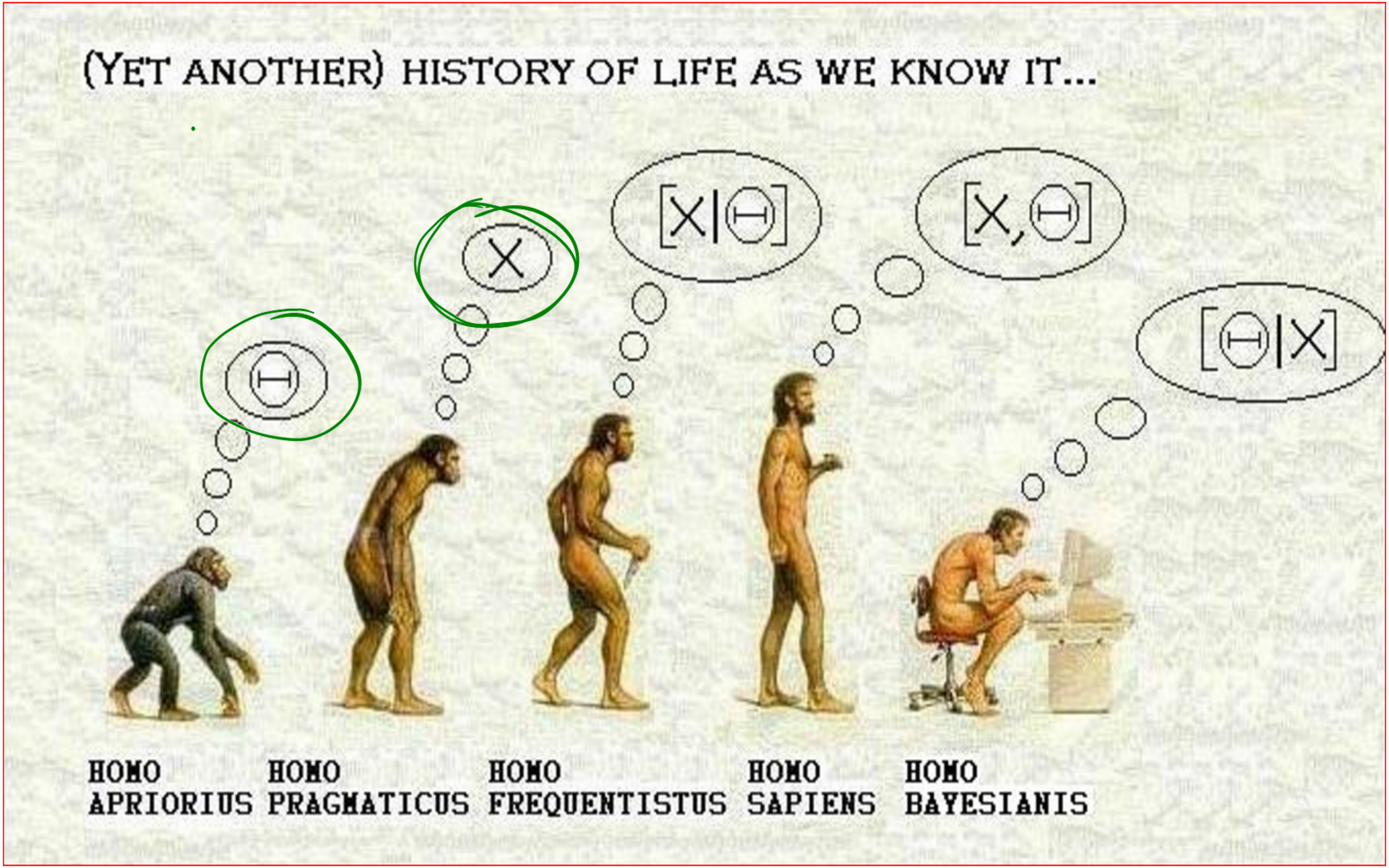
(YET ANOTHER) HISTORY OF LIFE AS WE KNOW IT...
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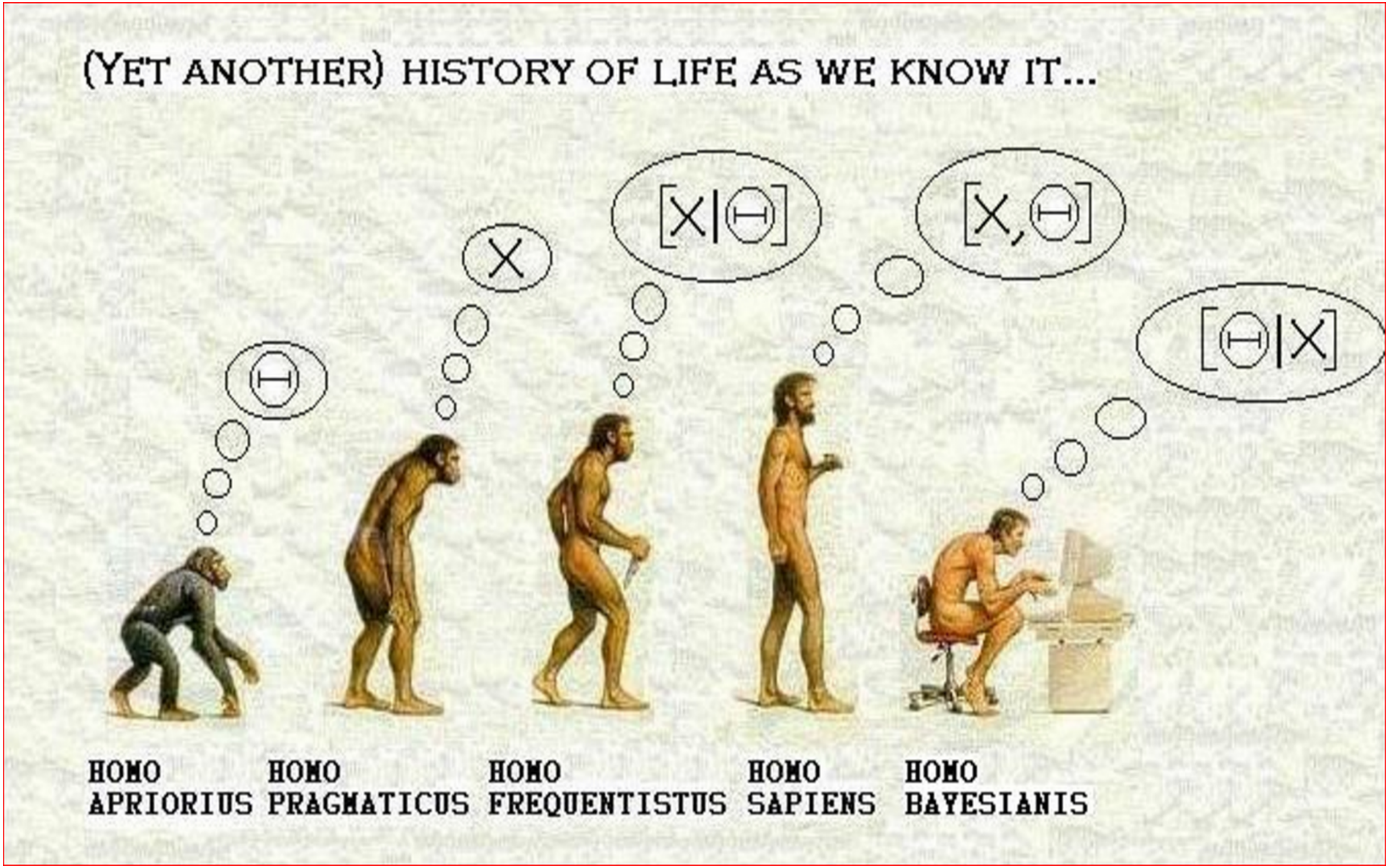

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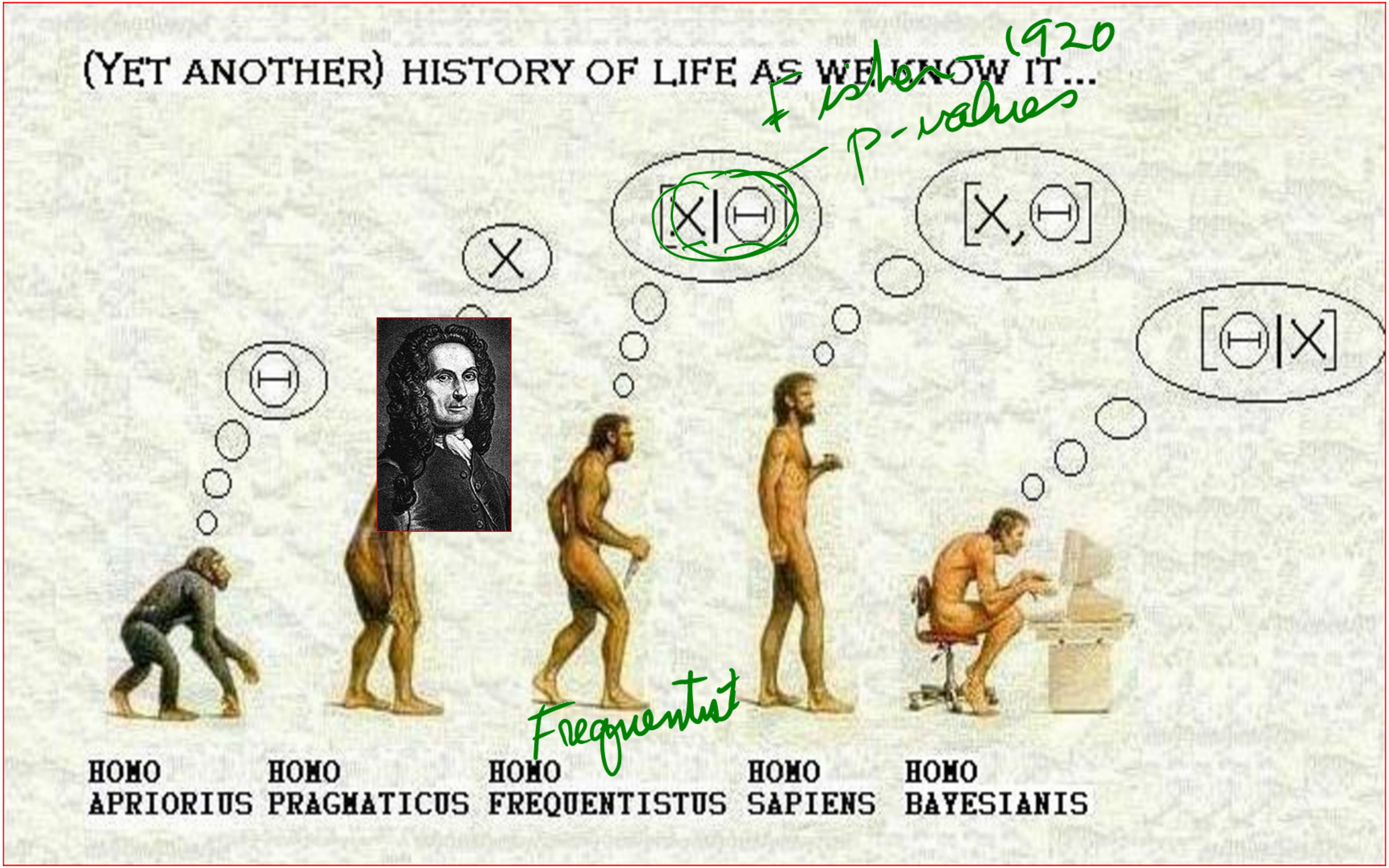
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p-values
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Frequentist
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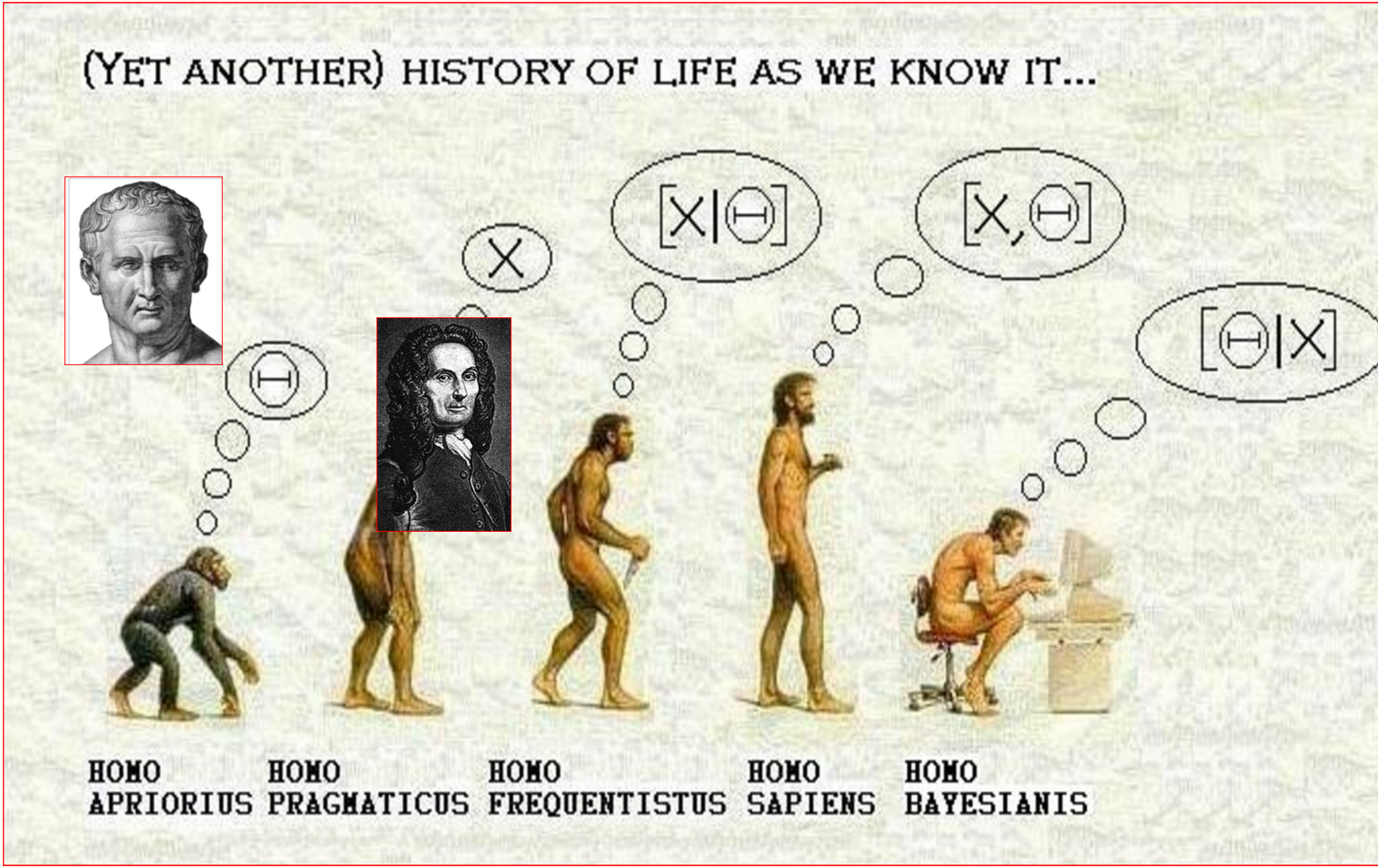
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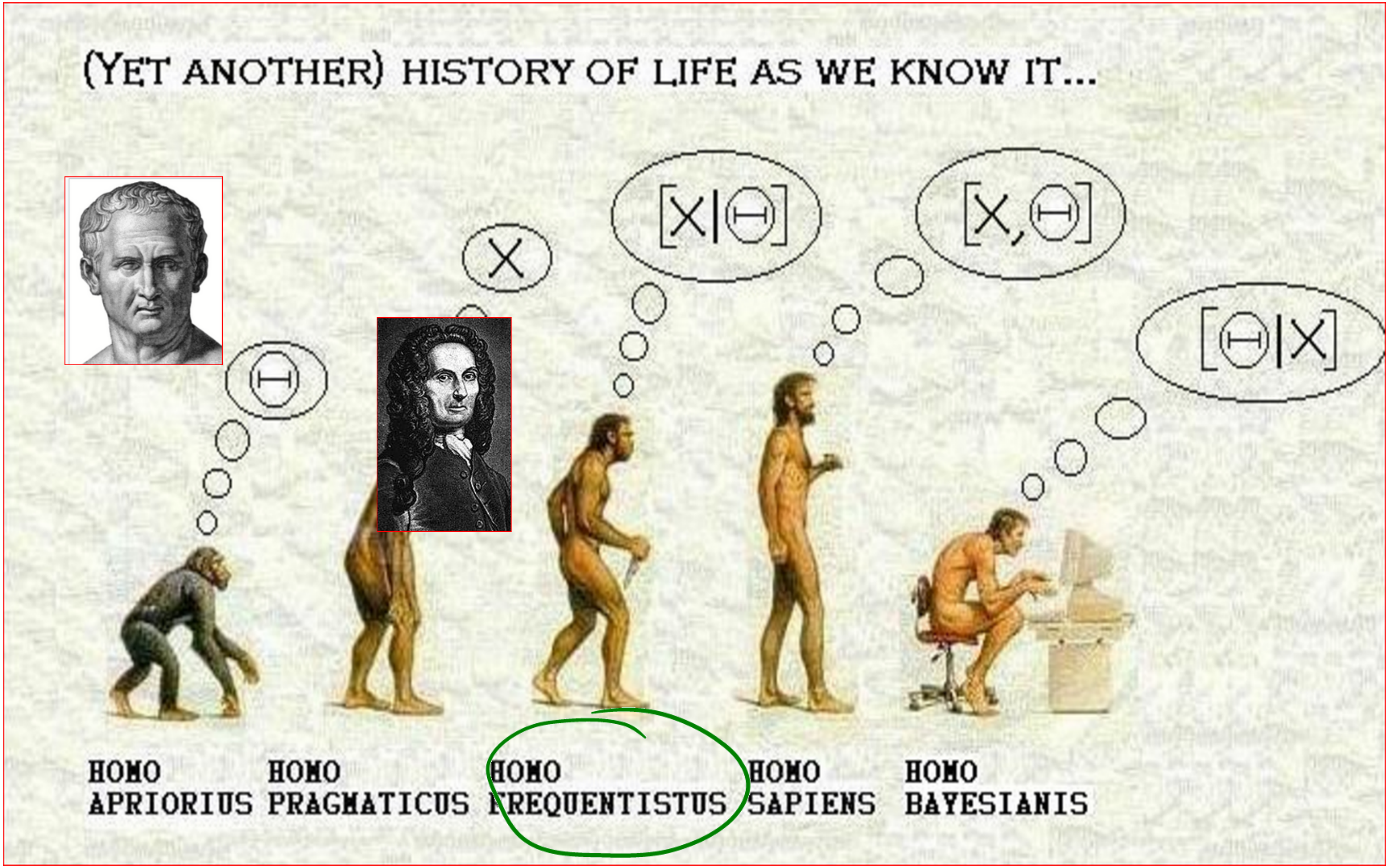
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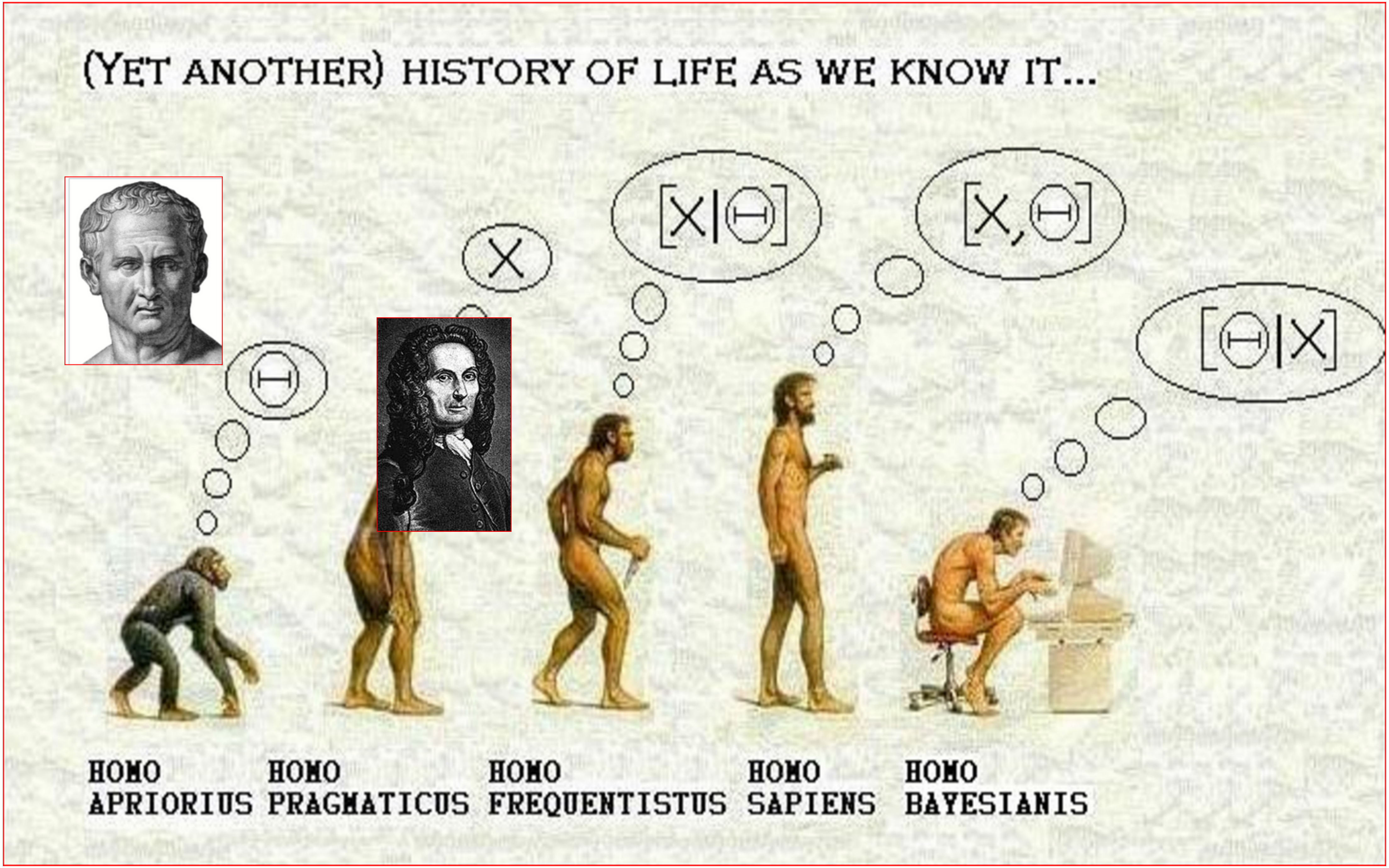
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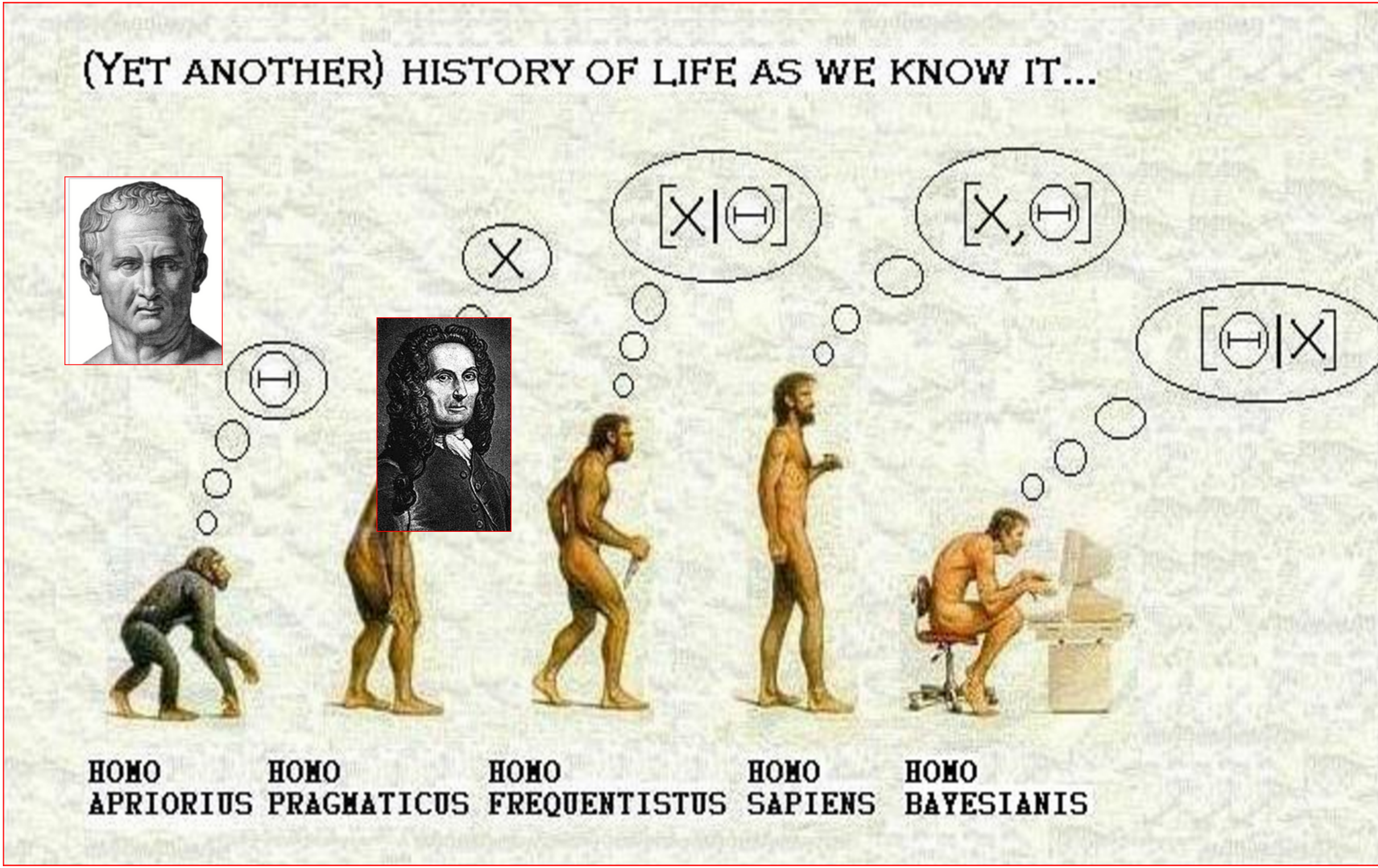
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HOMO BAYESIANIS

Philosophical ~~Basic~~ problem

Philosophical

~~Basic~~ problem

Given a model $P(X|\theta)$

Philosophical ~~Basic~~ problem

Given a model $P(X|\theta)$

To get $P(\theta|X)$

you need to be willing

to specify $P(\theta)$

Philosophical ~~Basic~~ problem

Given a model $P(X|\theta)$

To get $P(\theta|X)$

you need to be willing

to specify $P(\theta)$

Then $P(X,\theta) = P(X|\theta)P(\theta)$

and $P(\theta|X) = \dfrac{P(X,\theta)}{P(X)}$

Philosophical ~~Basic~~ problem

Given a model $P(X|\theta)$ Model

To get $P(\theta|X)$

you need to be willing to specify $P(\theta)$ Prior

Then $P(X,\theta) = P(X|\theta)P(\theta)$

and $P(\theta|X) = \dfrac{P(X,\theta)}{P(X)}$

Posterior

~~Basic~~ Philosophical problem

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Posterior

- You need a prior to get a posterior.
- Can we justify a particular prior?

Frequentists only use $P(X \mid \theta)$
and don't need $P(\theta)$

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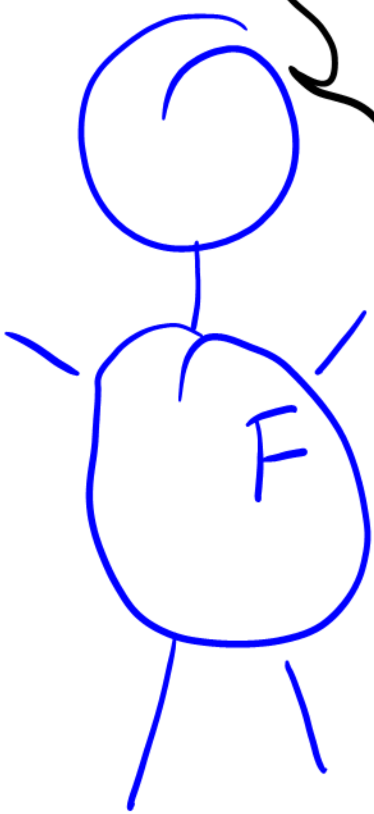
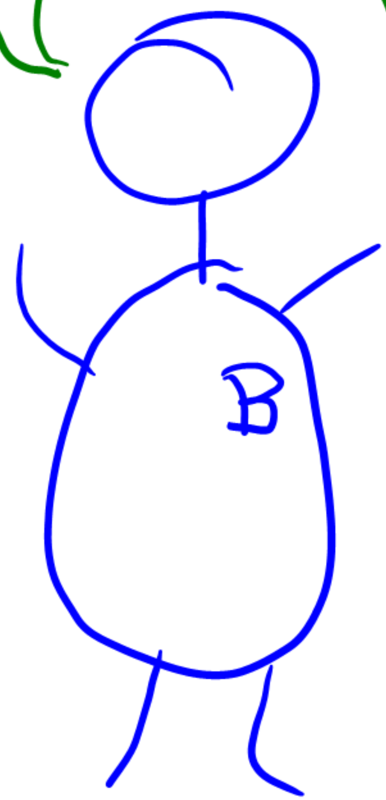


Your methods are subjective. You have no objective justification for your prior

Your methods may be "objective" but they answer the wrong question $P(Y^+ \mid \theta)$ instead of $P(\theta \mid Y)$



Practical problem:

$$p(X, \theta) = p(X \mid \theta)\, p(\theta)$$

Practical problem:

$$p(X, \theta) = p(X|\theta)\,p(\theta)$$

$$p(\theta|X) = \frac{p(X, \theta)}{p(X)}$$

Practical problem:

$$p(x, \theta) = p(x|\theta)\,p(\theta)$$

$$p(\theta|x) = \frac{p(x,\theta)}{p(x)}$$

$$\int p(x,\theta)\,d\theta$$

Practical problem:

$$p(X,\theta) = p(X|\theta)\,p(\theta)$$

$$p(\theta|X) = \frac{p(X,\theta)}{p(X)}$$

$$\int p(X,\theta)\,d\theta$$

If θ has high dimension this becomes easily impossible.

Practical problem:

$$p(X, \theta) = p(X|\theta)\, p(\theta)$$

$$p(\theta|X) = \frac{p(X, \theta)}{p(X)}$$

MCMC (mid 20th c.) comes to the rescue:
It's possible to sample from $p(\theta|X)$ knowing only $p(X, \theta)$

Posteriors without priors?

Fisher - Fiducial inference
Fraser - Structural inference
Objective Bayesian inference

Baking the Bayesian omelette without breaking the Bayesian egg.

Emerging practice:
Using weakly informative priors.