

The Poem that Makes things Happen: Diachronic Informatics, Effective Subjects and the English Common Law

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MITH “Shared Horizons”

12 April 2013

844. JAMES HOLLIS and THEODORE PIKE were indicted for stealing, on the 15th of June, one handkerchief, value 4s., the goods of James Bernard Bernard, from his person. Mr. HONG conducted the prosecution. JAMES BERNARD BERNARD. I am a shoemaker and reside in Gray's Inn. On the 15th of June, about nine o'clock in the morning, I was in Castle-street, Bloomsbury—I heard a voice say, "I have taken a handkerchief." I felt and missed my handkerchief—and at the same time, turning round, I saw two persons running away. I pursued them towards Blumtree-street into Museum-street, crossed over, St. John's—and where they divided. I secured Hollis, and never lost sight of him. Pike was brought back, and my handkerchief produced.

WILLIAM HATTON. I am eleven years old, and belong to Shelton school; I live in Little Russell-street. On the 15th of June, I was coming out of a dairy in Castle-street with some milk, and saw Hollis draw the handkerchief from Mr. Bernard's pocket and give it to Pike, who followed close behind him. I am certain they are the boys. I immediately called to Mr. Bernard, they both went home, and saw them at the office the same day.

JOHN CAREY. I am a shoemaker, and live in Plumtree-street. I was going from Museum-street to Drury-lane, and saw Pike running with a handkerchief in his hand. I joined in the pursuit—and when he ran across, he threw it into a shop-door. I picked it up, and gave it to the prosecutor—he was stopped directly. (*Property produced and sworn to.*)

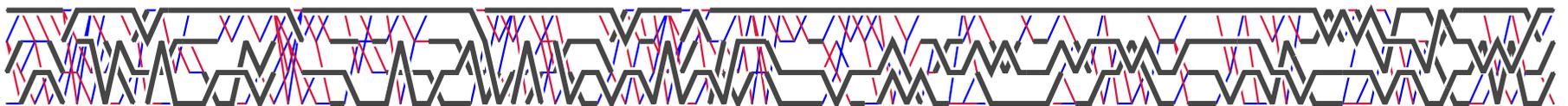
The prisoners pleaded distress.

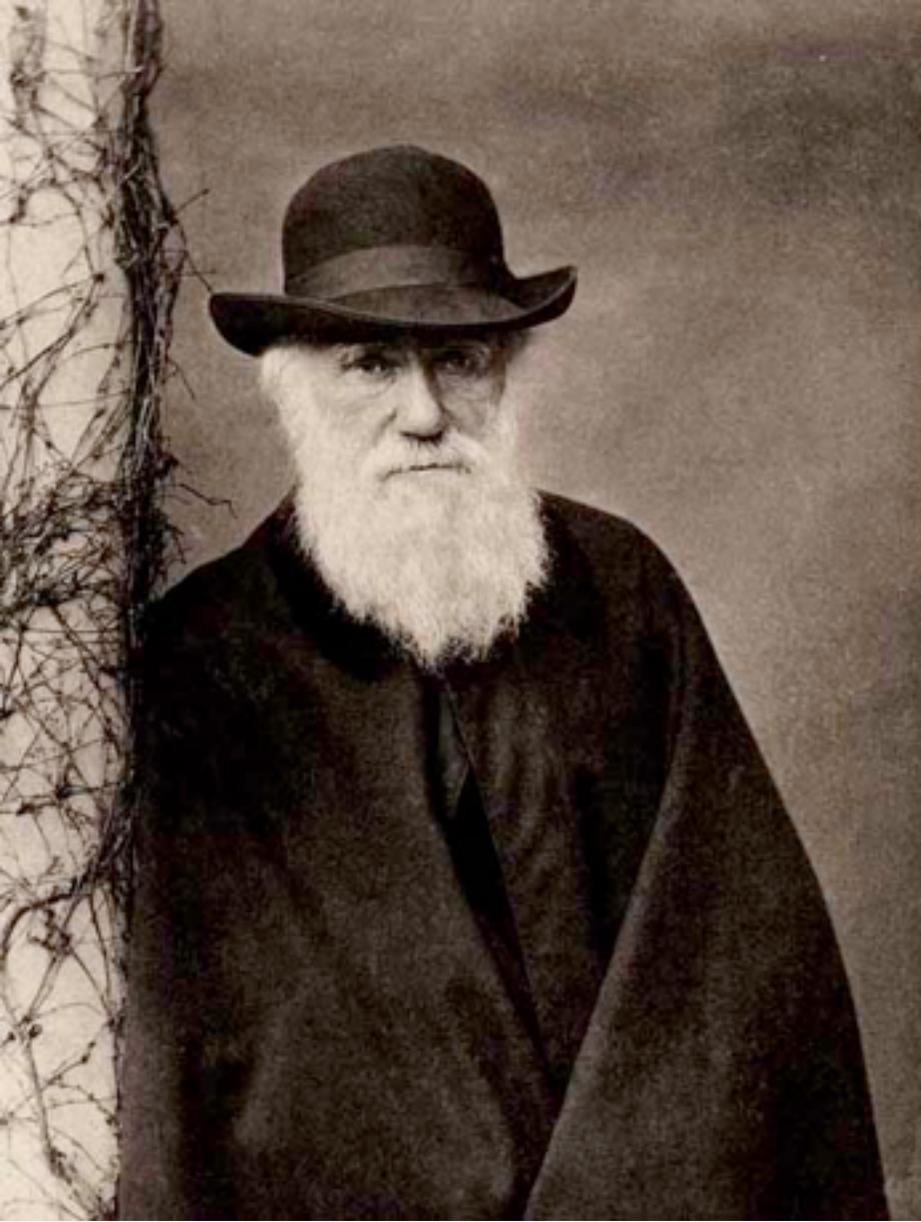
HOLLES—GUILTY. Aged 14.

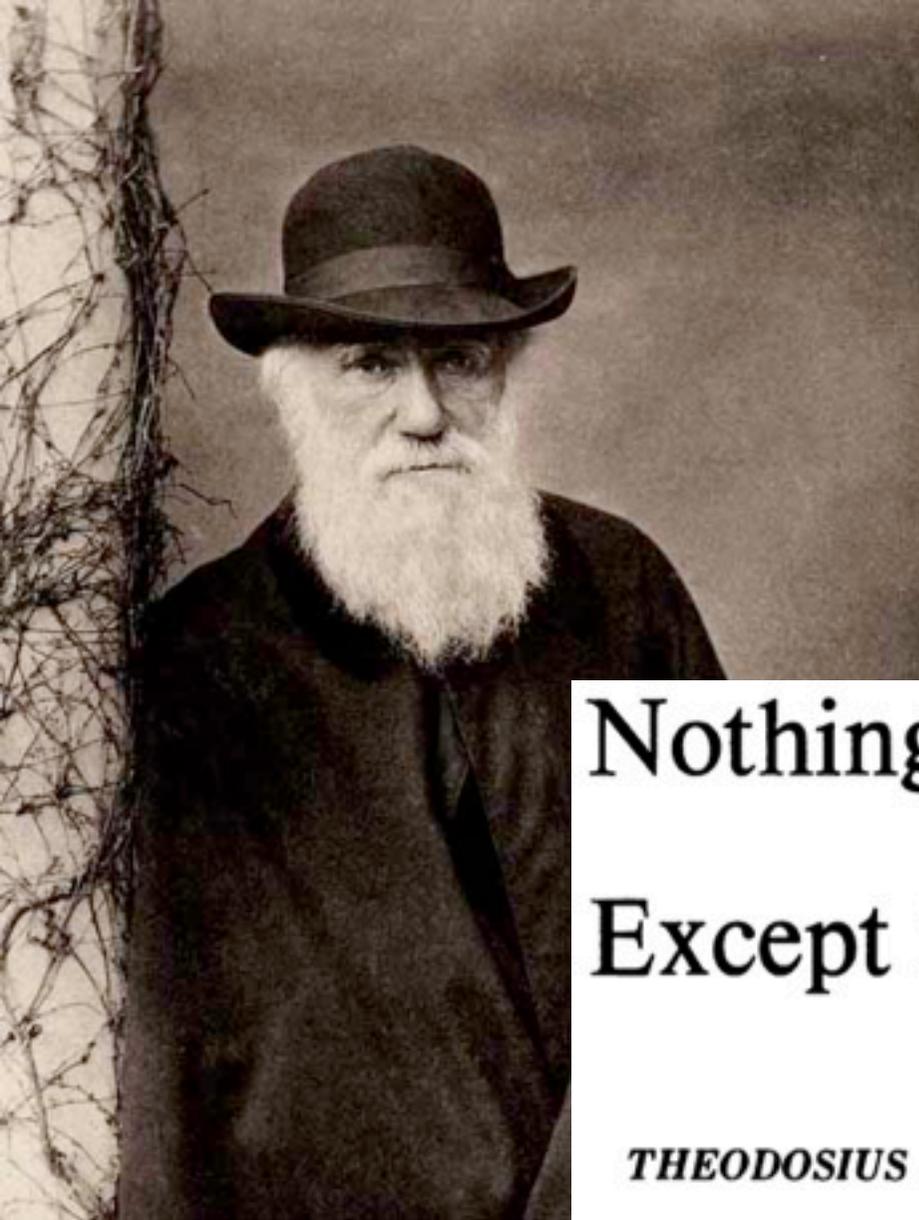
PIKE—GUILTY. Aged 15.

Transported for Life.

First Middlesex Jury, before Mr. Common Sergeant.







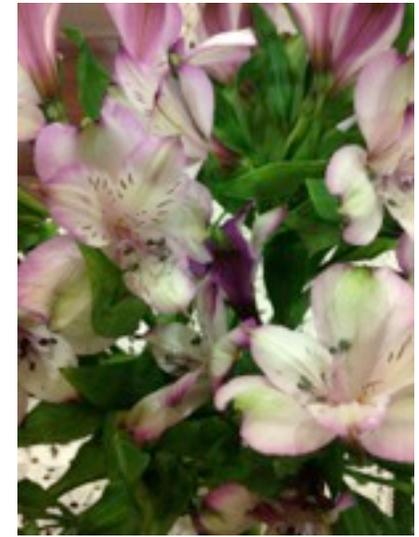
Nothing in Biology Makes Sense Except in the Light of Evolution

THEODOSIUS DOBZHANSKY

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(Property produced and sworn to.)

The prisoners pleaded distress.

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PIKE—GUILTY. Aged 15.

Transported for Life.

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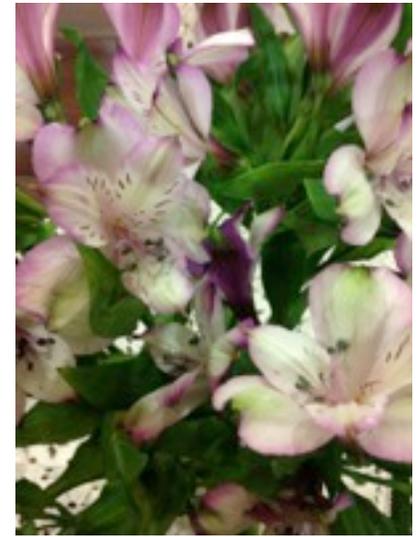
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phenotypic variation



genetic bottleneck

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phenotypic variation



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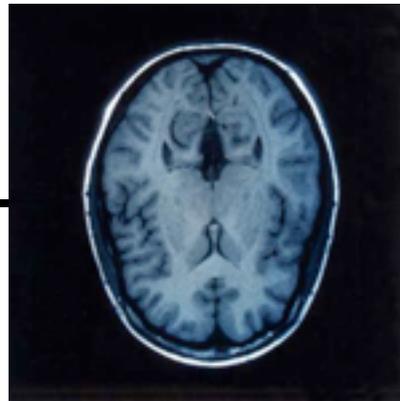
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cognitive bottleneck

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The Old Bailey

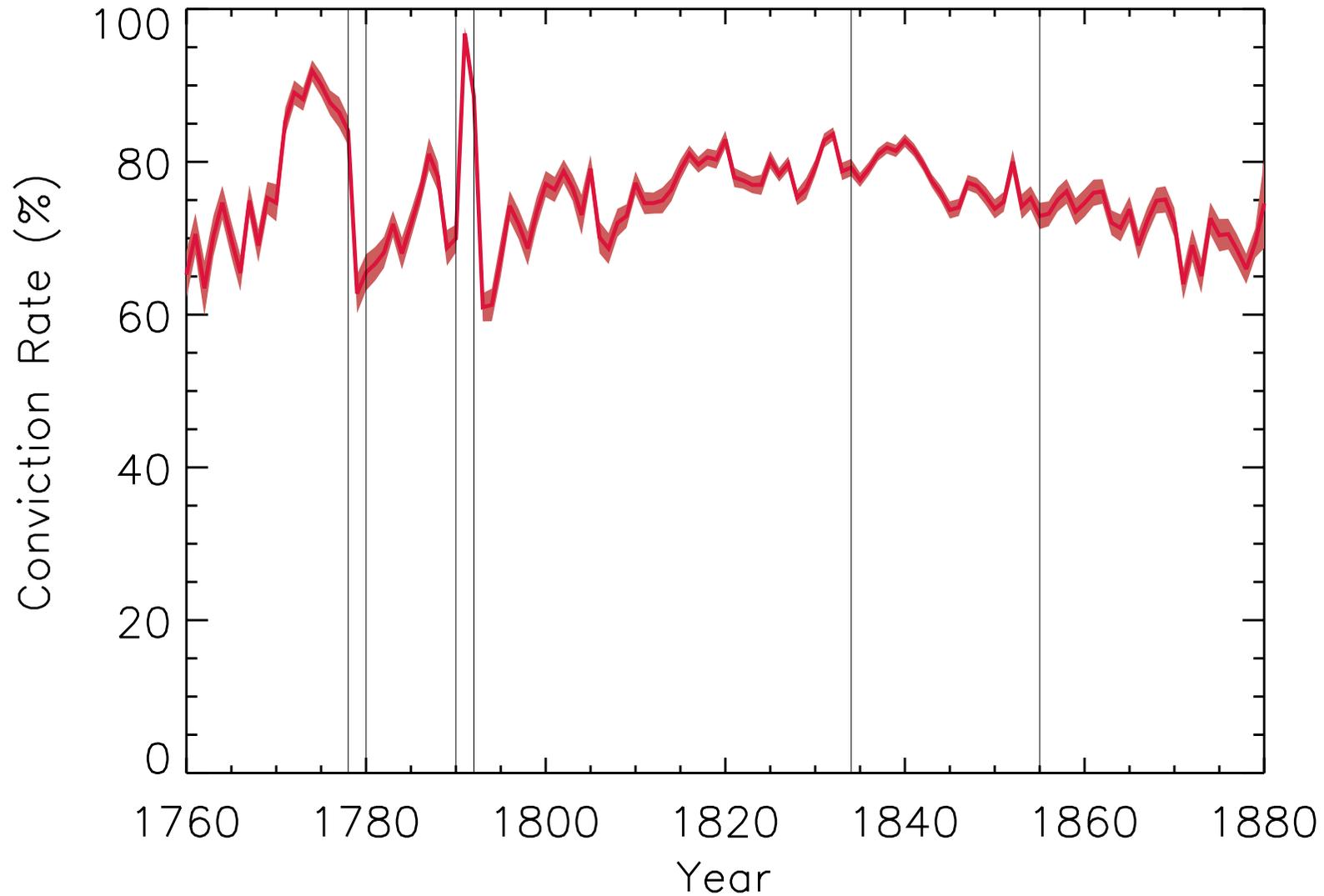


The Old Bailey

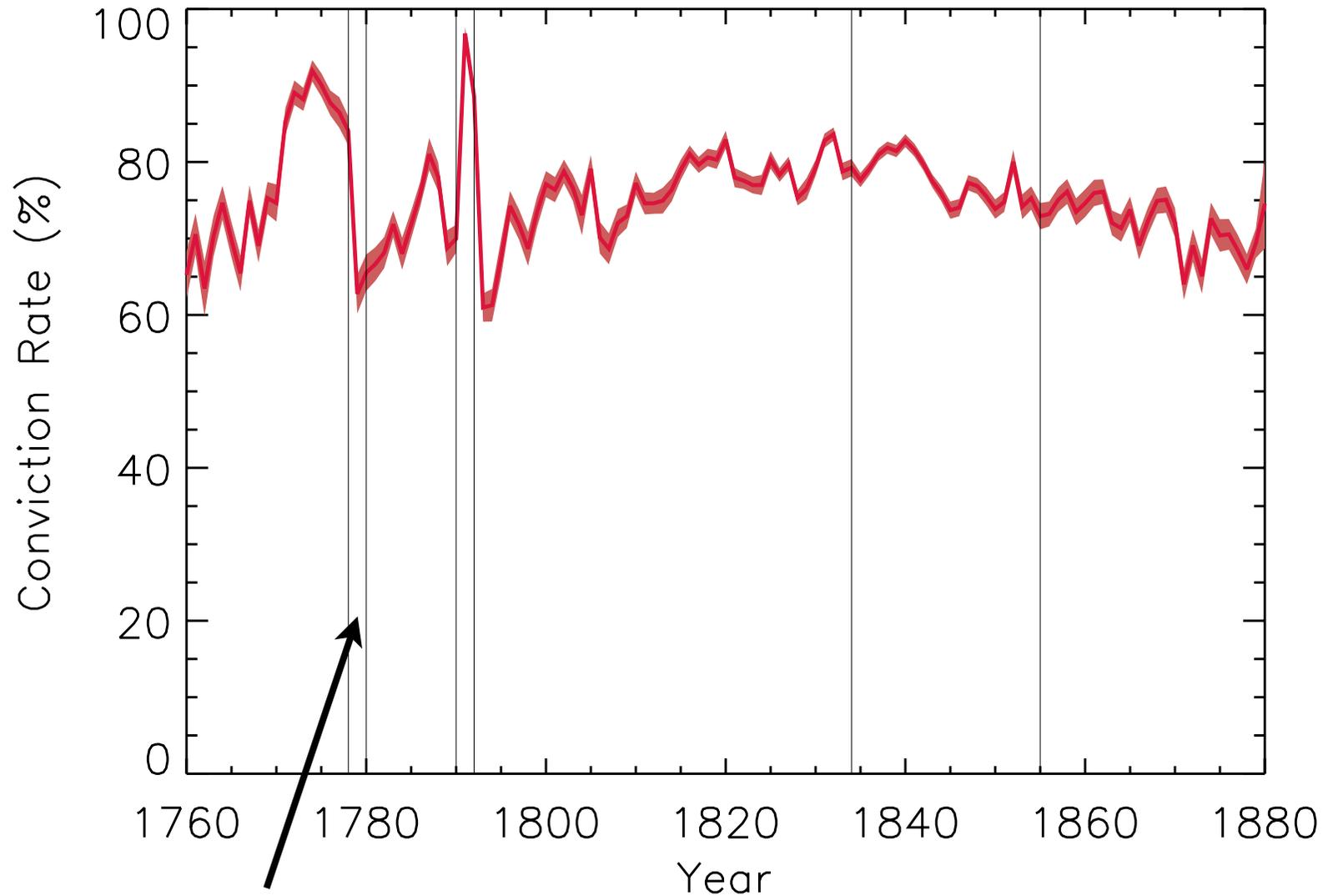
“A courtroom is a machine for producing guilty verdicts.”
(Tim Hitchcock)



A Brief History of London's Courts

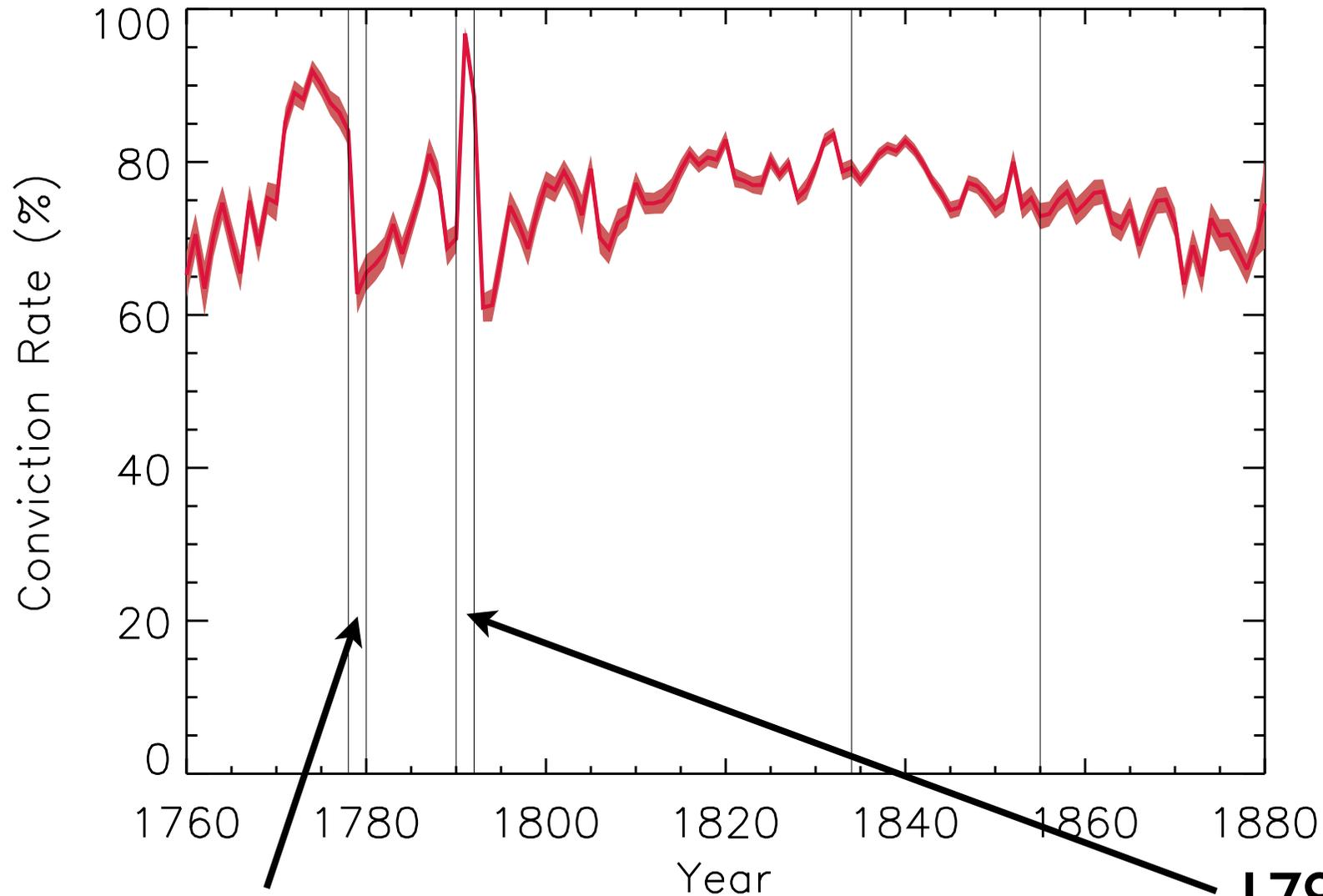


A Brief History of London's Courts



John Wilkes mandates
“true, fair & perfect”

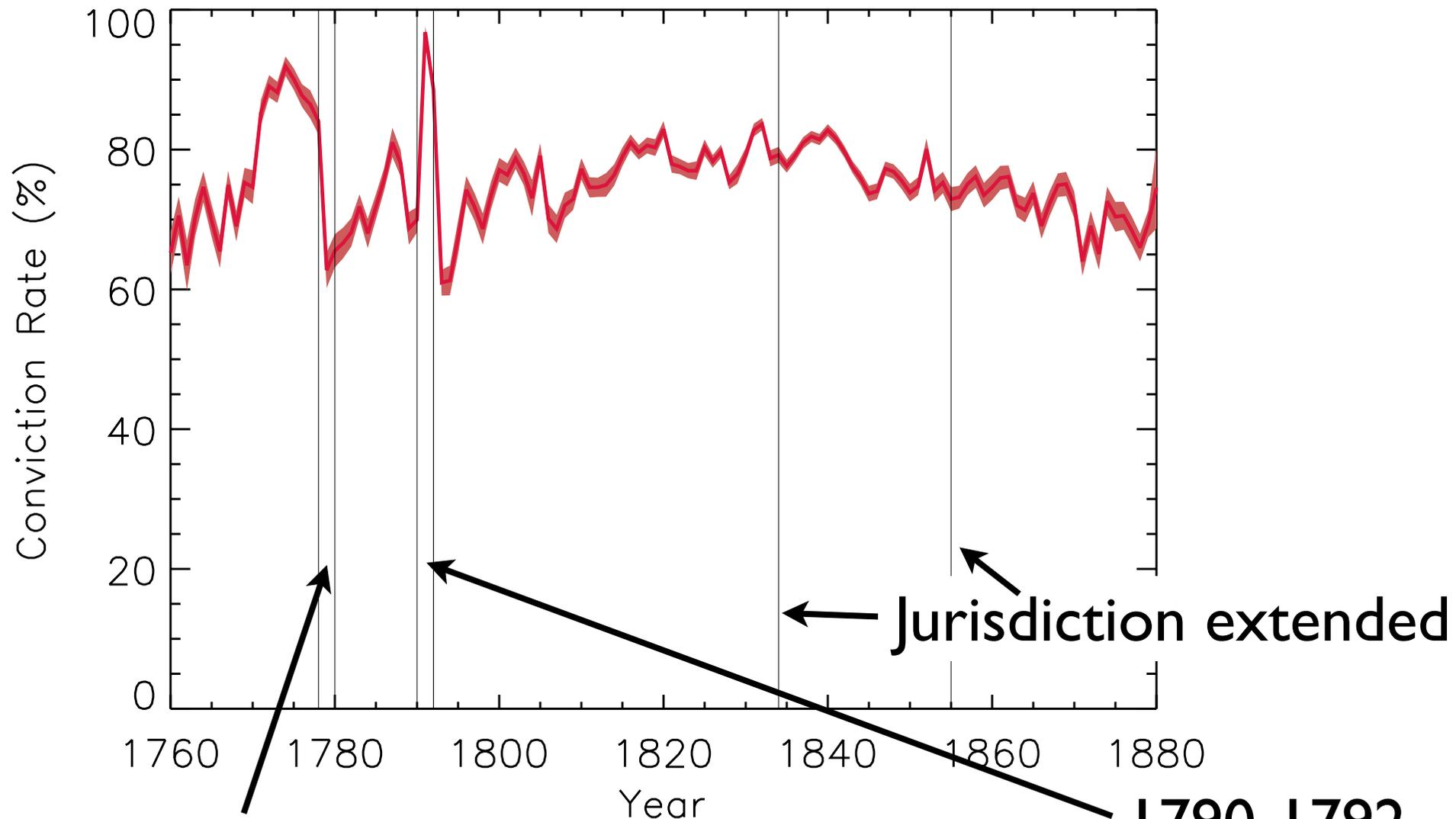
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**1790-1792
Censorship**

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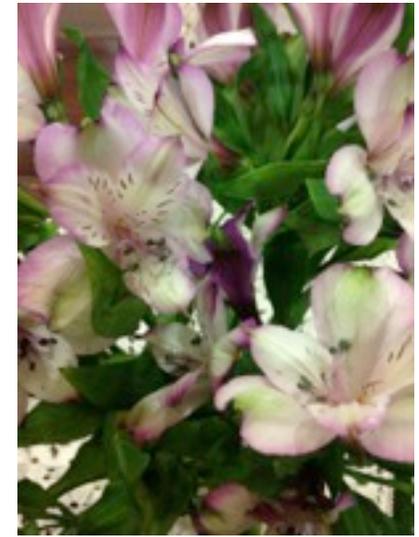


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1790-1792
Censorship

Jurisdiction extended

Evolution



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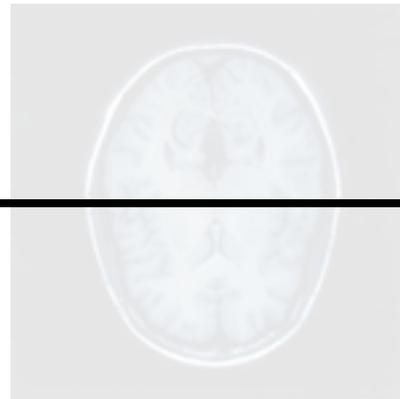
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First Middlesex Jury, before Mr. Common Sergeant.

The Trial of John Ince

January 1805

Mrs. CHAMBERLAIN sworn. - Q. What is your husband's name? - A. Edward Chamberlain, a bricklayer; the prisoner is a servant to Mr. Stapleton, I have always bought sand of Mr. Stapleton; the prisoner came with the sand, and delivered it; he came another time with the receipt, I gave him eleven shillings for the load of sand, and he gave me the receipt; I gave him half a guinea in gold and a sixpence; I am positive he is the man I paid the money to.

WILLIAM STAPLETON sworn. - I am a coal-merchant and sandman ; a load of sand was sent to Mrs. Chamberlain by her order, this man with another took the load of sand; in consequence of his being in the habit of receiving money, and appropriating it to his own use, he was ordered to receive no more, and this load of sand being on my books, I sent my young man to receive the money; I found Mrs. Chamberlain had paid for it.

Q. When was this that you first found it out? - A. Three or four days after Christmas-day; after he was detected, I interrogated him; he acknowledged having received it, and not paying it to me, together with several others.

Prisoner's defence. My master trusted me to carry out a dozen bills a little while before; I called on that lady at one time, she was not at home, and then I called again, she paid me the money.

GUILTY, aged 51.

Confined one week in Newgate, and whipped in the jail .

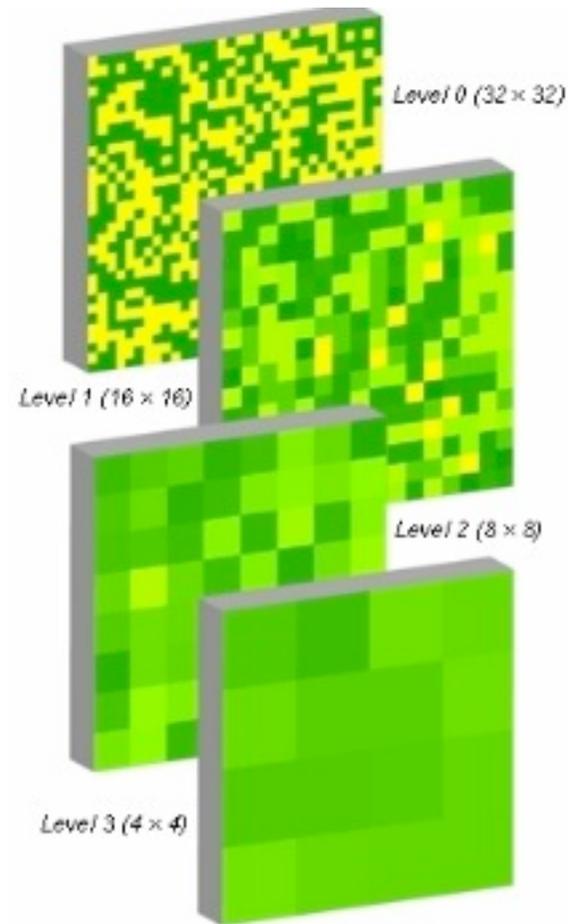
90% of Physics Since 1950 in One Slide

condensed matter
quantum field theory
Navier-Stokes & turbulence
statistical physics
information theory

Fine-grained
descriptions



Coarse-grained
descriptions



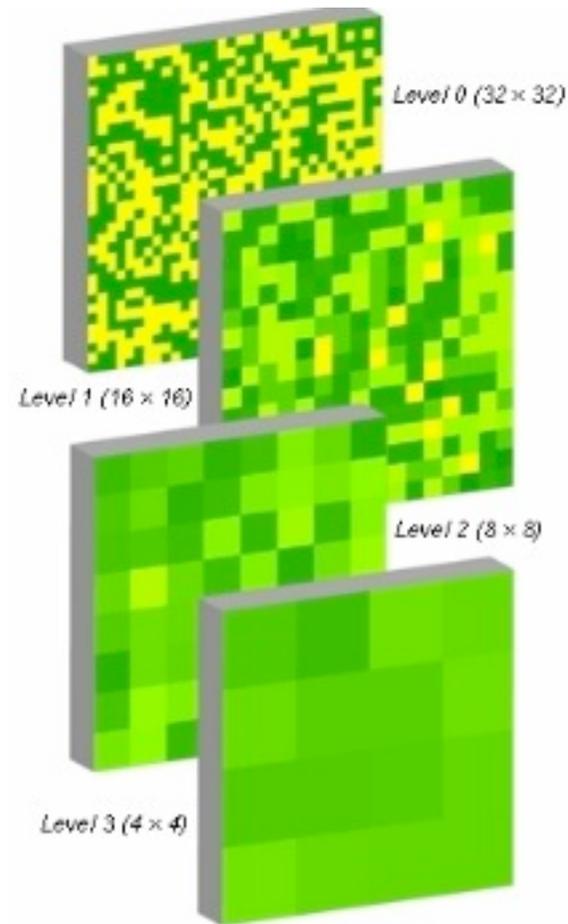
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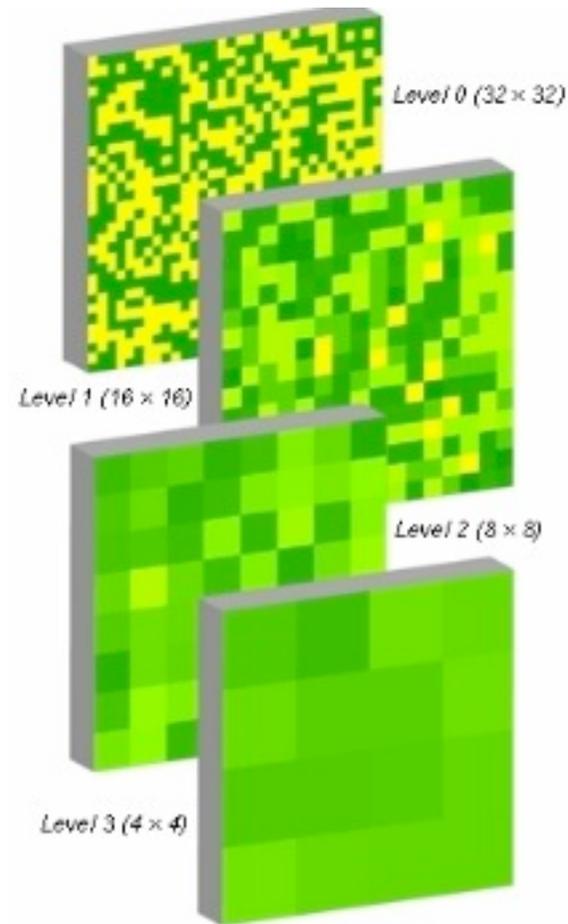
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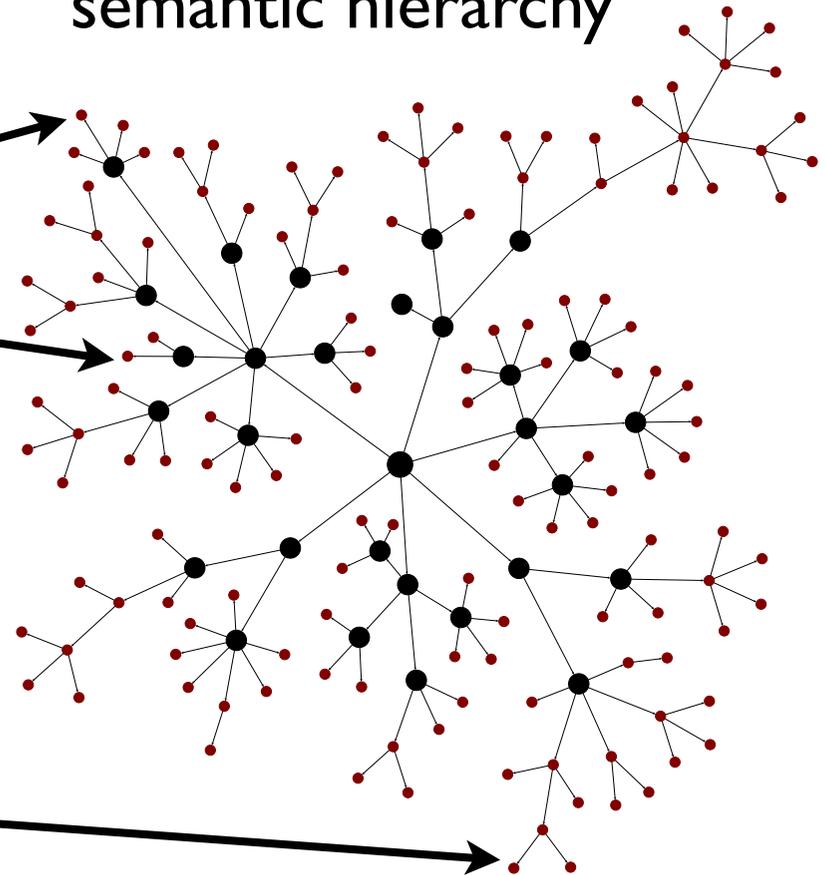
Coarse-grained
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Semantic Classification

Sentence — Parts of Speech Tagging — Stemming
— Identification of Semantic Class — Coarse-graining of tree

semantic hierarchy



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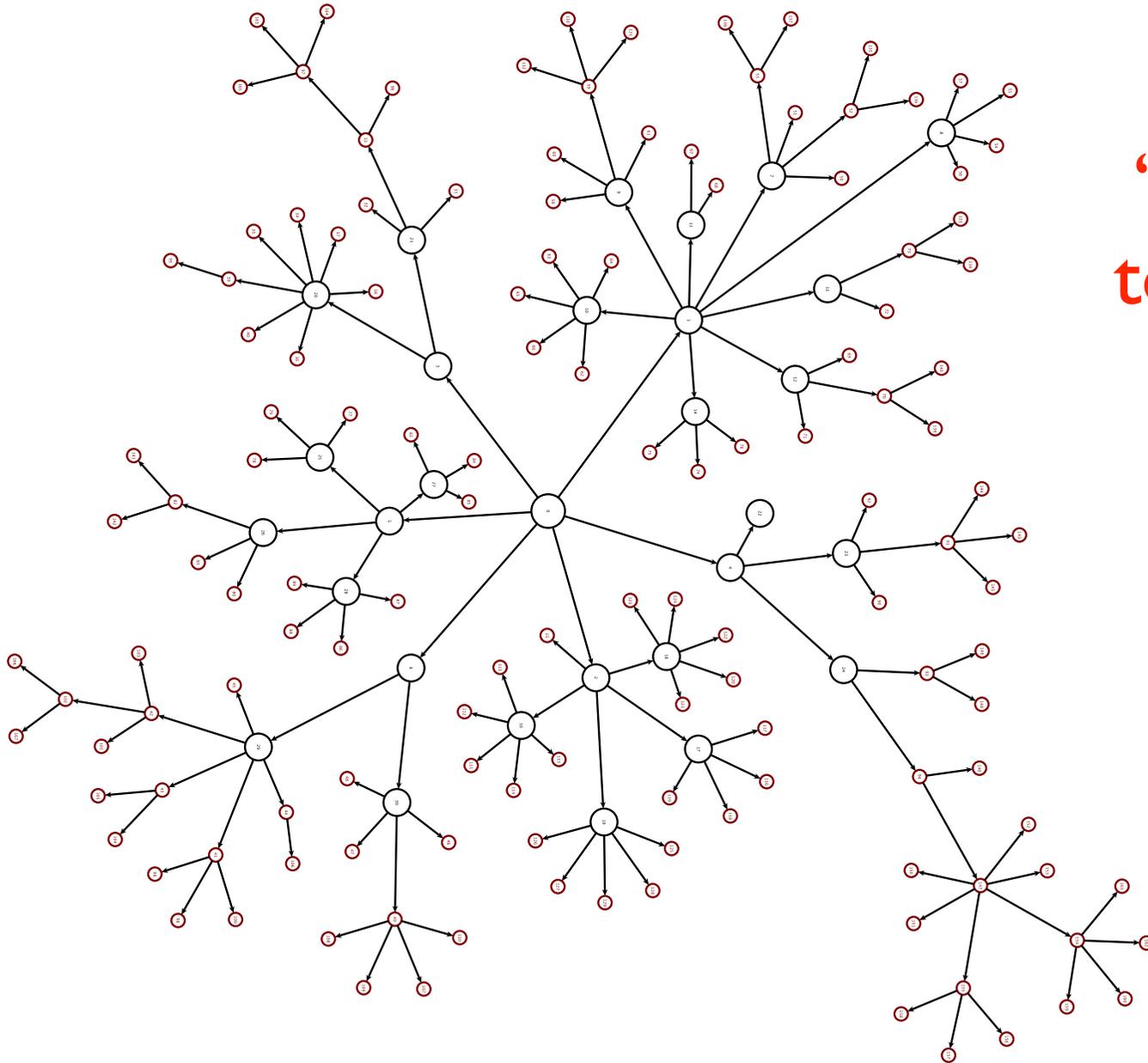
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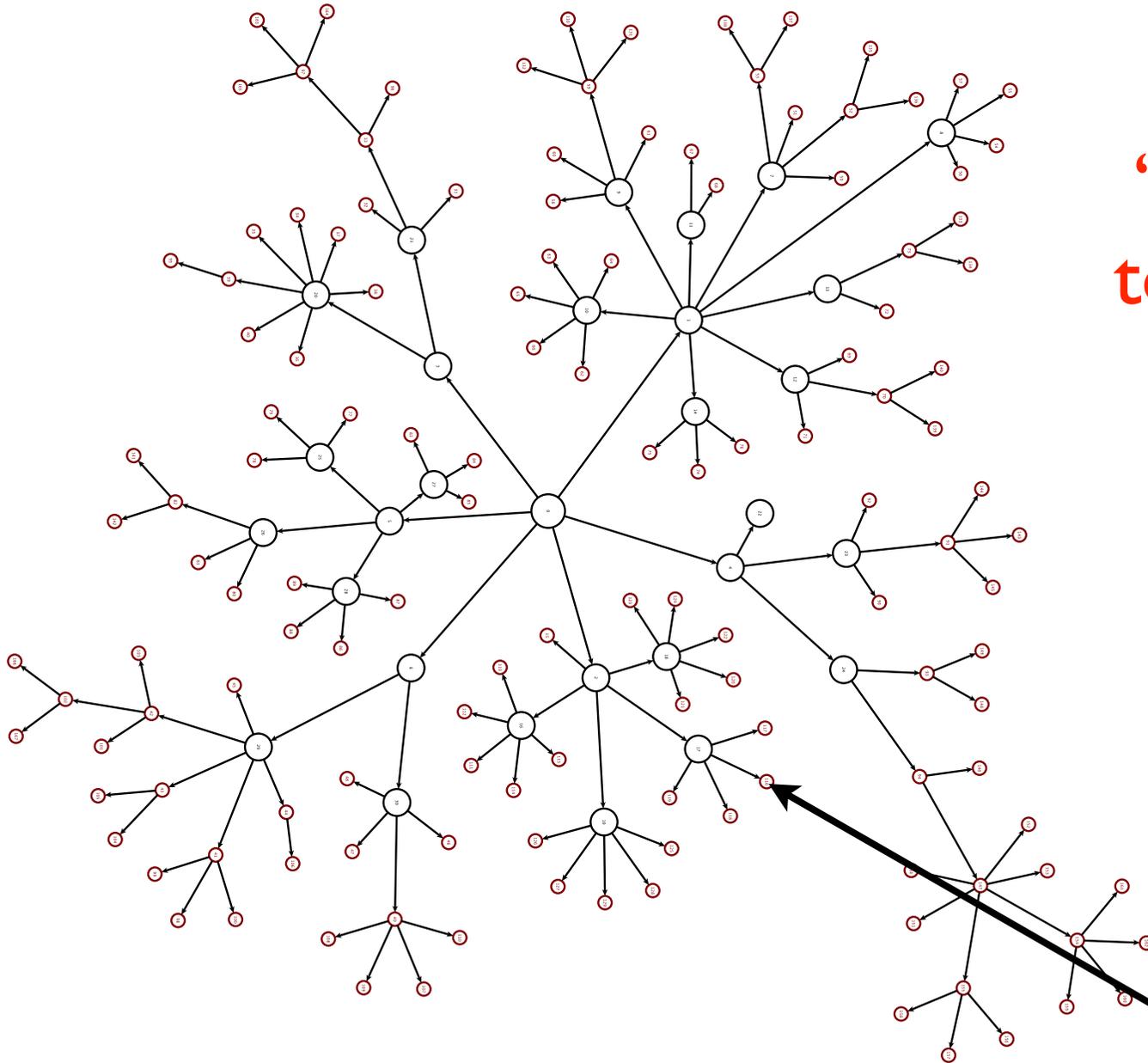
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Coarse-Grained Semantics



“I was surprised
to see my friend”

Coarse-Grained Semantics

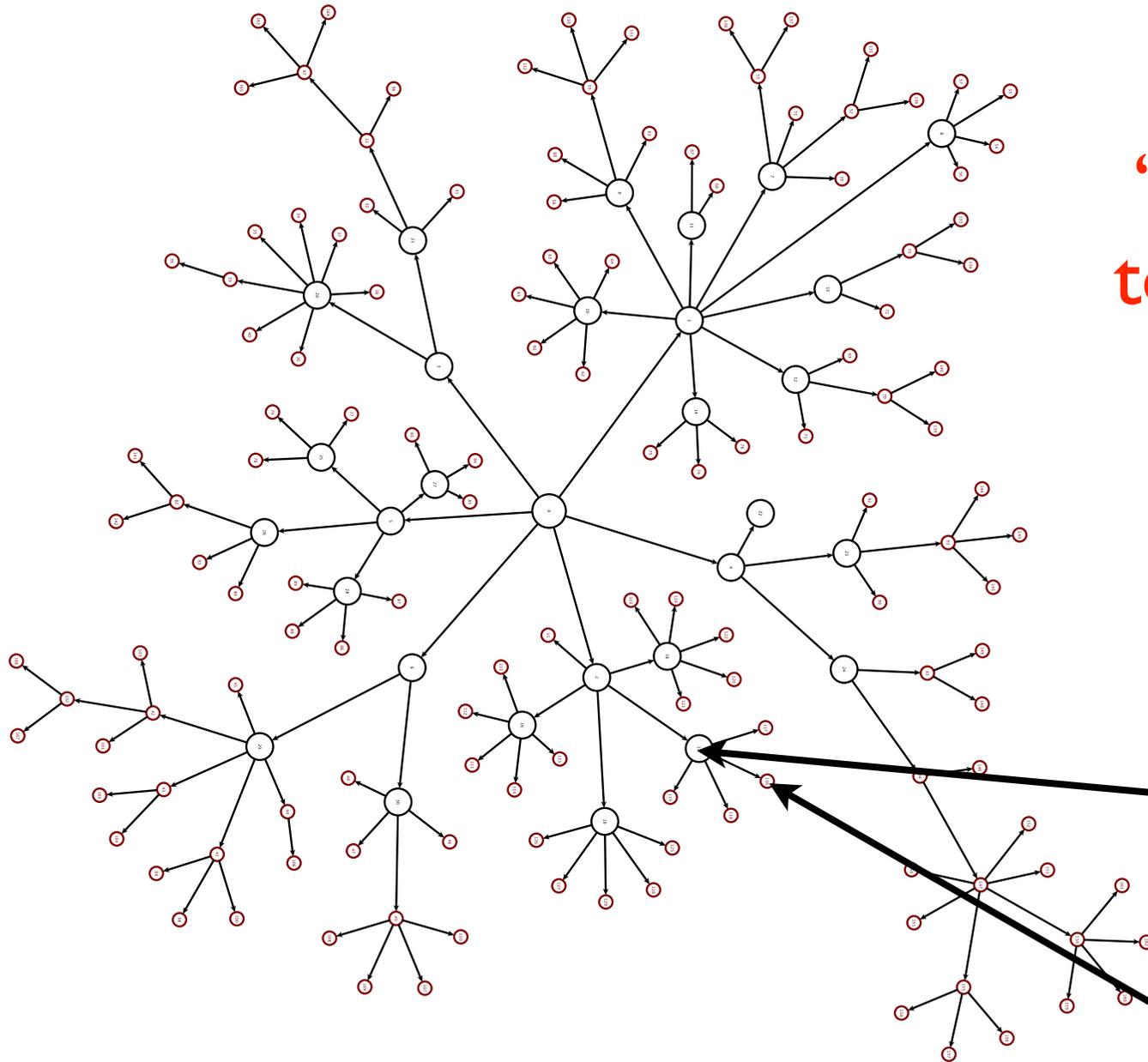


“I was surprised
to see my friend”

Social Affections

890. “friend”

Coarse-Grained Semantics

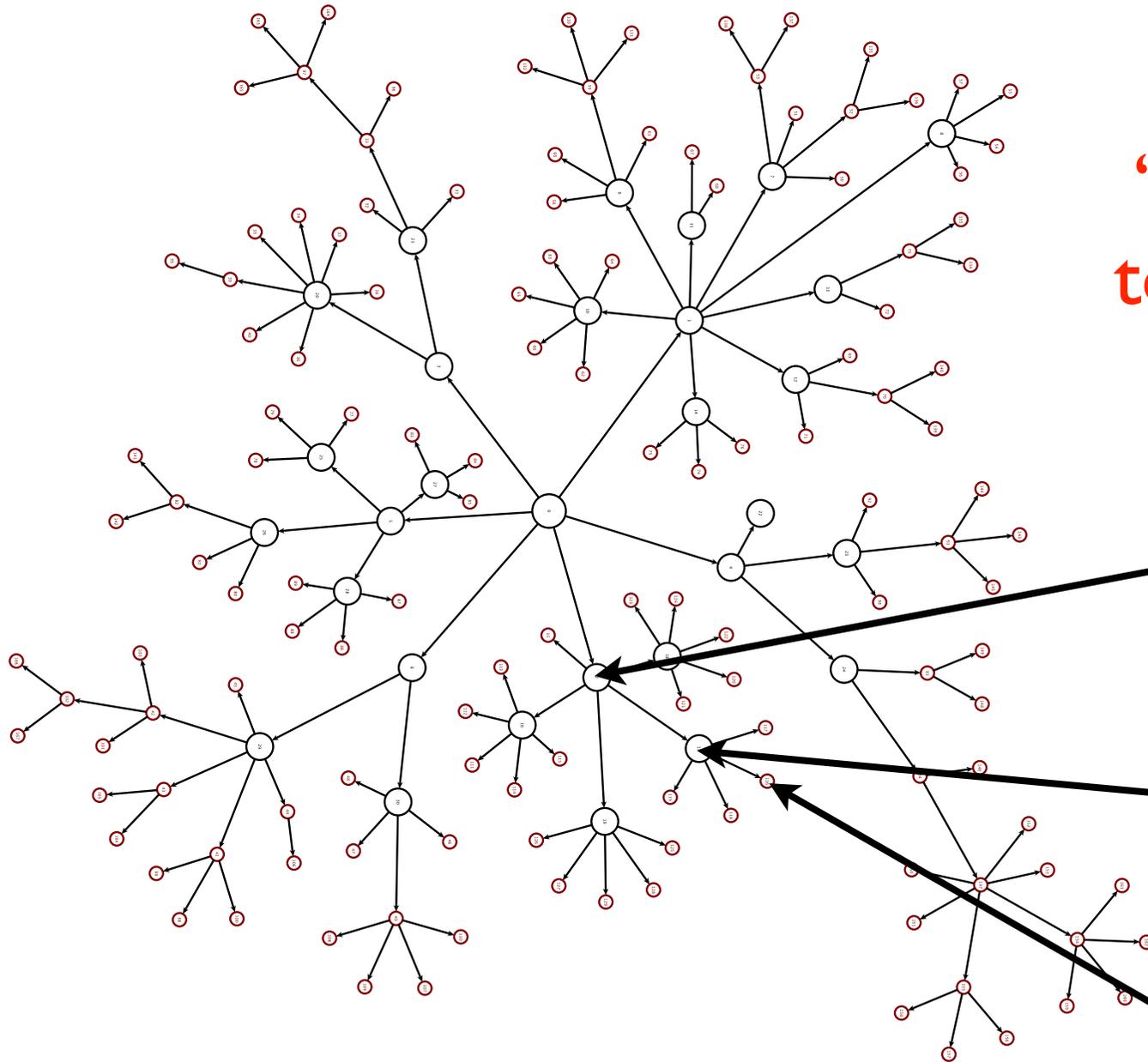


“I was surprised
to see my friend”

Sympathetic
Affections

Social Affections

Coarse-Grained Semantics



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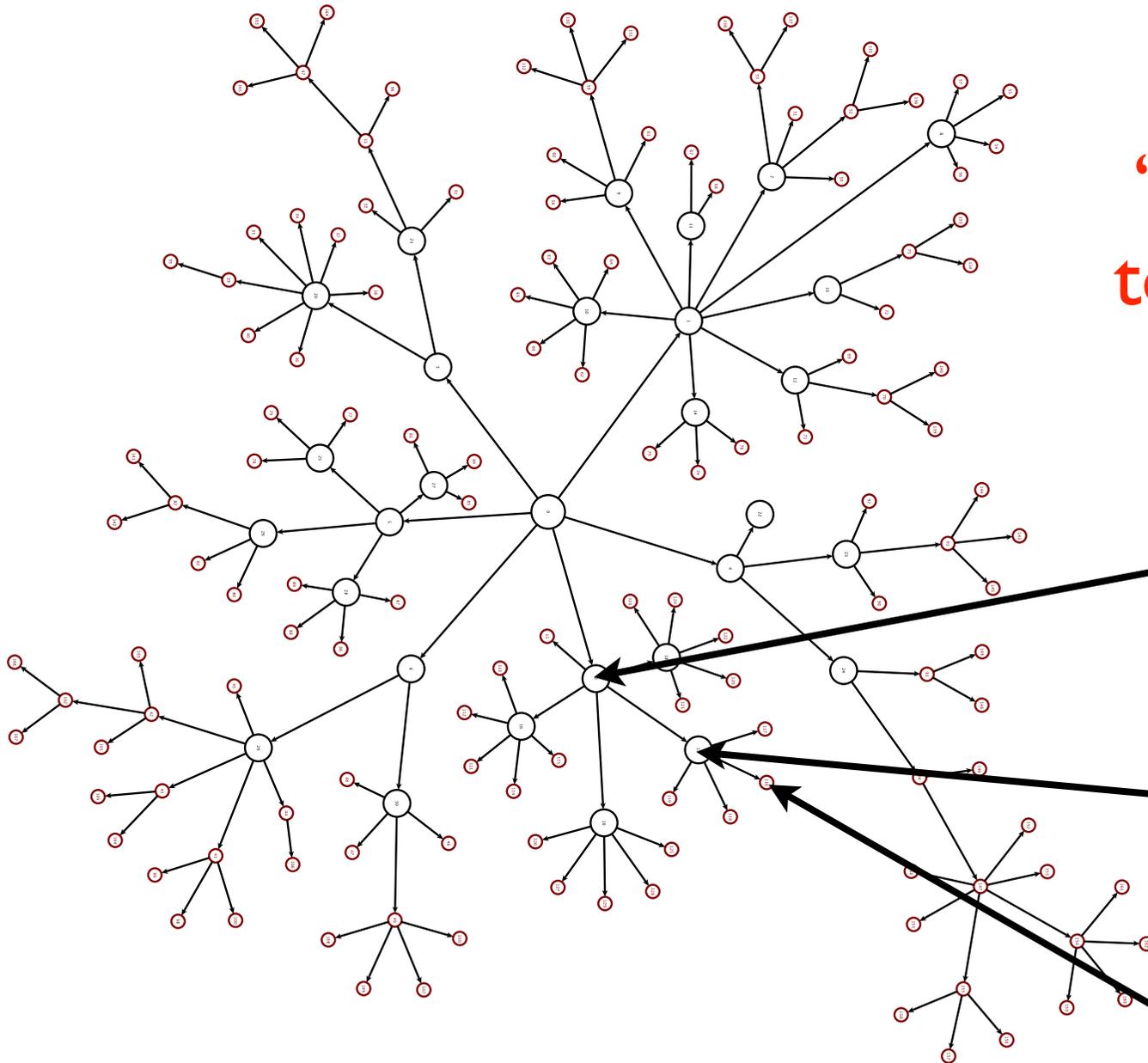
Affections

Sympathetic
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Social Affections

Coarse-Grained Semantics

“I was surprised to see my friend”



Affections

Sympathetic
Affections

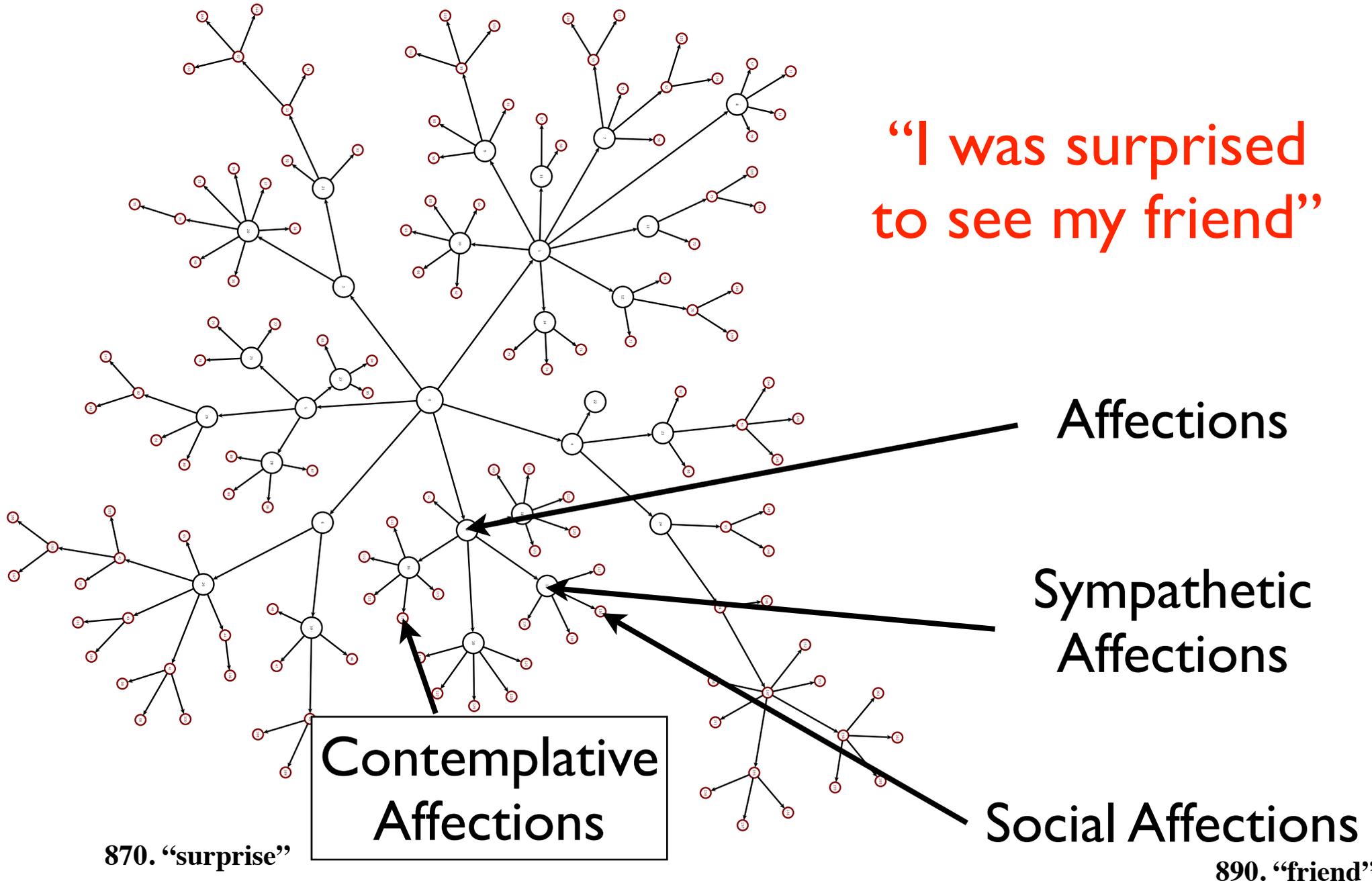
Social Affections

870. “surprise”

890. “friend”

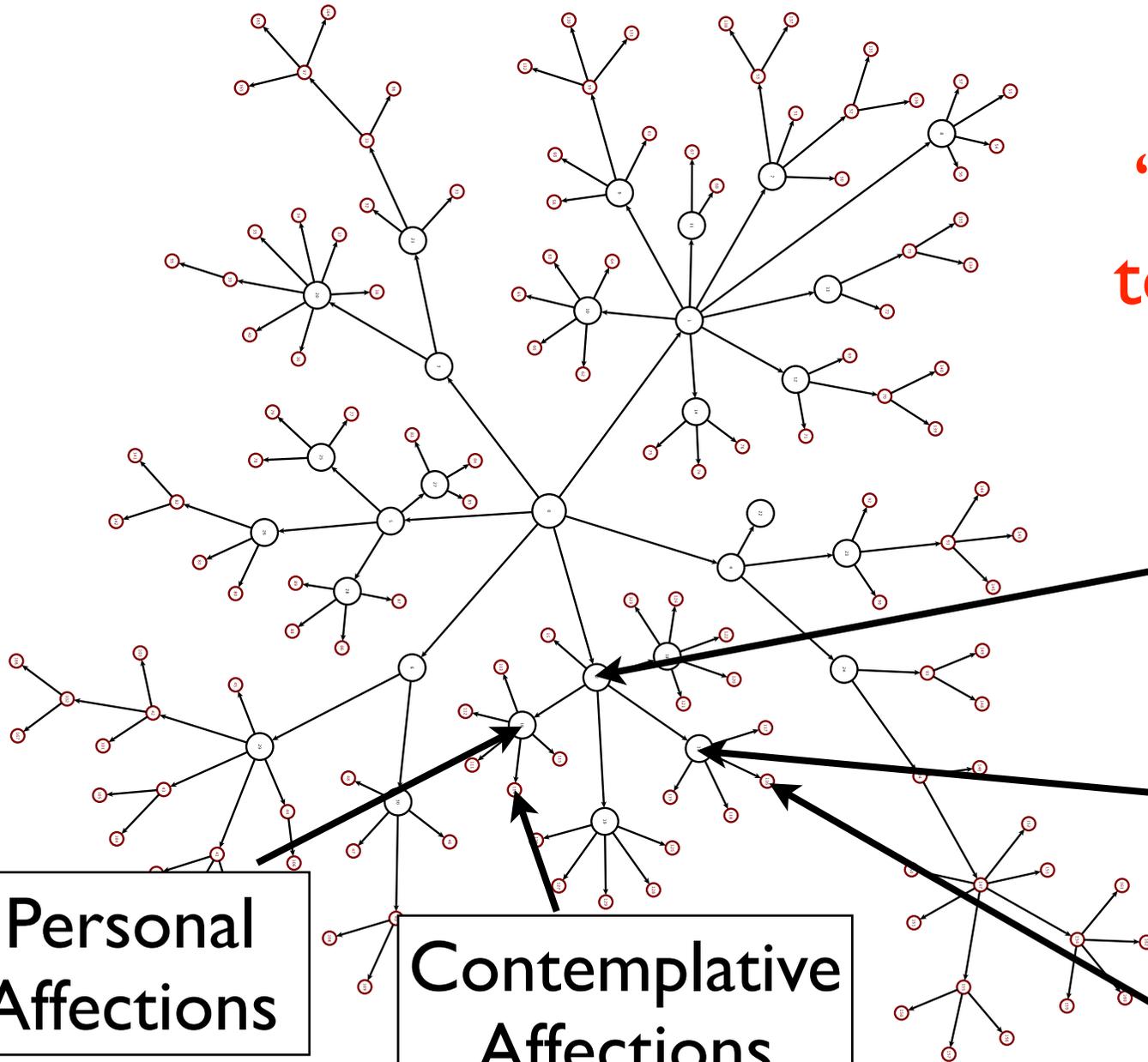
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“I was surprised to see my friend”



Coarse-Grained Semantics

“I was surprised to see my friend”



Affections

Sympathetic
Affections

Social Affections

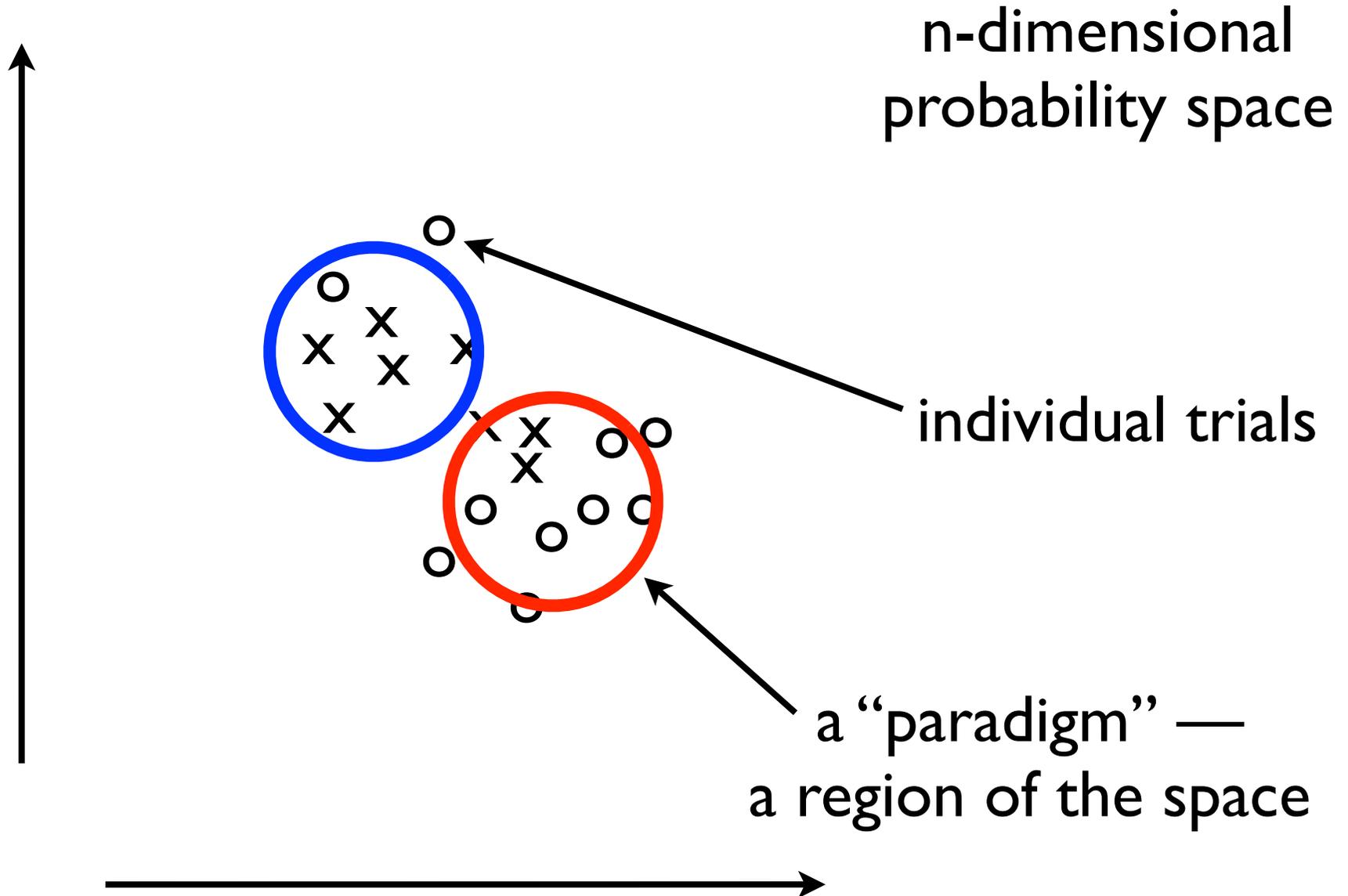
Personal
Affections

Contemplative
Affections

870. “surprise”

890. “friend”

Patterns of Meaning



Skein (1760–1870)

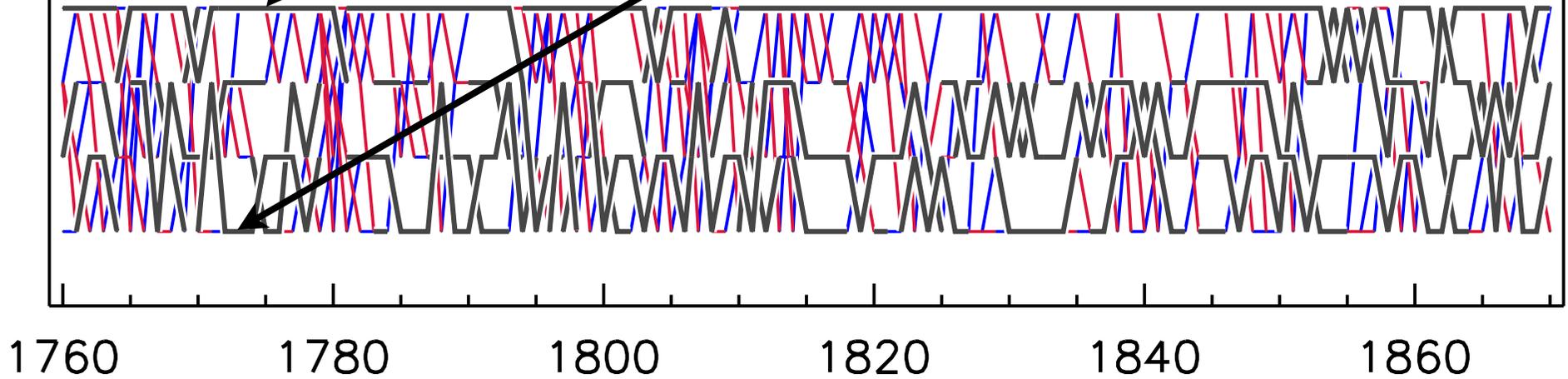
Blue: prospective alignment

Red: retrospective alignment

Black: total alignment

Most Common Paradigm

Rarest Paradigm



Skein (1760–1870)

Blue: prospective alignment

Red: retrospective alignment

Black: total alignment

(Legal–Historical Context)

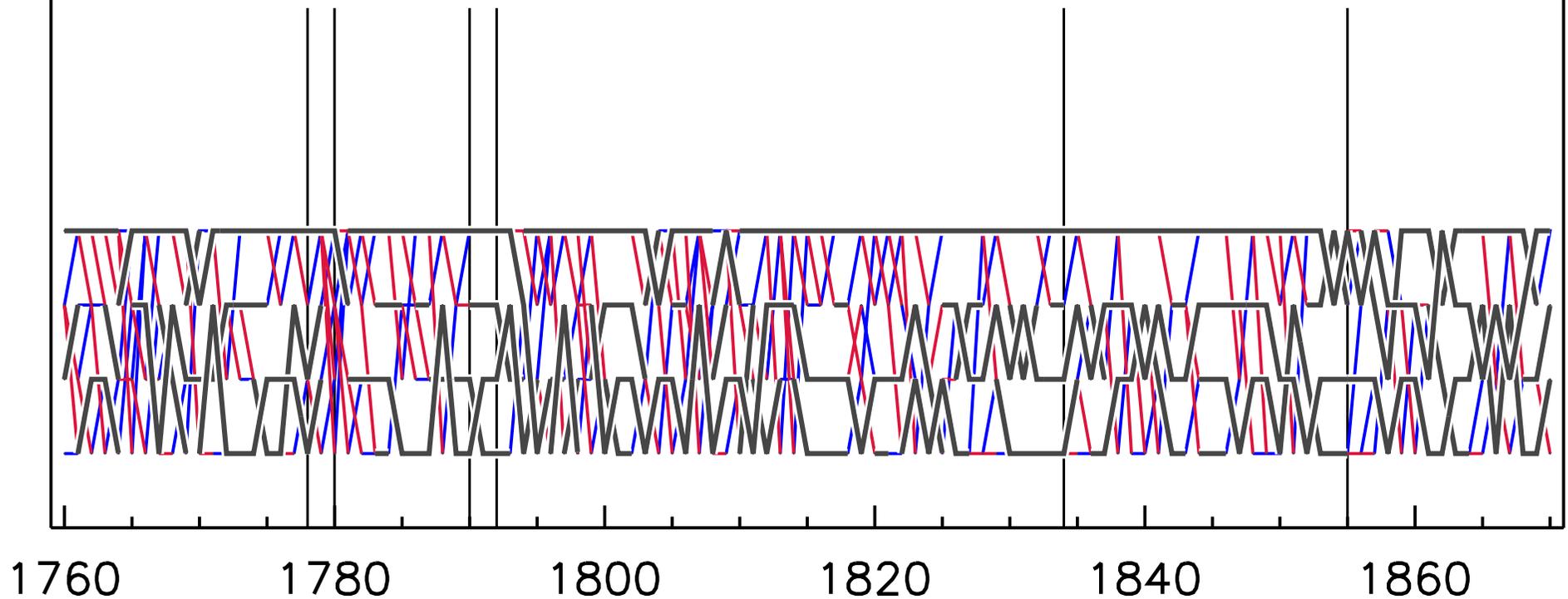
1778: Transcripts "true, fair and perfect"

1780: Gordon Riots

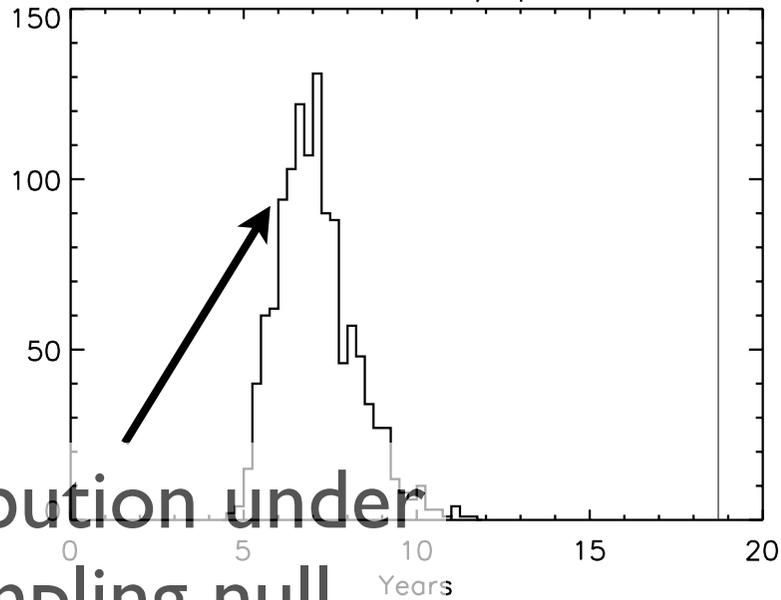
1790–1792: Partial Censorship of Record

1834: Jurisdiction Enlarged

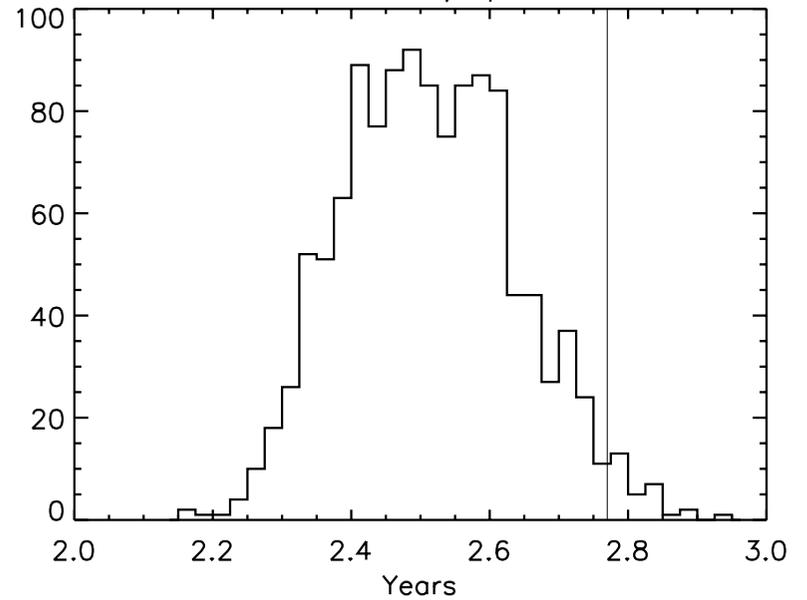
1855: Major Felonies Only



TOP RUN LENGTH / $p < 10^{-3}$

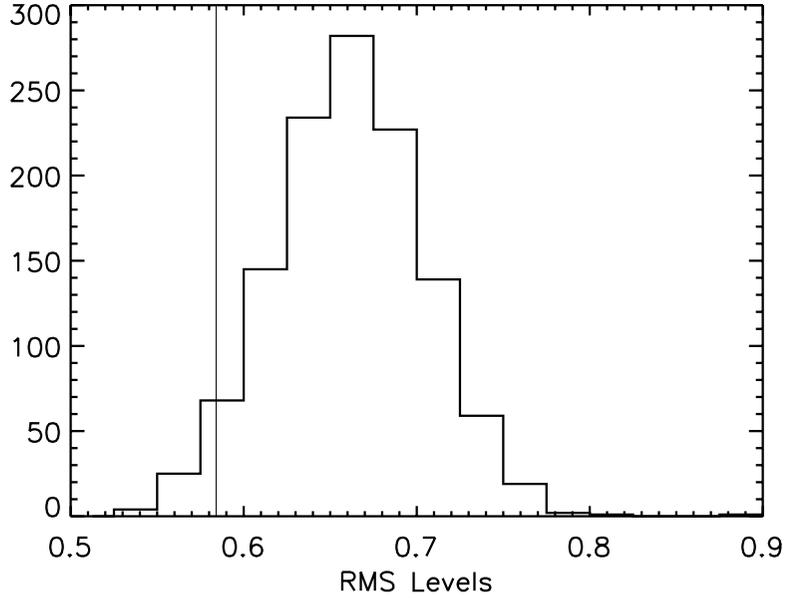


OTHER RUN LENGTH / $p = 0.0265340$

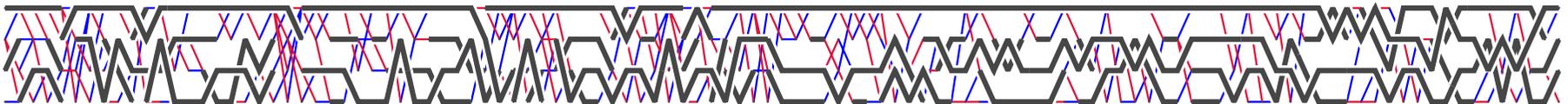
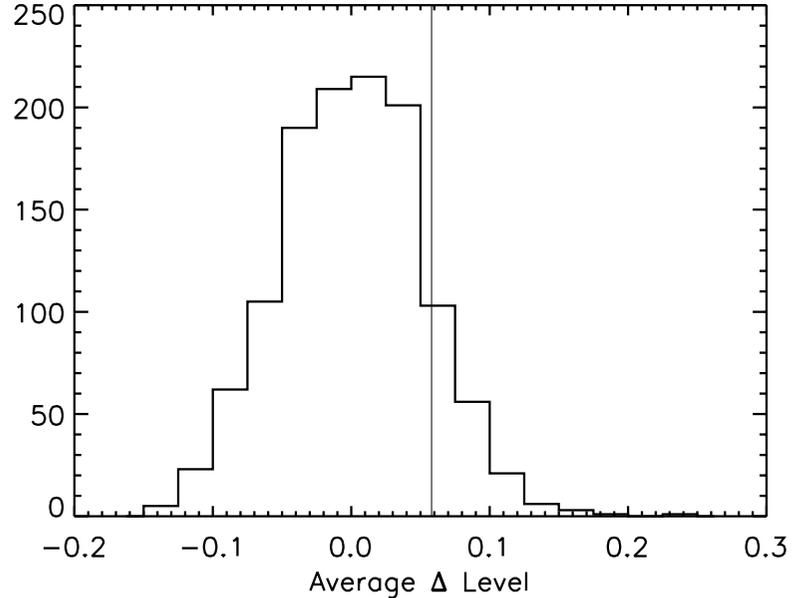


distribution under
sampling null

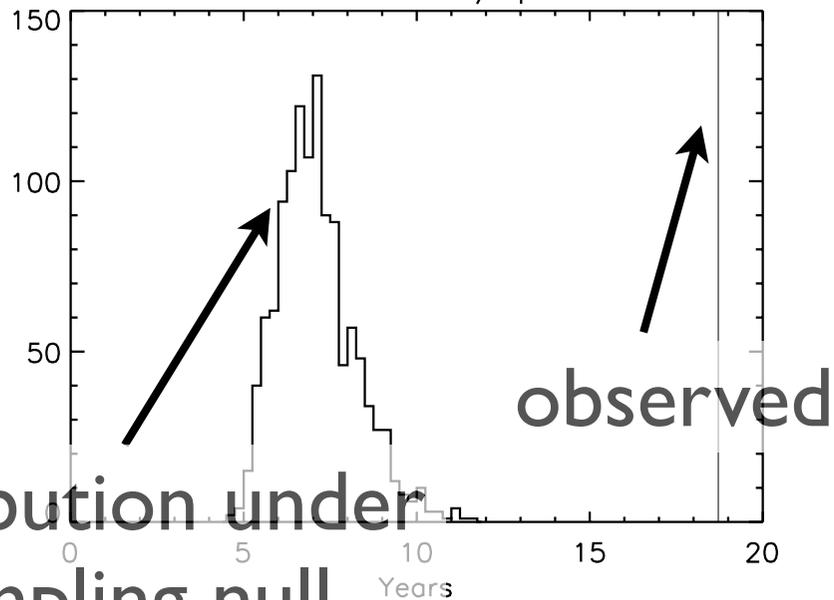
VARIANCE OF RUN RANGE / $p = 0.0373134$



UP/DOWN RUN BIAS / $p = 0.120232$

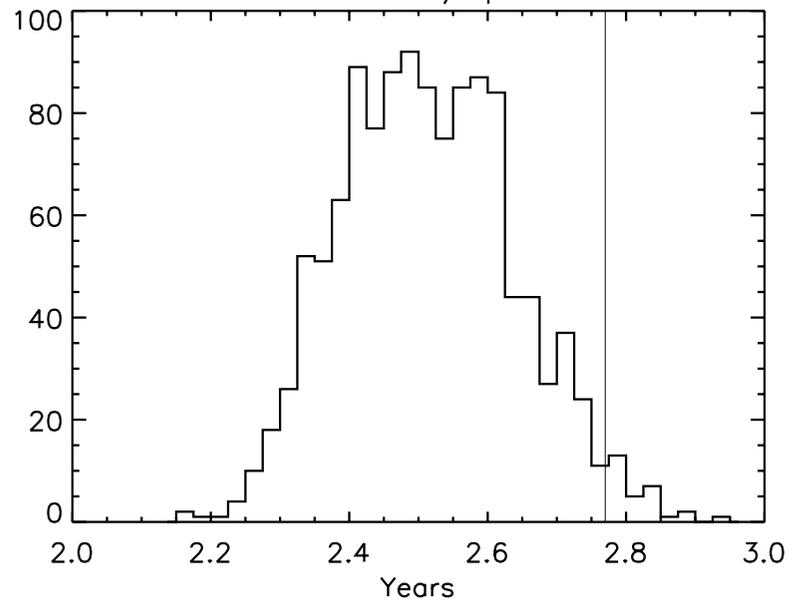


TOP RUN LENGTH / $p < 10^{-3}$

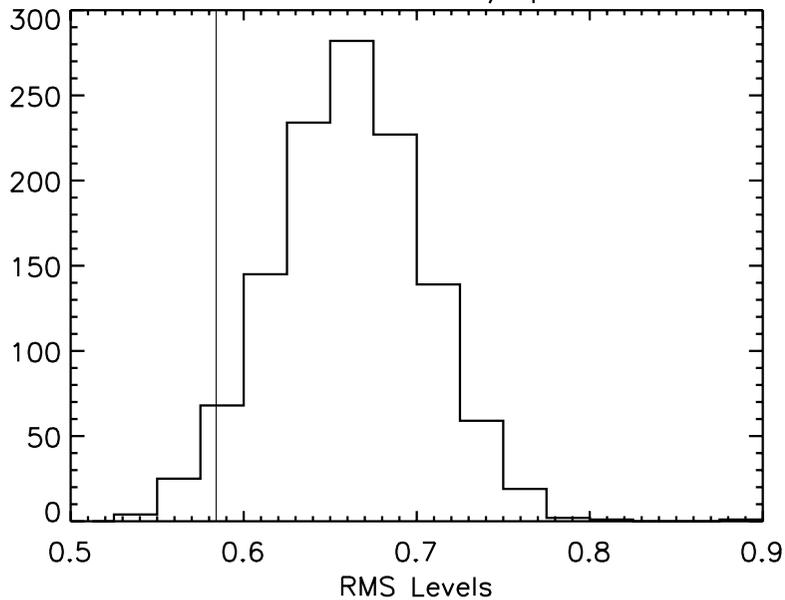


distribution under
sampling null

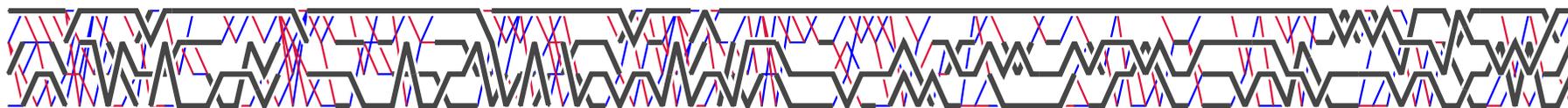
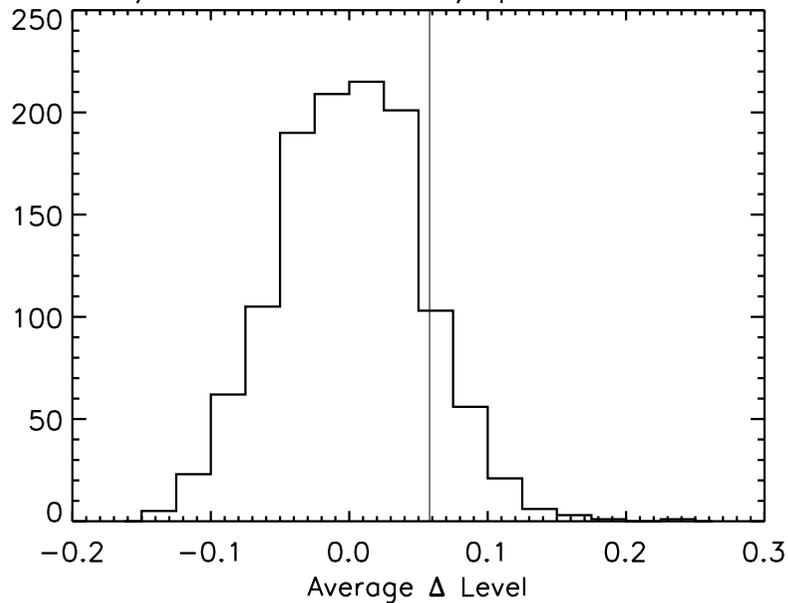
OTHER RUN LENGTH / $p = 0.0265340$

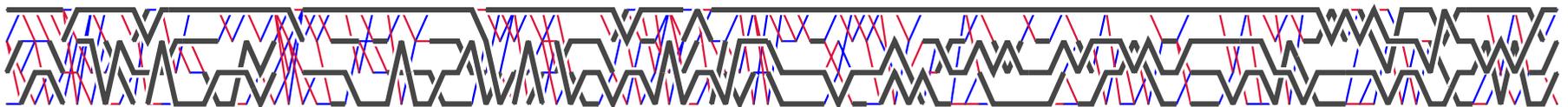
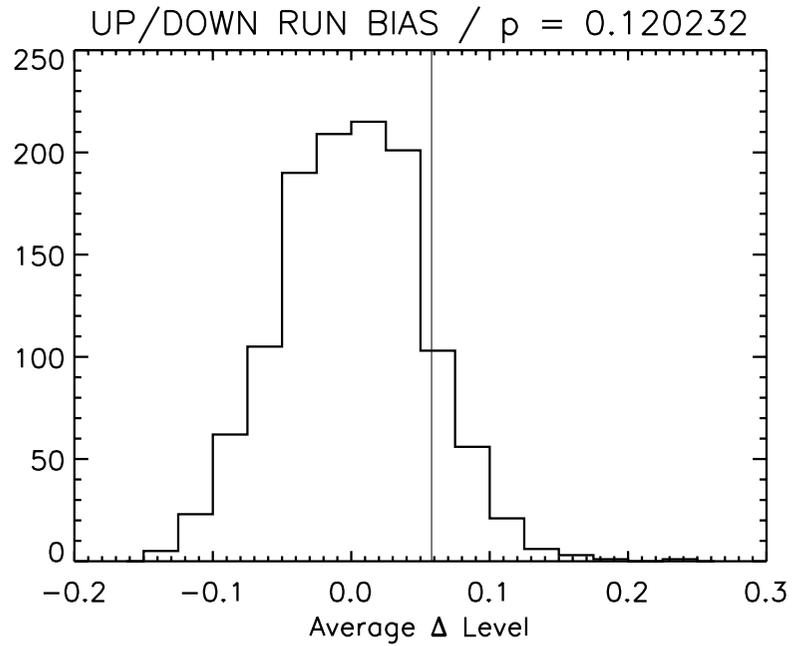
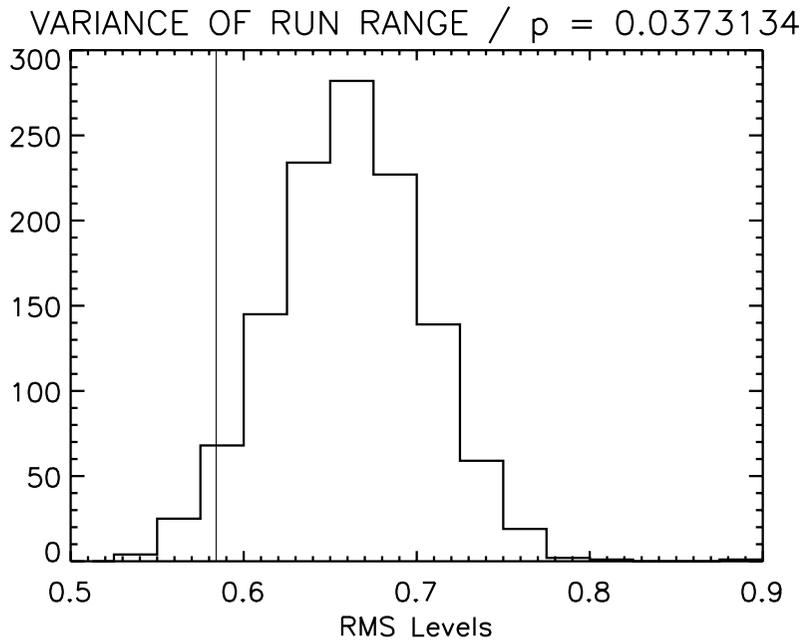
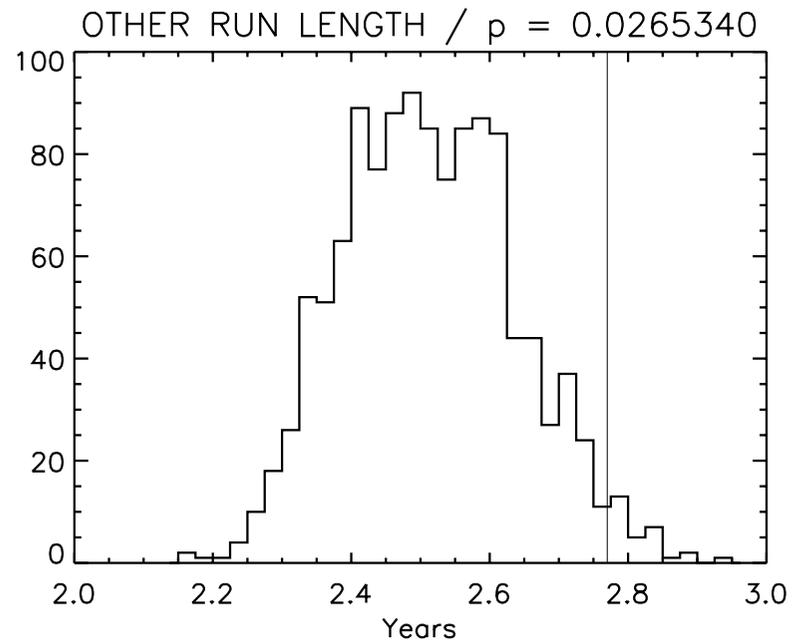
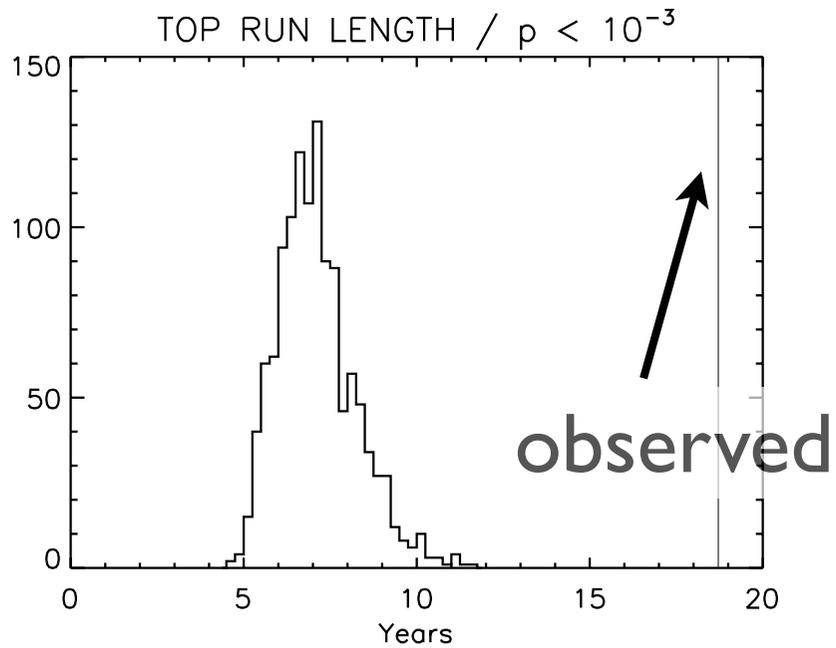


VARIANCE OF RUN RANGE / $p = 0.0373134$

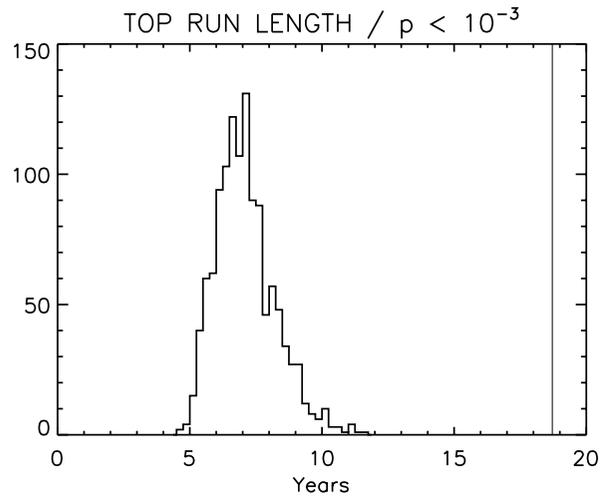


UP/DOWN RUN BIAS / $p = 0.120232$

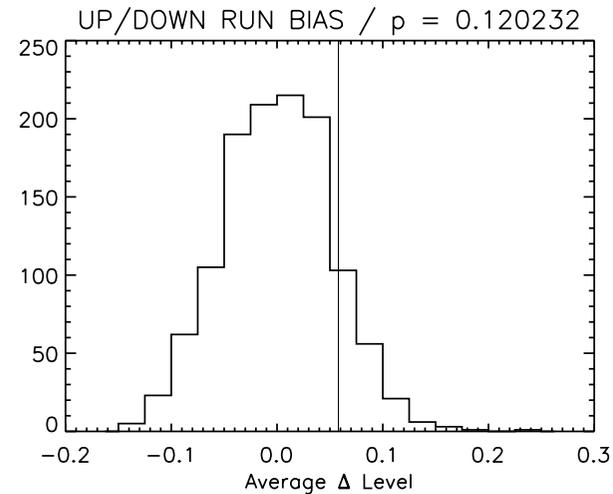
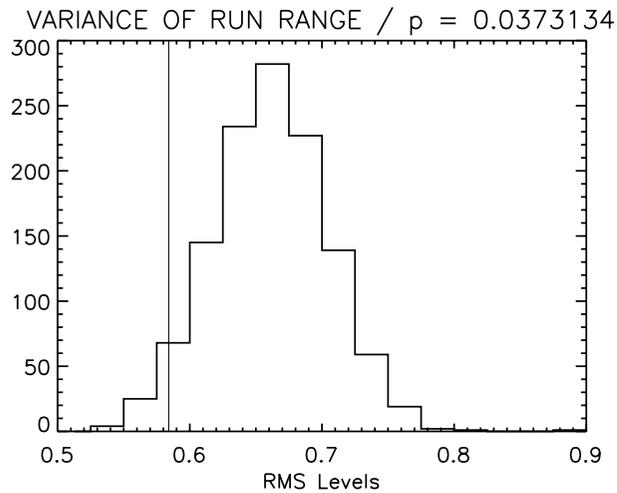
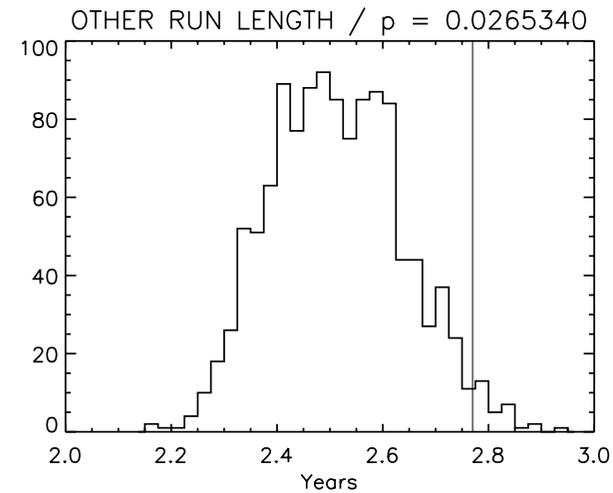




persistence of “dominant” paradigms

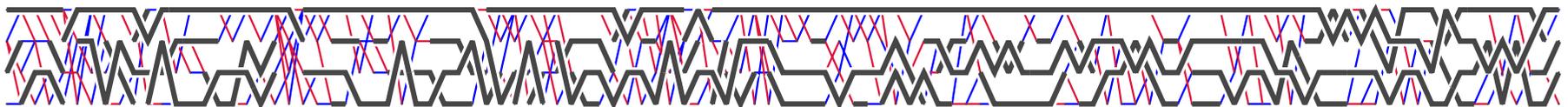


persistence of “marginal” paradigms

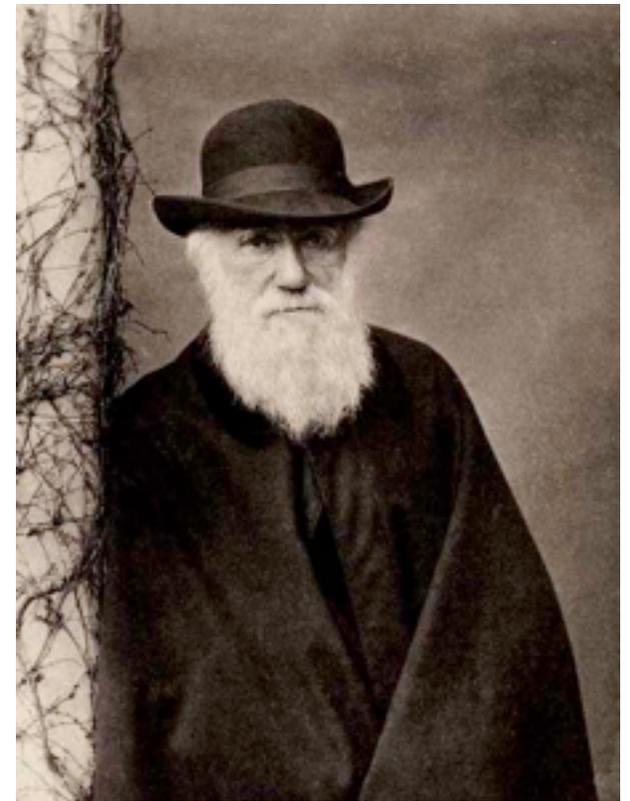
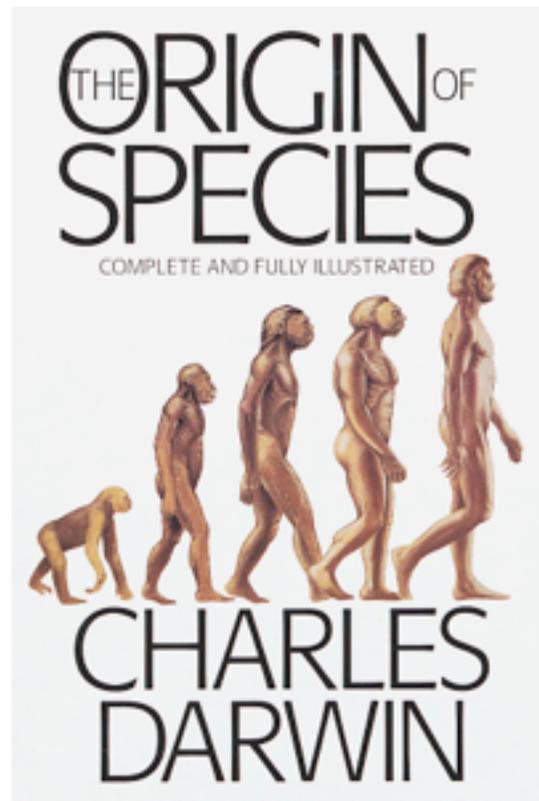


stability of ordering

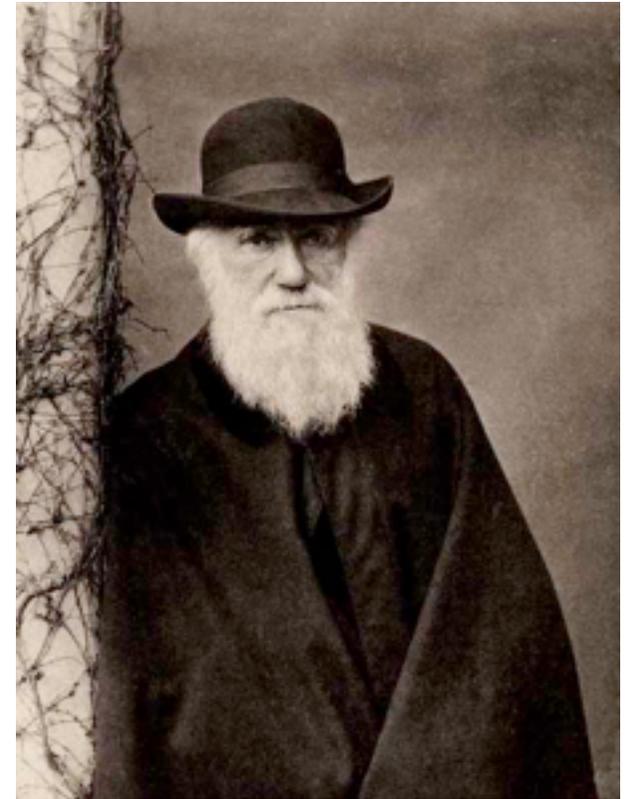
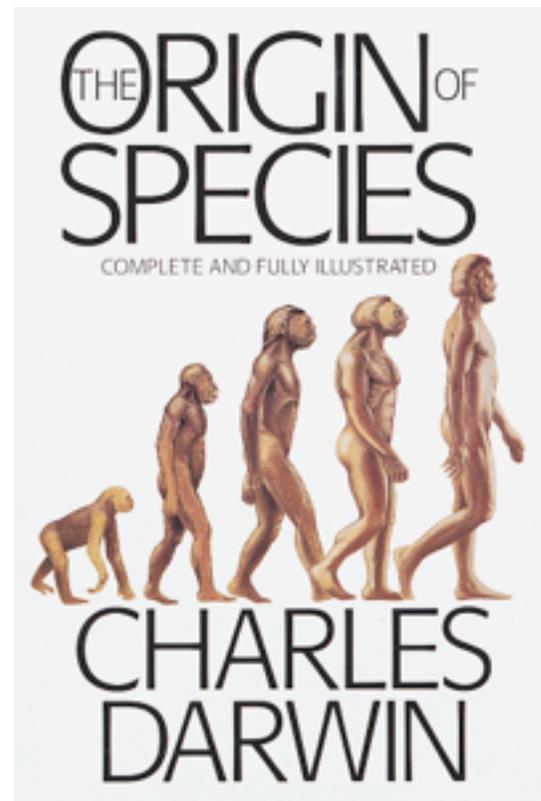
mode of change (N.D.)



Selection



Selection

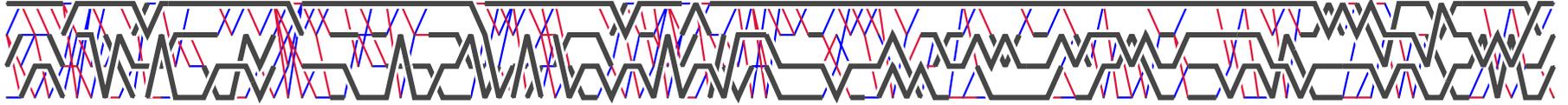
A photograph of Motoo Kimura, a Japanese population geneticist. He is a middle-aged man with dark hair, wearing a light-colored shirt and a grey jacket. He is standing in a room with many potted plants, looking down at a small plant he is holding in his hands.

The neutral theory of molecular evolution

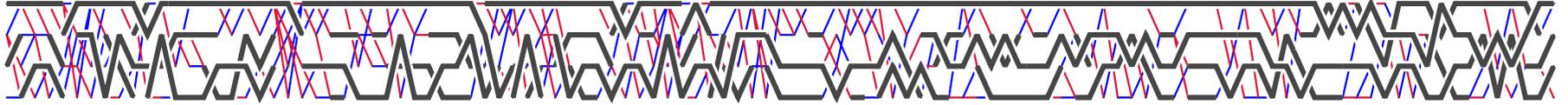
Motoo Kimura

Drift

Evolutionary Selection

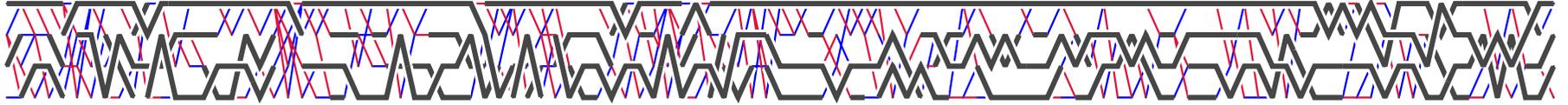


Evolutionary Selection



“s” : *selection coefficient*

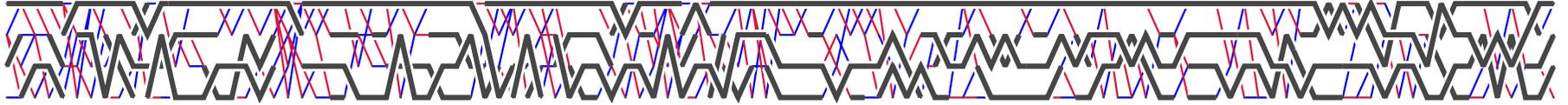
Evolutionary Selection



“s” : *selection coefficient*

The fraction by which one phenotype
out-reproduces another

Evolutionary Selection

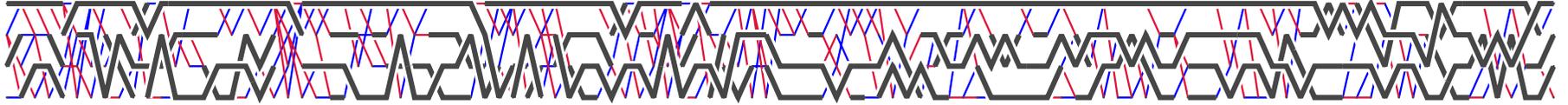


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Biological
Systems

Evolutionary Selection



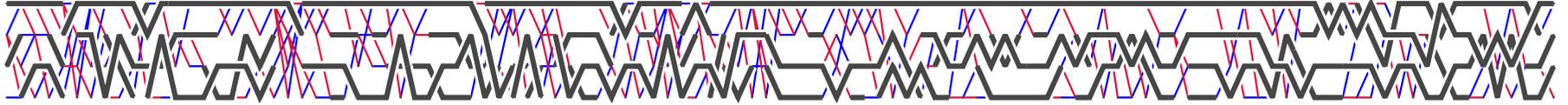
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$$s \sim 10^{-3} - 10^{-4}$$

Evolutionary Selection



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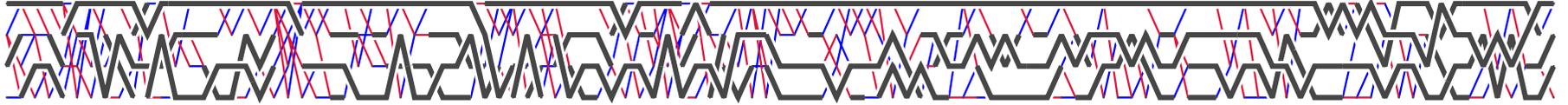
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Systems

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Cultural
Systems

Evolutionary Selection



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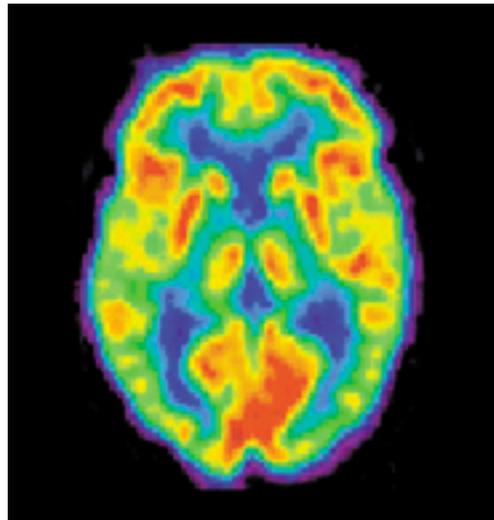
Biological
Systems

$$s \sim 10^{-3} - 10^{-4}$$

Cultural
Systems

[to date unknown]

Cognition





844. JAMES HOLLIS and THEODORE PIKE were indicted for stealing, on the 15th of June, one handkerchief, value 4s., the goods of James Bernard Bernard, from his person.—Mr. HONE conducted the prosecution.

JAMES BERNARD BERNARD. I am a barrister, and reside in Gray's Inn. On the 15th of June, about nine o'clock in the morning, I was in Castle-street, Bloomsbury—I heard a voice call out "They have picked your pocket." I felt and missed my handkerchief—and at the same time, turning round, I saw two persons running away. I pursued them towards Plumtree-street, into Museum-street, Broad-street, St. Giles's—and there they divided. I secured Hollis, and never lost sight of him. Pike was brought back, and my handkerchief produced.

WILLIAM HATTON. I am eleven years old, and belong to Shelton school; I live in Little Russell-street. On the 15th of June, I was coming out of a dairy in Castle-street with some milk, and saw Hollis draw the handkerchief from Mr. Bernard's pocket and give it to Pike, who followed close behind him. I am certain they are the boys. I immediately called to Mr. Bernard, they both ran away. I went home, and saw them at the office the same day.

JOHN CAREY. I am a shoemaker, and live in Plumtree-street. I was passing from Museum-street to Drury-lane, and saw Pike running with a handkerchief in his hand. I joined in the pursuit—and when he ran across, he threw it into a shop-door. I picked it up, and gave it to the prosecutor—he was stopped directly.

(Property produced and sworn to.)

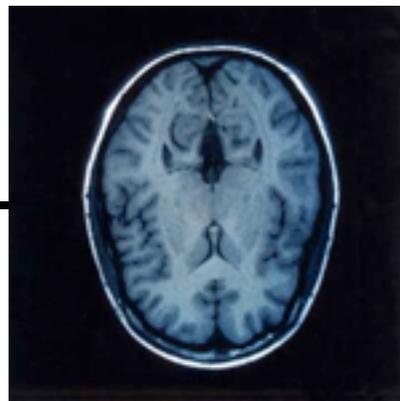
The prisoners pleaded distress.

HOLLIS—GUILTY. Aged 14.

PIKE—GUILTY. Aged 15.

Transported for Life.

First Middlesex Jury, before Mr. Common Sergeant.



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Cognition in the Social World

What matters is not (just) what you know

What matters is *how* and *how well* you know it

Cognition in the Social World

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What matters is *how* and *how well* you know it



“I got there first.”

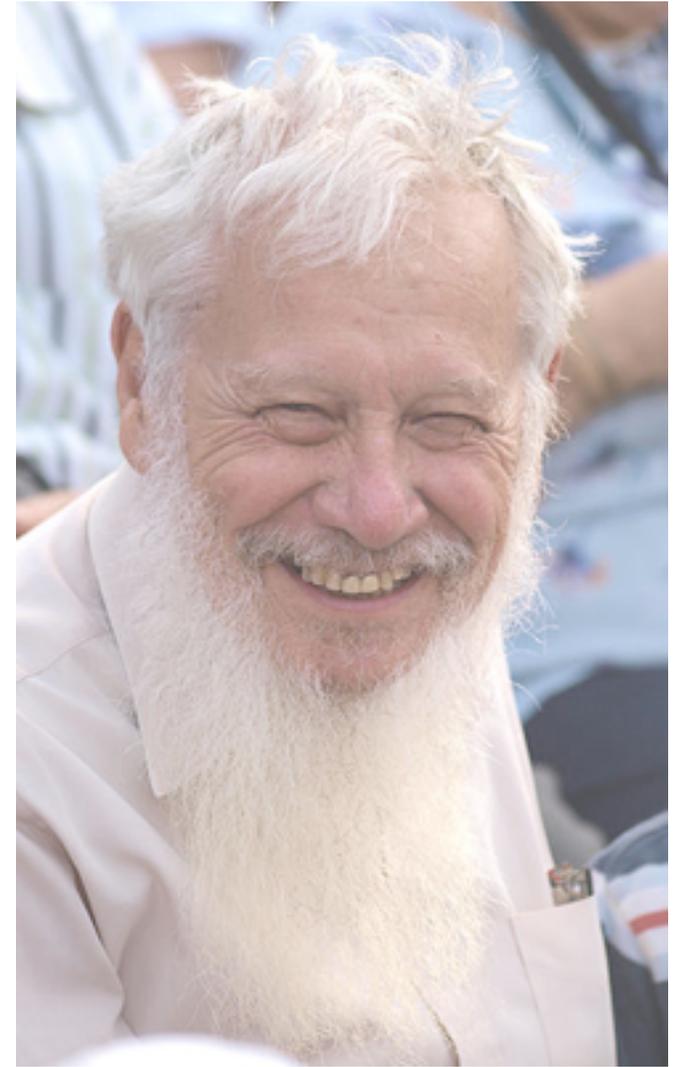
BUT

“I am uncertain whether
you know whether I got
there first.”

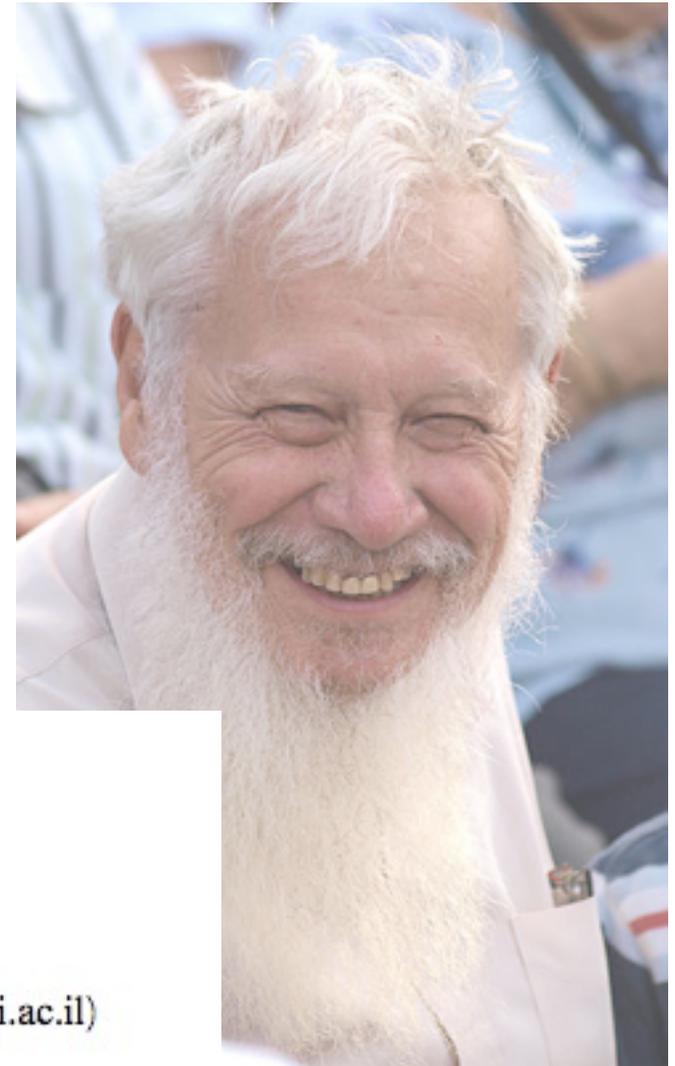
Cognition in the Social World



Cognition in the Social World



Cognition in the Social World



Interactive epistemology I: Knowledge*

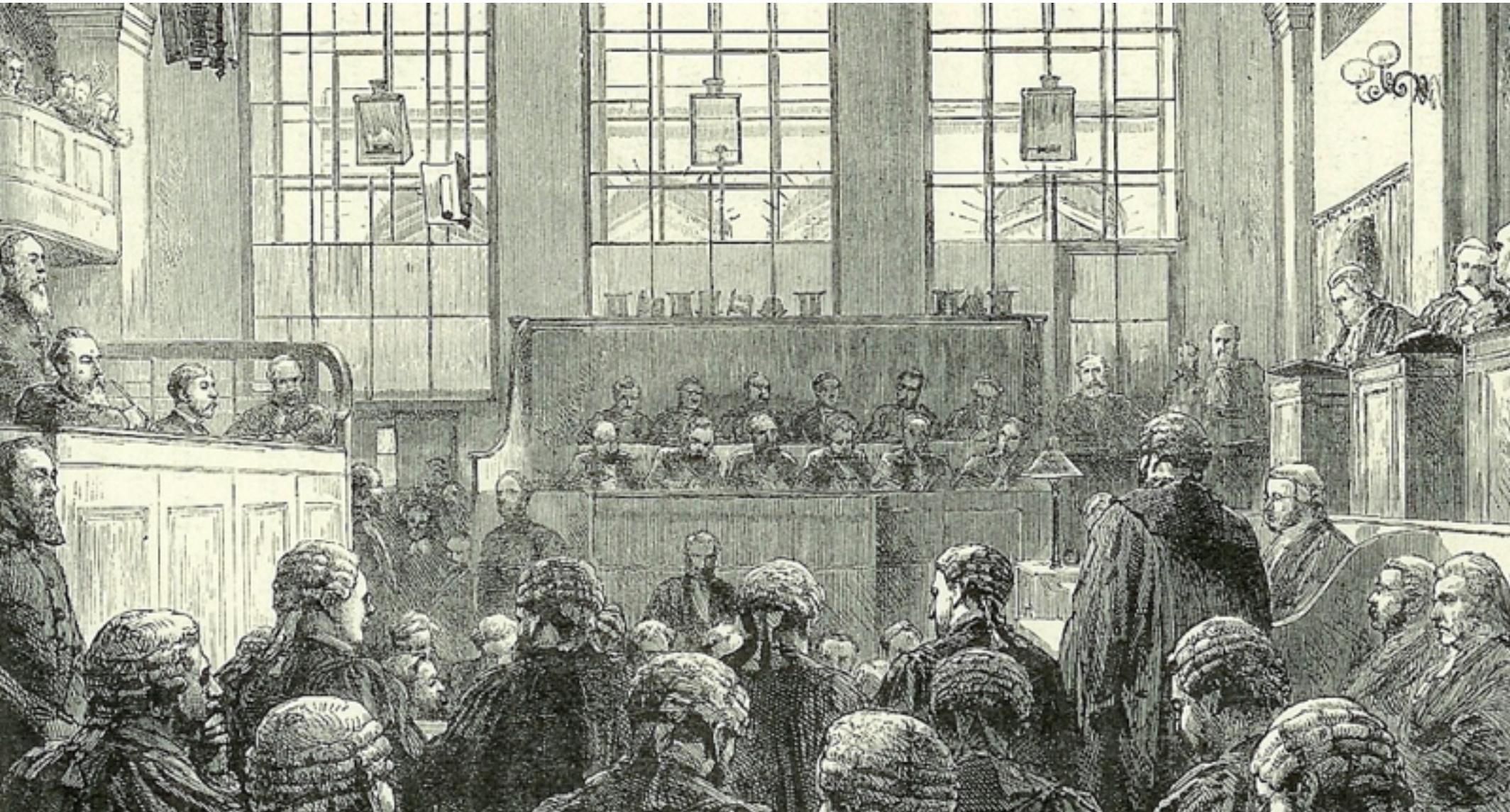
Robert J. Aumann

Center for Rationality and Interactive Decision Theory, The Hebrew University,
Feldman Building, Givat Ram, 91904 Jerusalem, Israel (e-mail: raumann@math.huji.ac.il)

Abstract. Formal Interactive Epistemology deals with the logic of knowledge and belief when there is more than one agent or “player.” One is interested not only in each person’s knowledge about substantive matters, but also in his knowledge about the others’ knowledge. This paper examines two parallel

The Natural History of Information

What information does the trial itself contain about the verdict?



What information does the transcript itself contain about the verdict?



How does knowledge of the transcript increase a participant's prediction accuracy?

Agents and Angels

Real-World Agent

Bayesian Angel



Sharpening the Question

What information does the transcript itself contain about the verdict?



How does knowledge of the transcript increase an **ideal agent's** prediction accuracy?

The True and the Useful

The True and the Useful

Forming correct beliefs
(within a model) about
the data to hand

a “solved” and
(nearly) axiomatized
problem

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Predicting the Future

an ongoing,
trillion-dollar
venture

“Fictitious Hindsight”

A New Method for Measuring Predictability

Insight: you don't have to be able to predict the system itself to estimate its predictability

elaborate cognitive
skills (fundamentally
unknowable)

modeled by
→

post-selection
of local
maxima

“Fictitious Hindsight”

An empirical hypothesis

elaborate cognitive
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“Fictitious Hindsight”

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post-selection of local maxima



“Fictitious Hindsight”

An empirical hypothesis

elaborate cognitive skills (fundamentally unknowable)

modeled by



post-selection of local maxima

the “reality principle”:
among nearby models, will choose most likely



“Fictitious Hindsight”

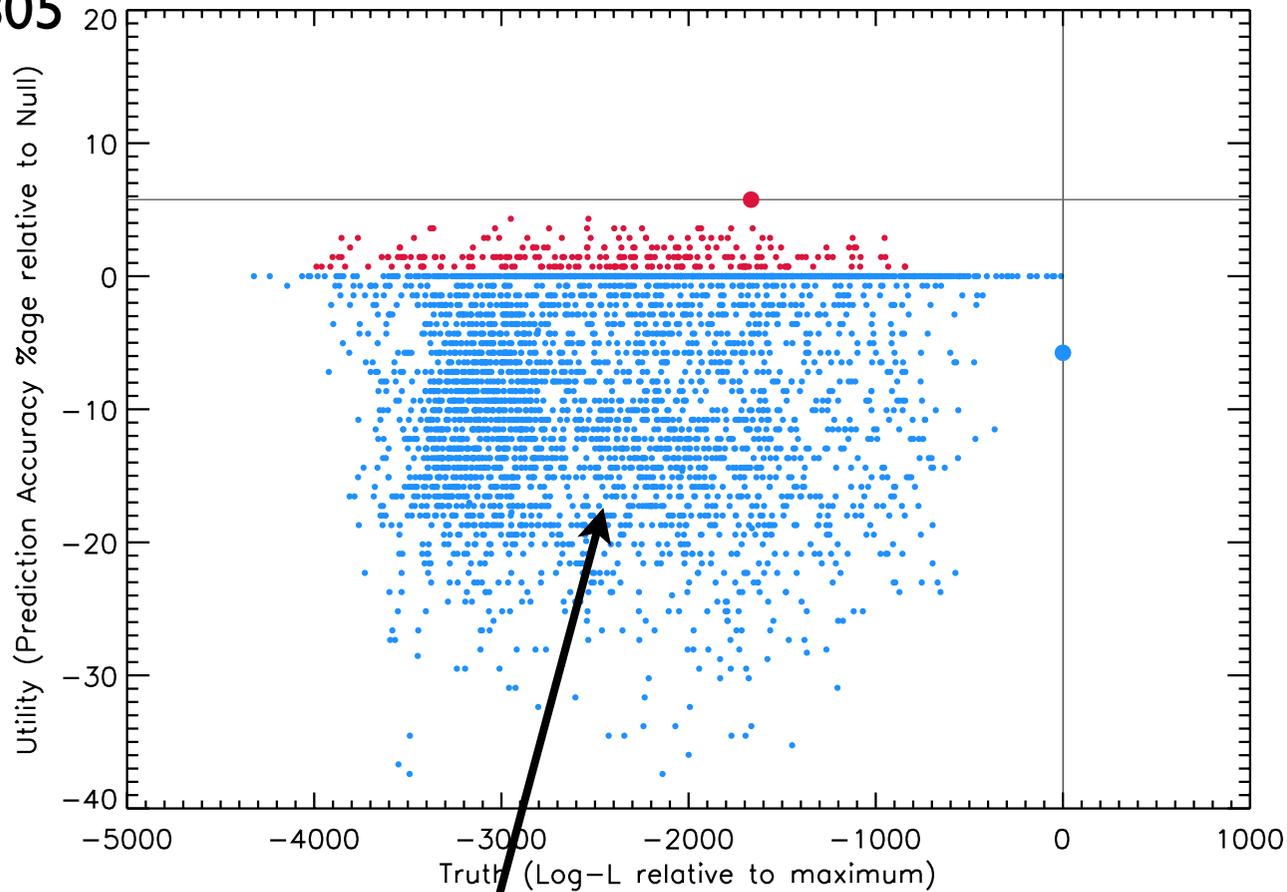
An empirical hypothesis

can be combined with any generative model
(e.g., pairwise max-ent / Ising-type)

suggests experimental tests for real-world tasks

Fictitious Hindsight

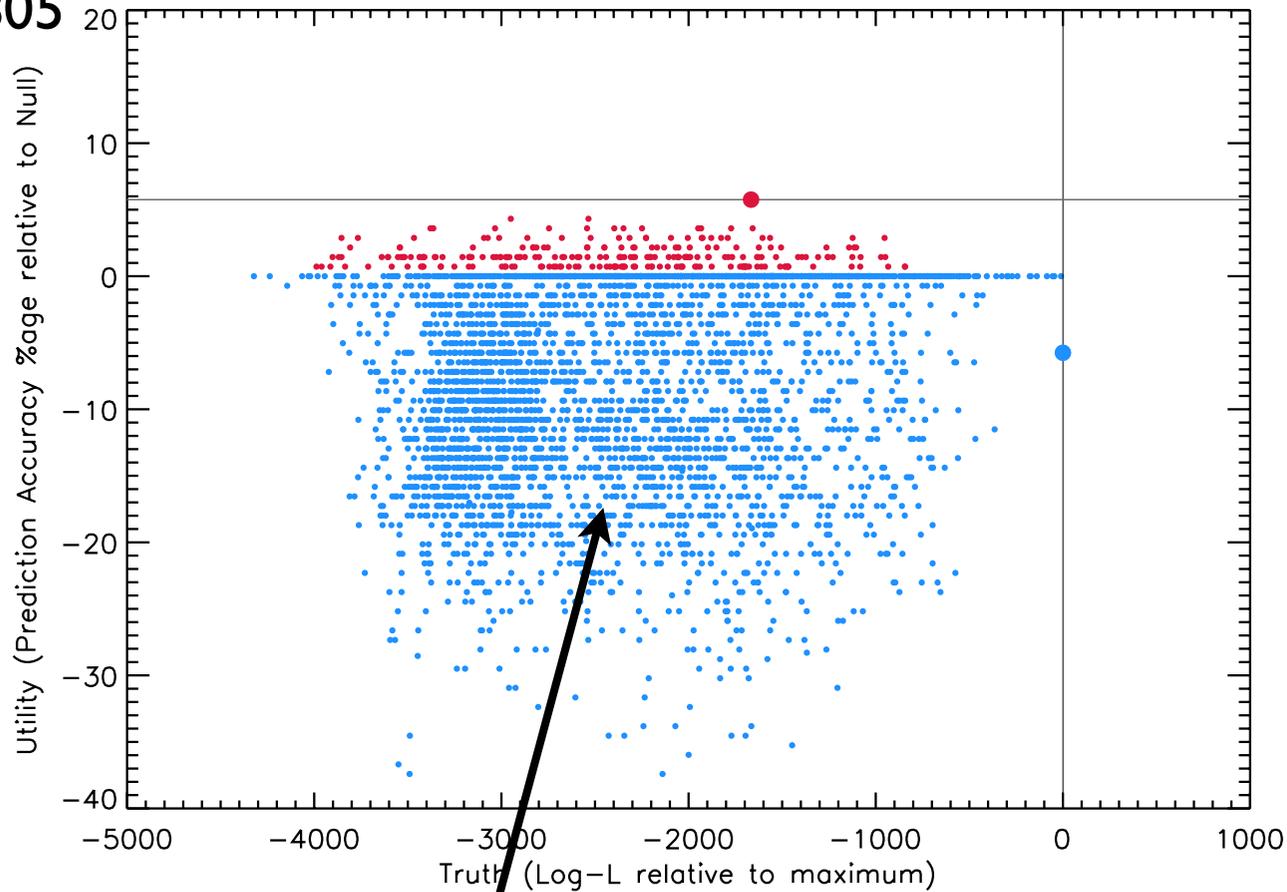
Knowability of trial outcomes in 1806, given complete knowledge of 1805



each point a local maximum

Fictitious Hindsight

Knowability of trial outcomes in 1806, given complete knowledge of 1805



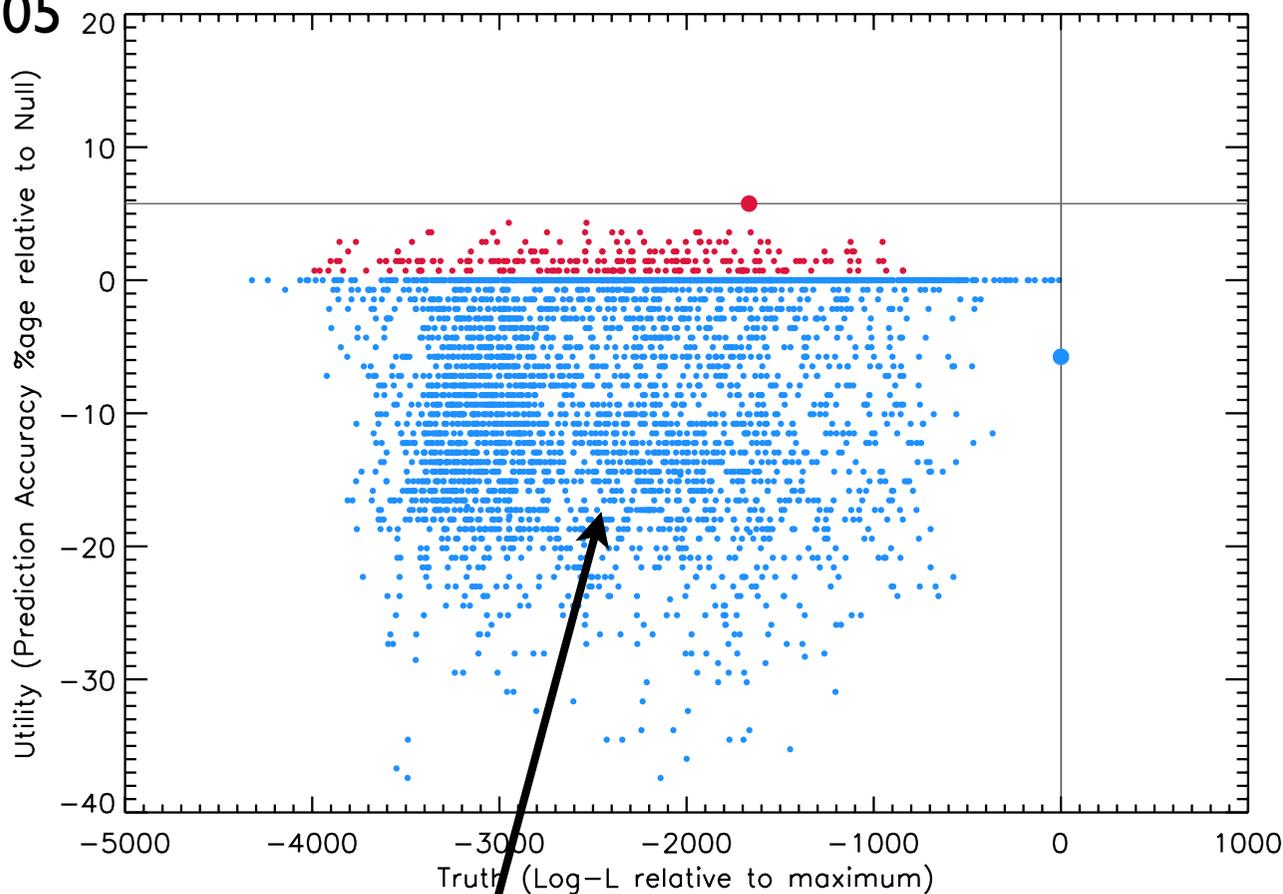
1805

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1806



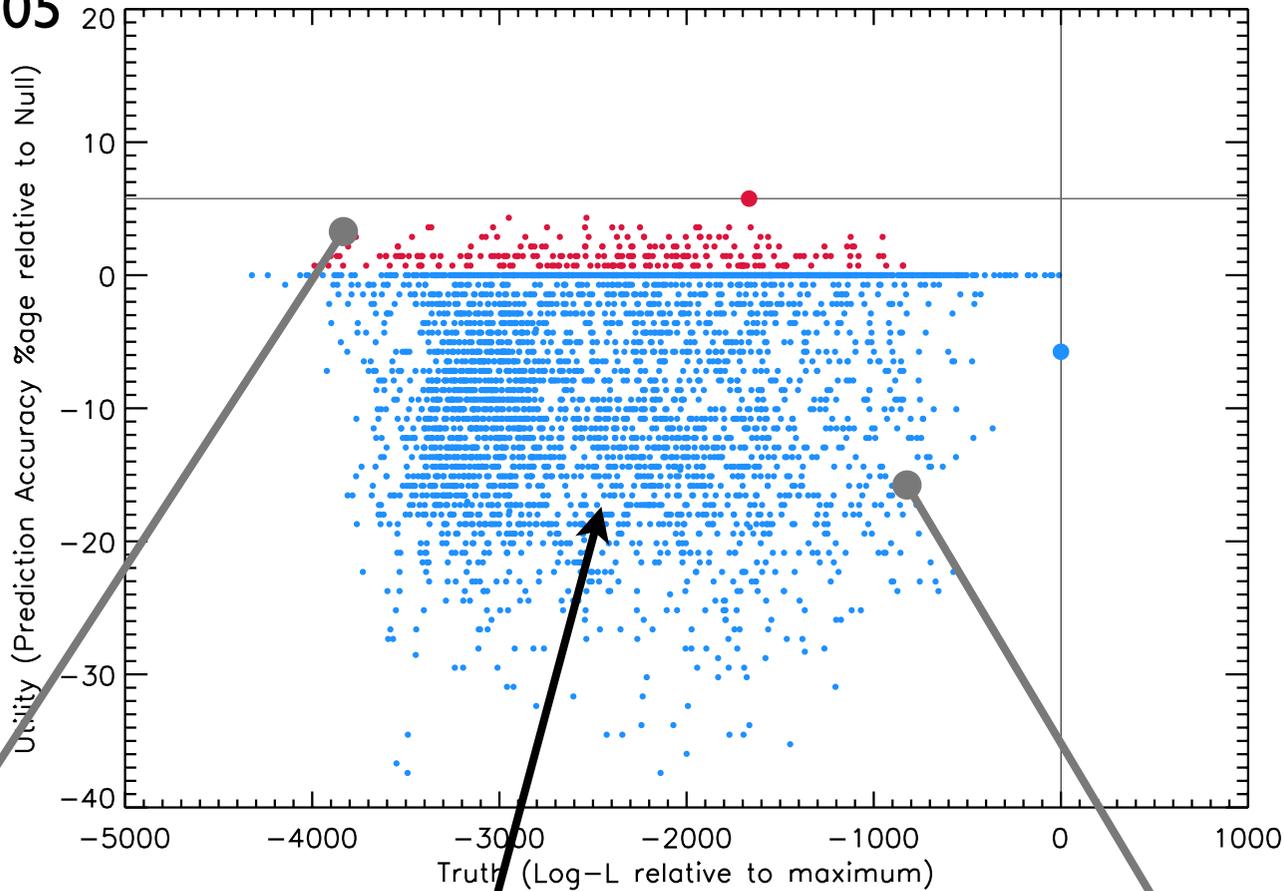
1805

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1806



“false but useful”

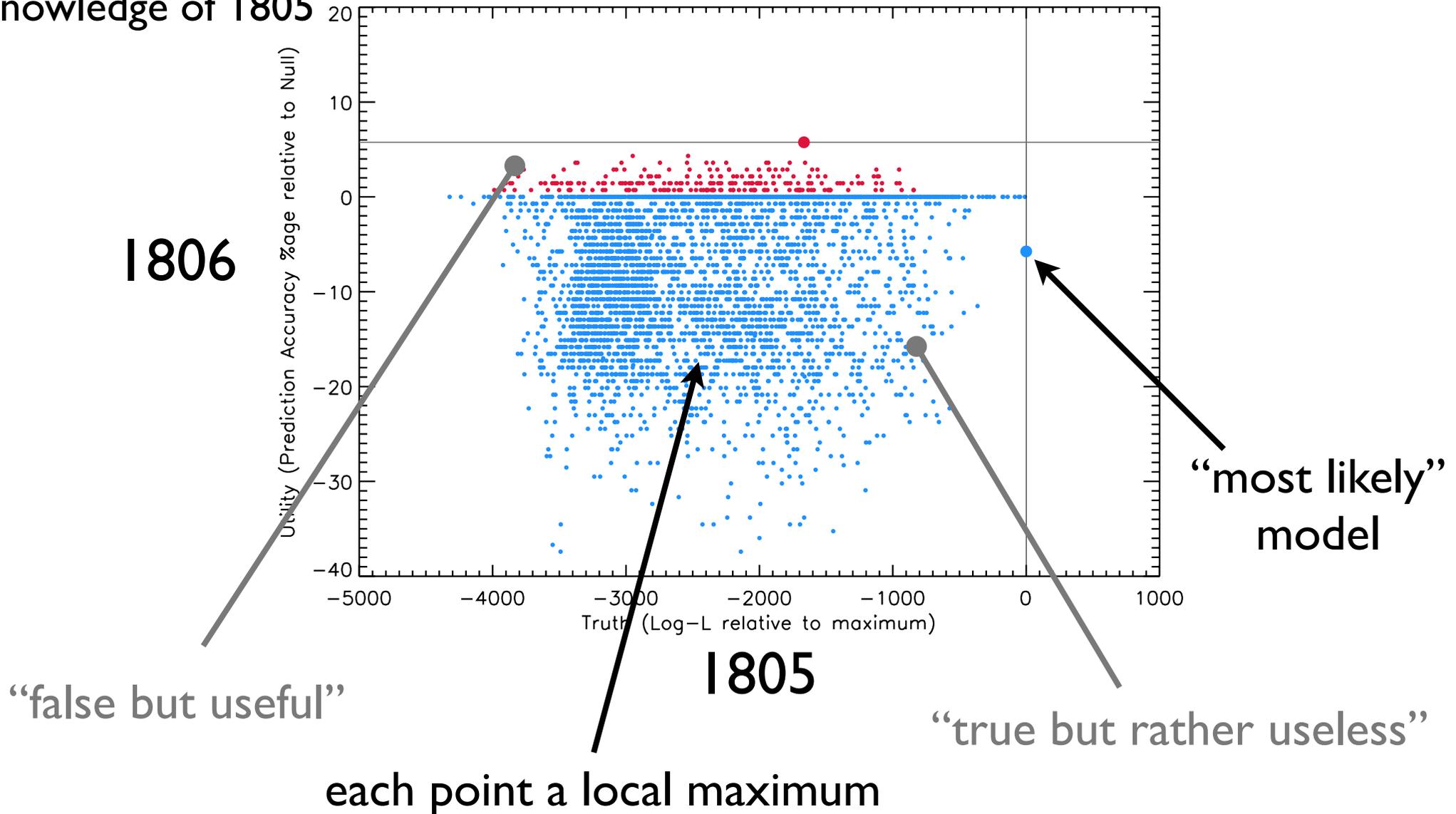
1805

“true but rather useless”

each point a local maximum

Fictitious Hindsight

Knowability of trial outcomes in 1806, given complete knowledge of 1805

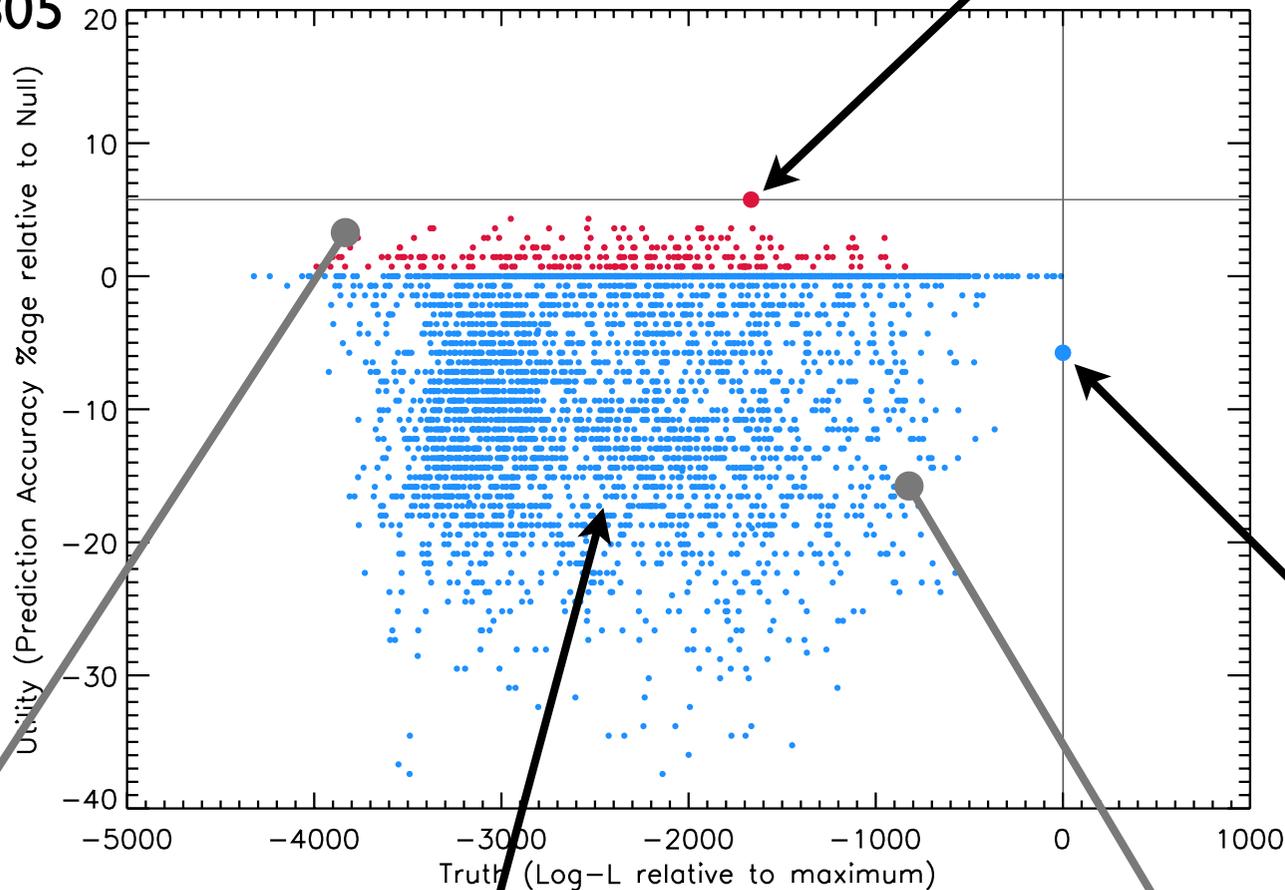


Fictitious Hindsight

Knowability of trial outcomes in 1806, given complete knowledge of 1805

“most useful” model : chosen by angel

1806



“most likely”
model

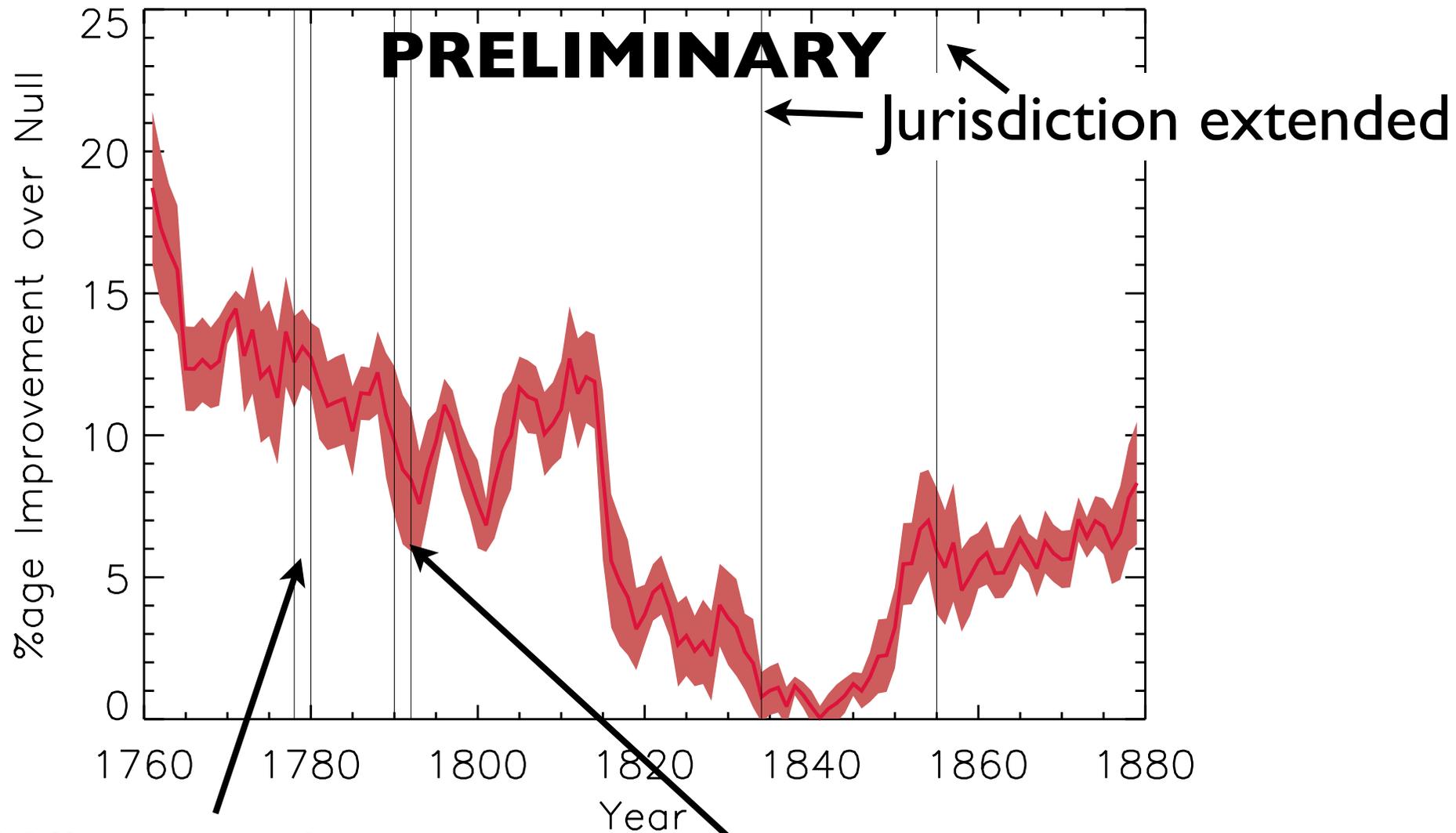
“false but useful”

1805

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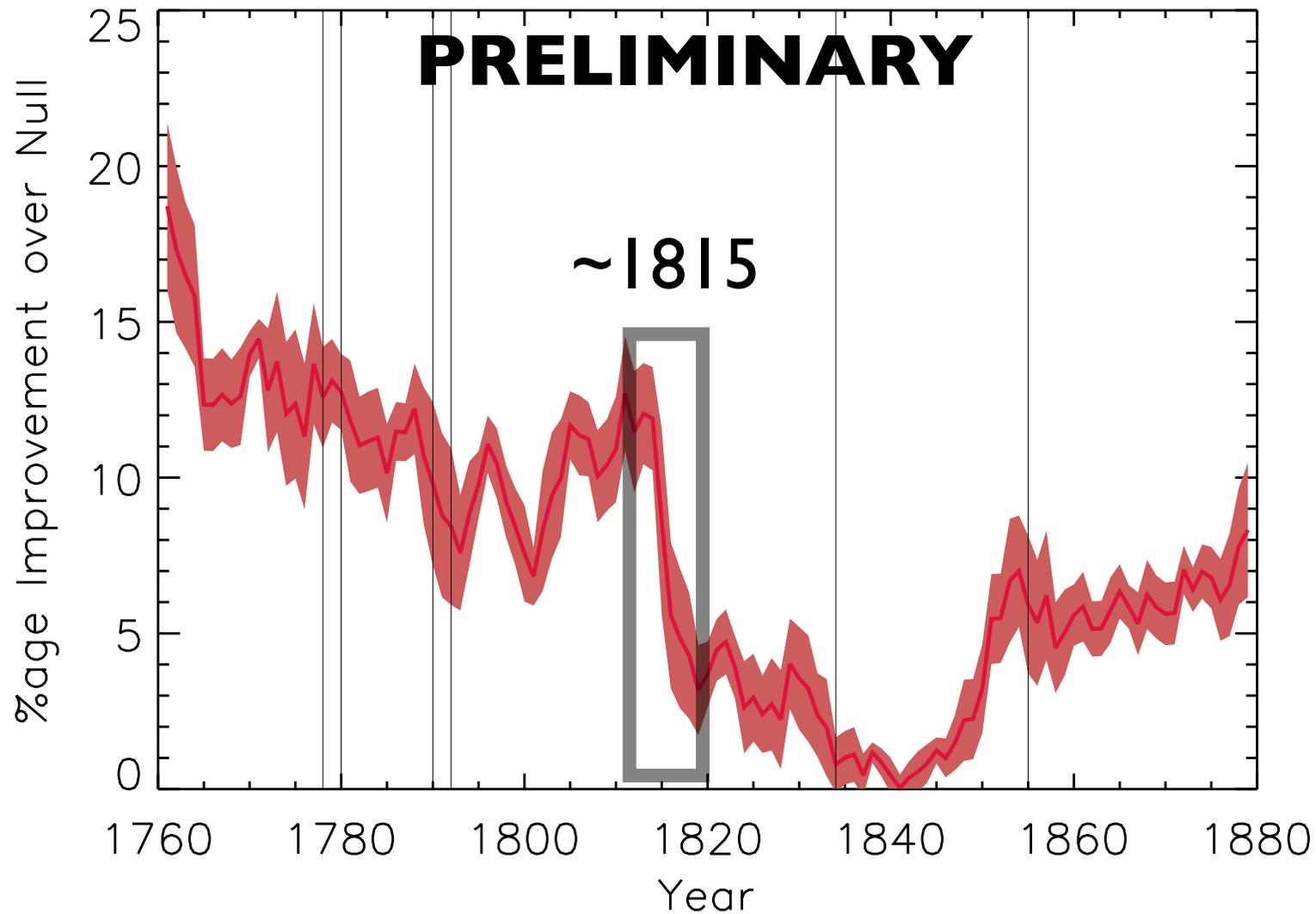
Predictability of Trial Outcome



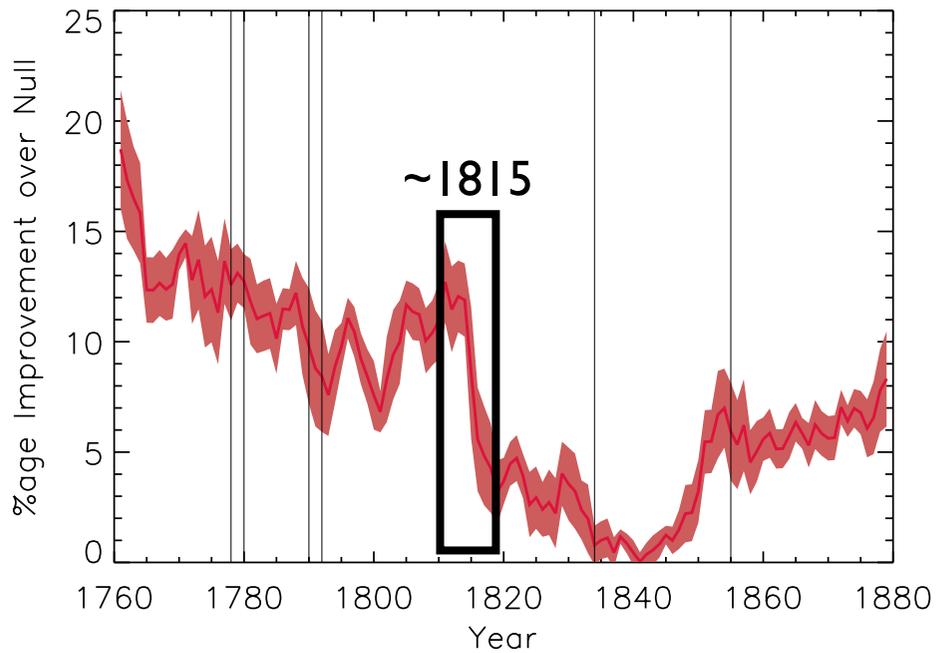
John Wilkes mandates
“true, fair & perfect”

1790-1792
Censorship

Predictability of Trial Outcome

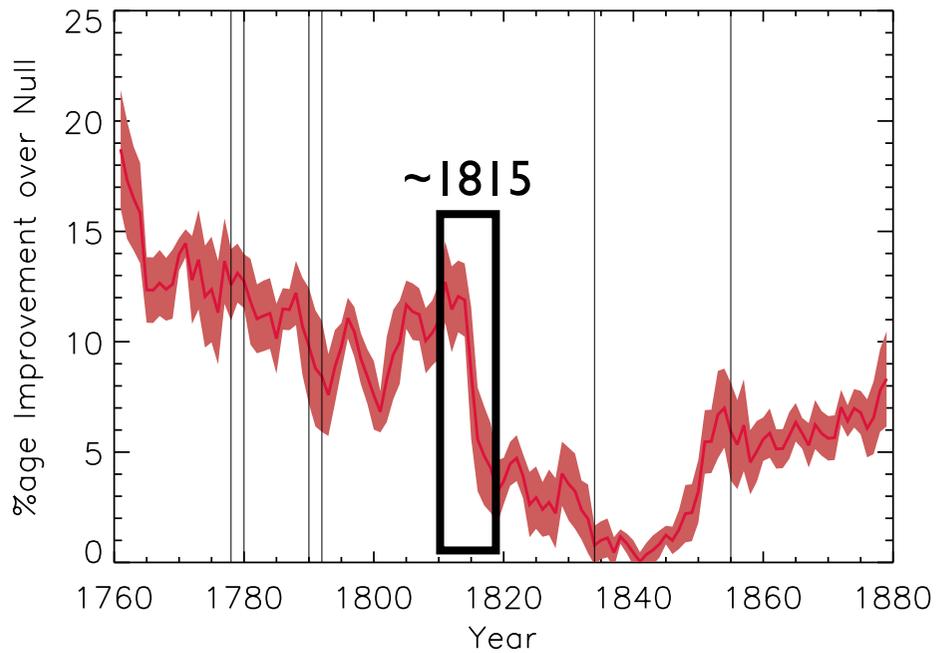


Predictability of Trial Outcome

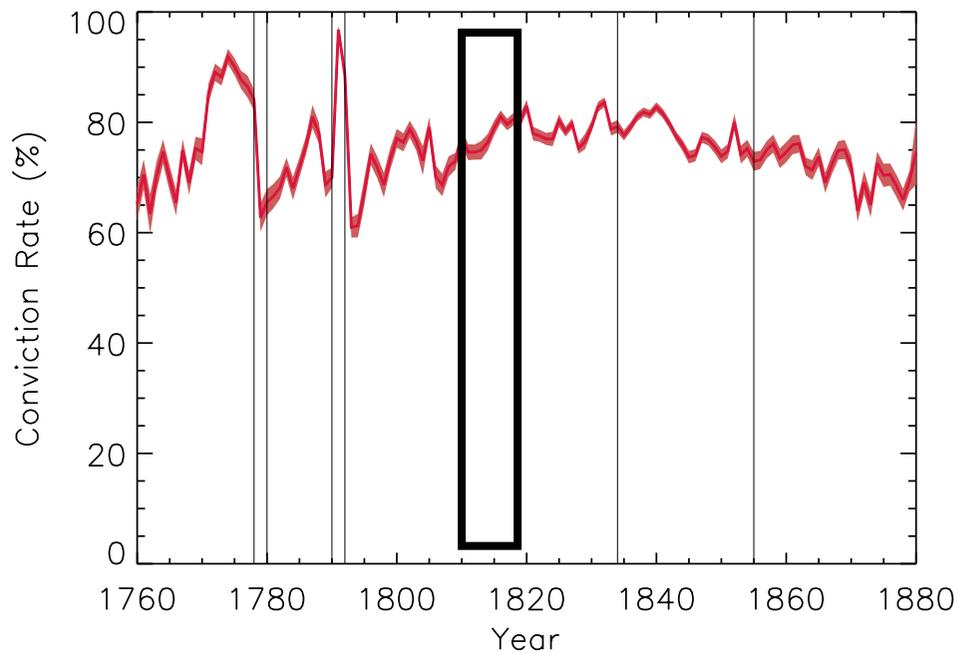


Why the sudden decline?

Predictability of Trial Outcome

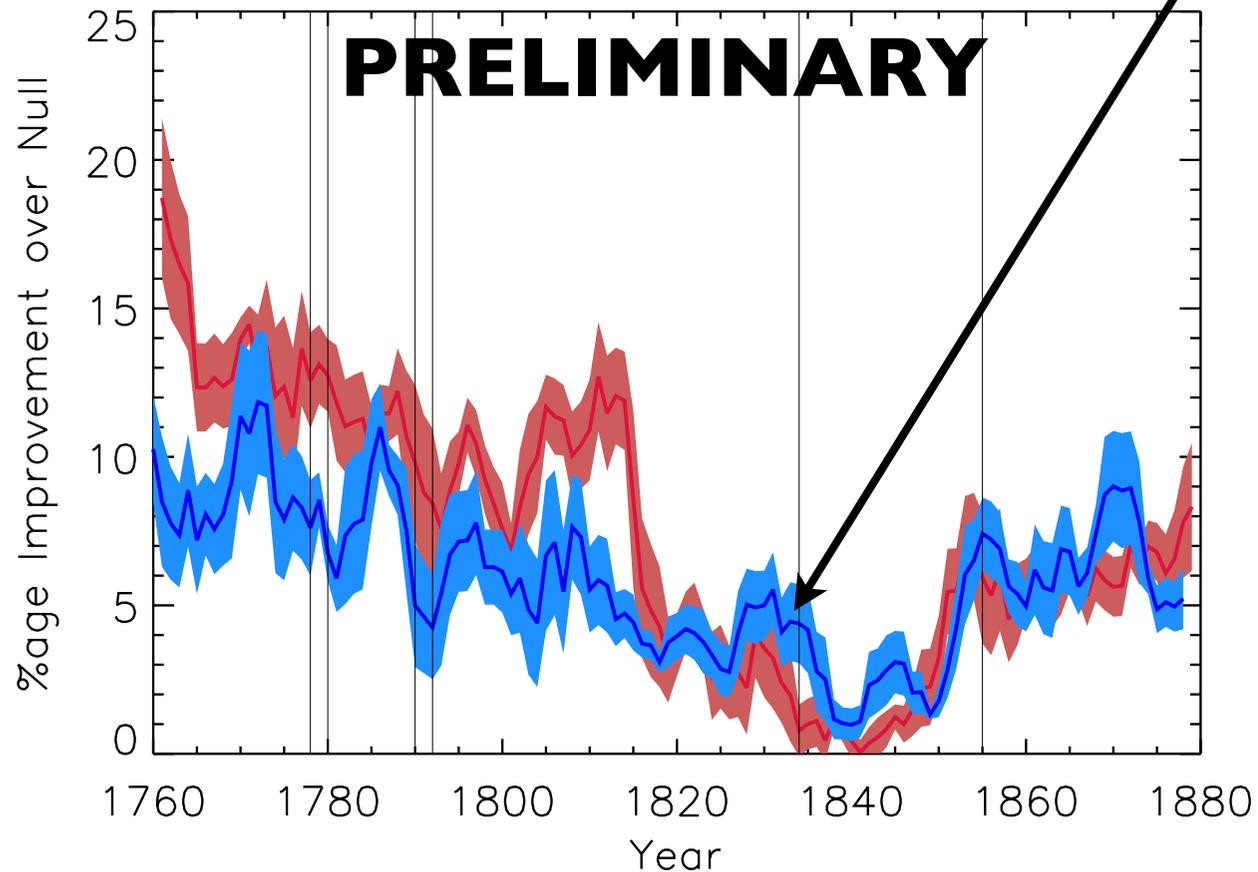


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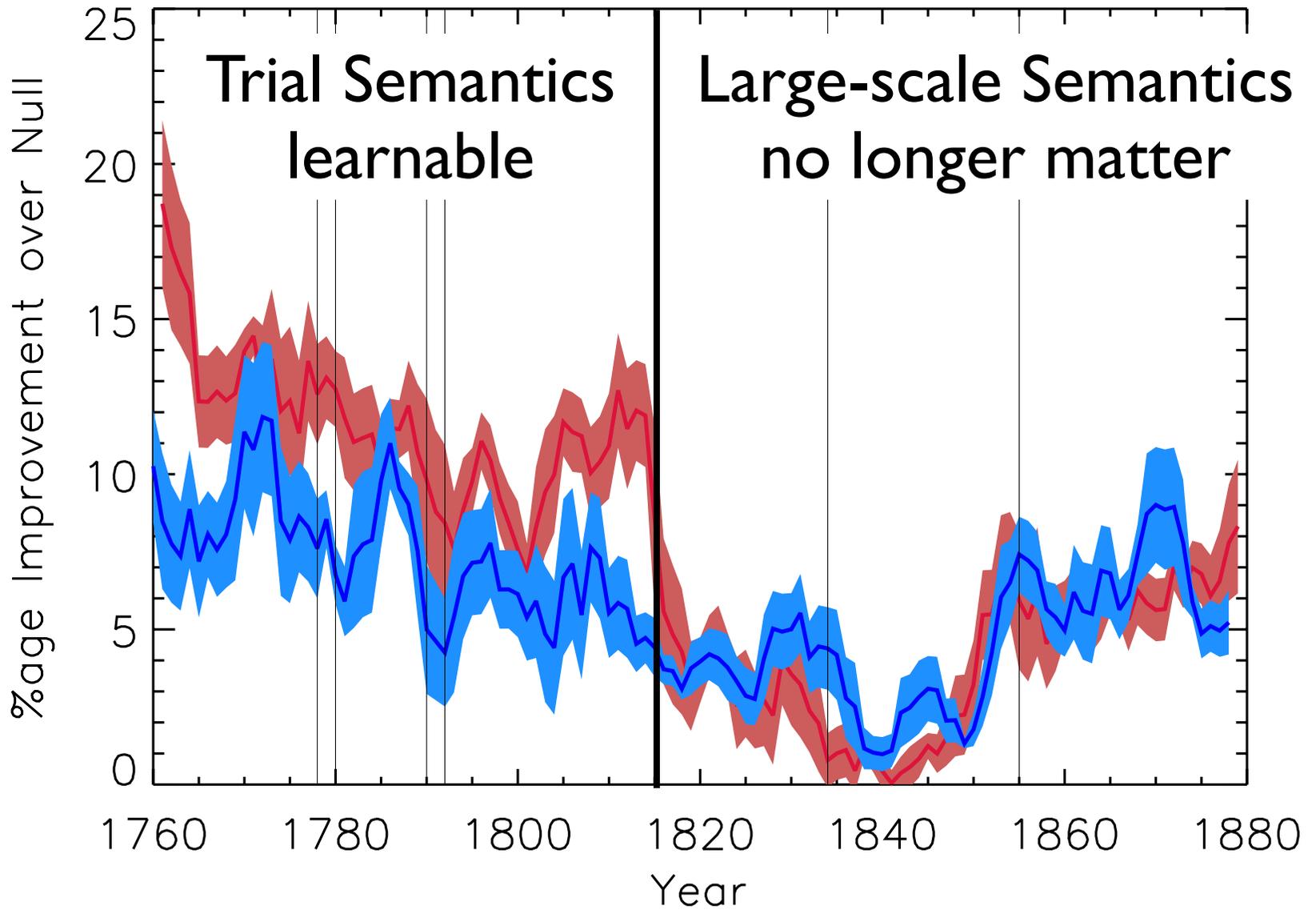


Predictability of Trial Outcome

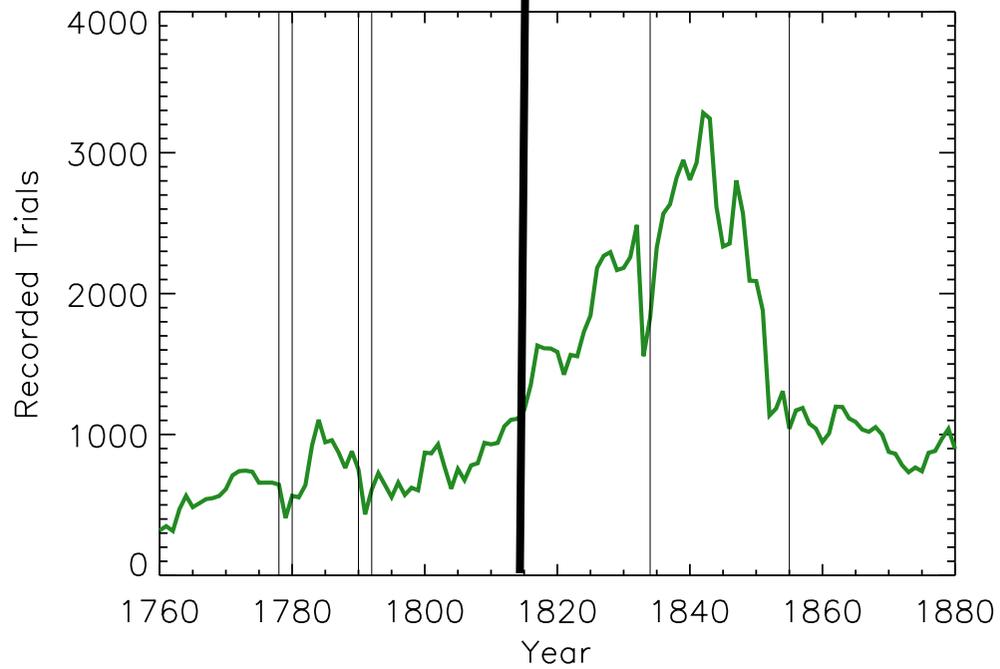
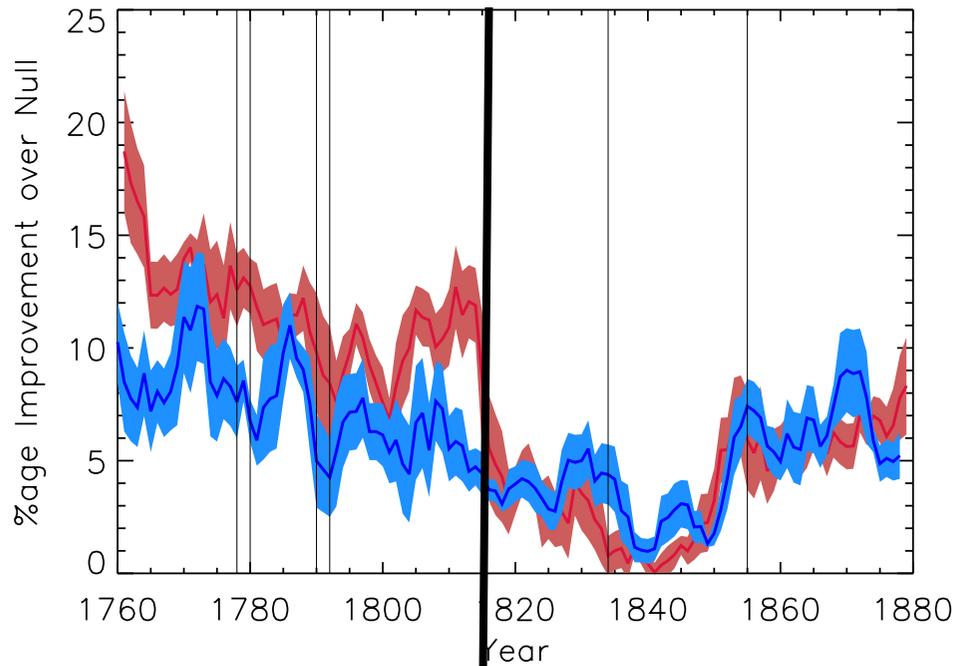
Prediction of outcome given
knowledge of offense category alone



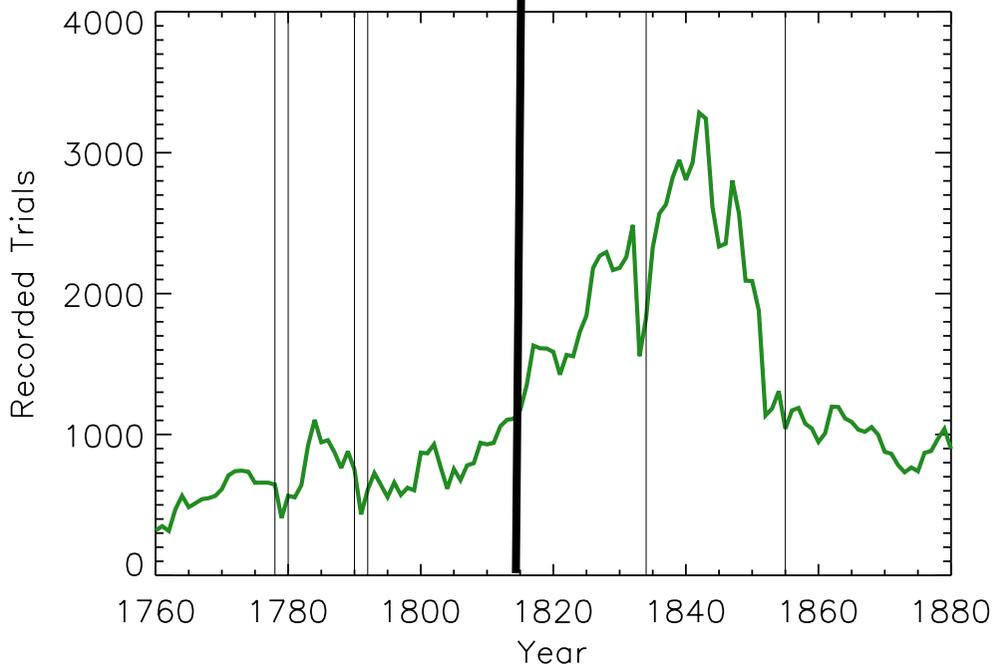
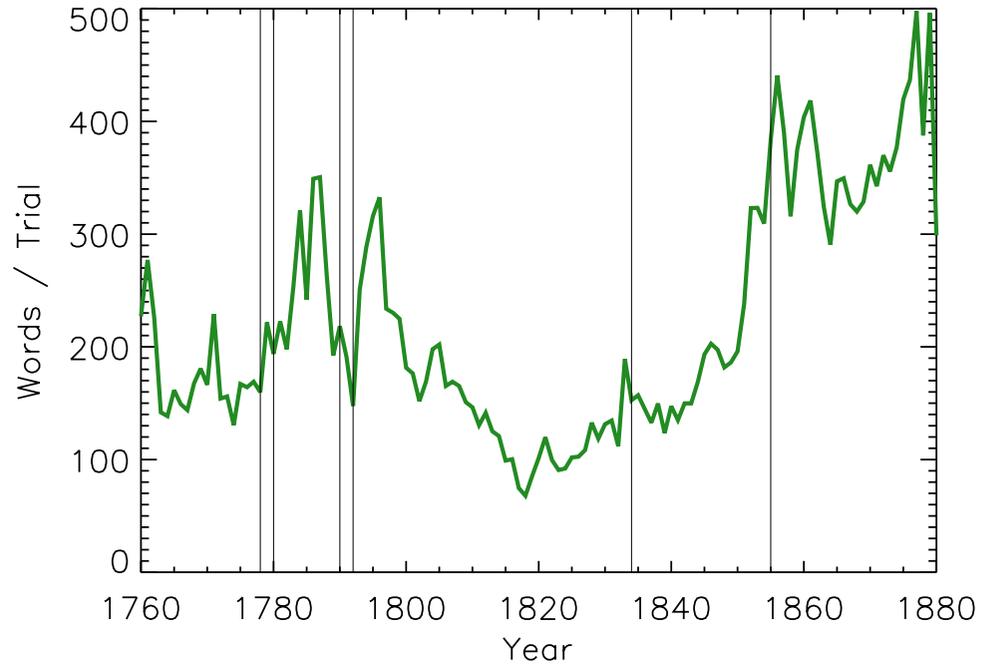
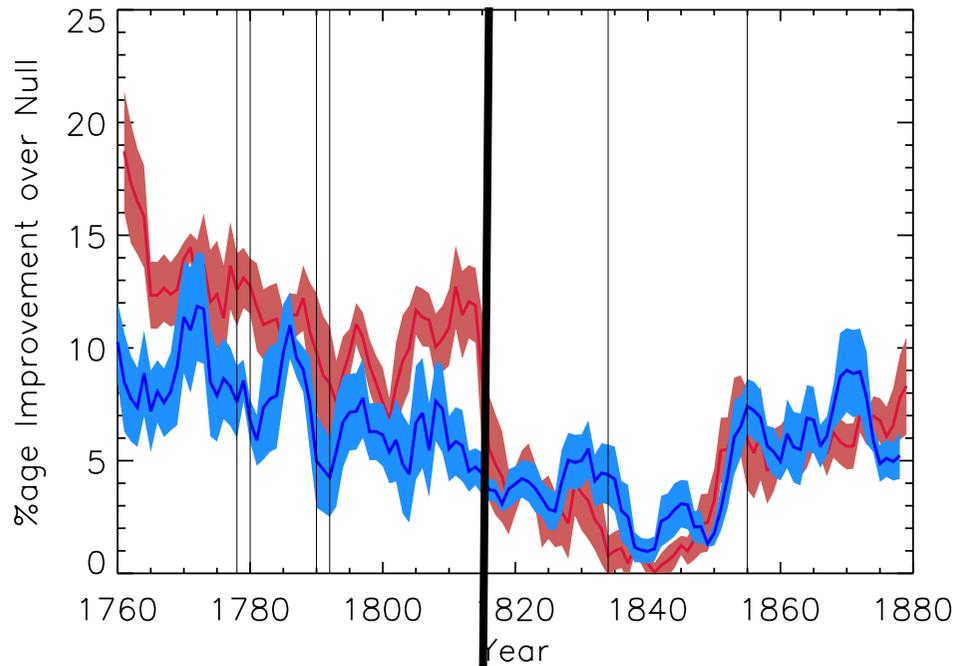
Two Eras



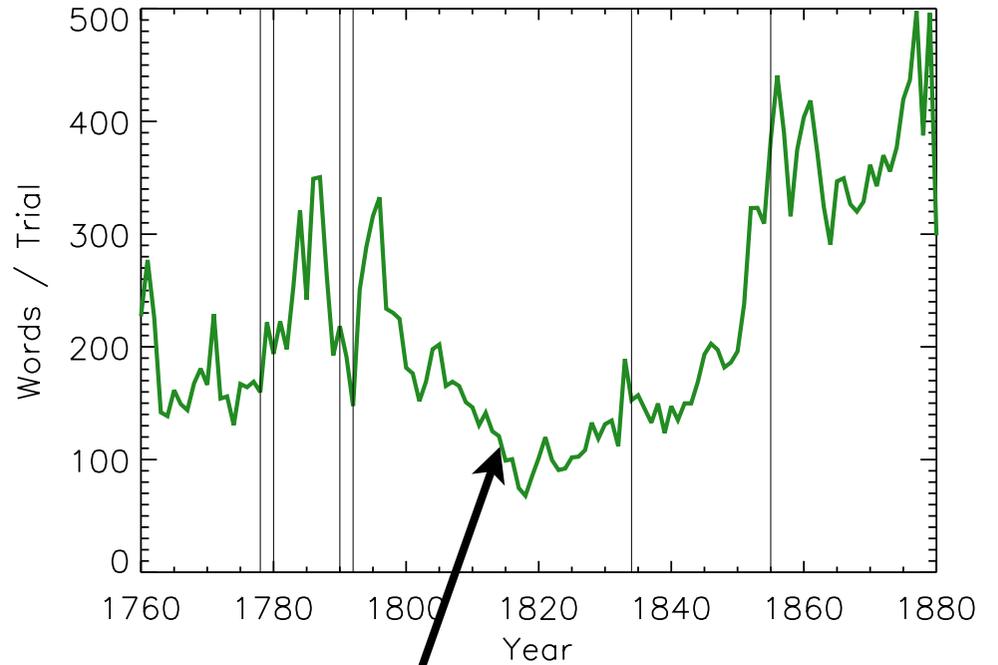
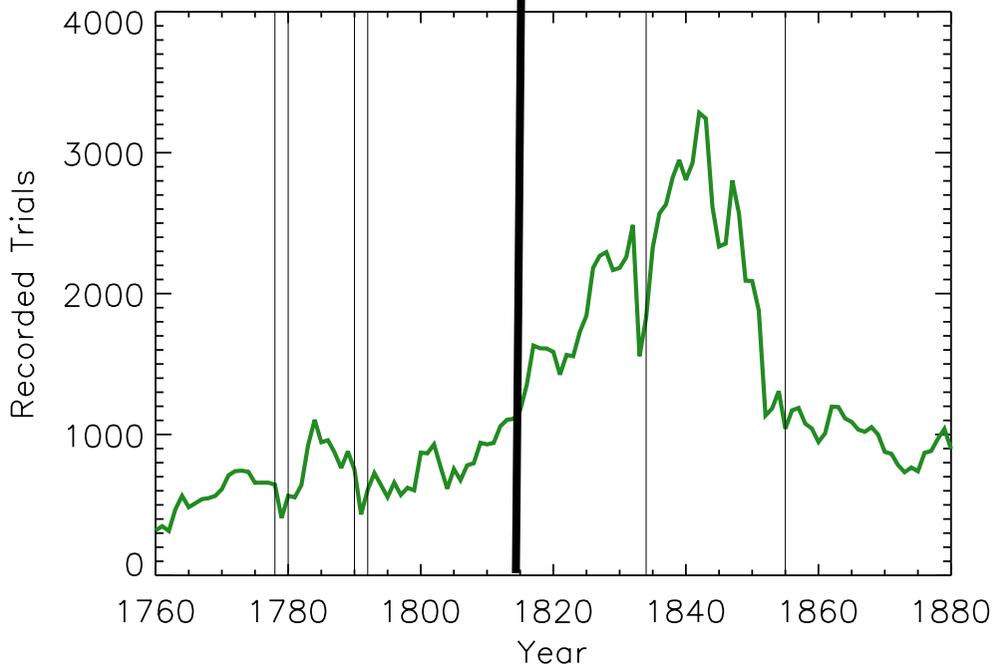
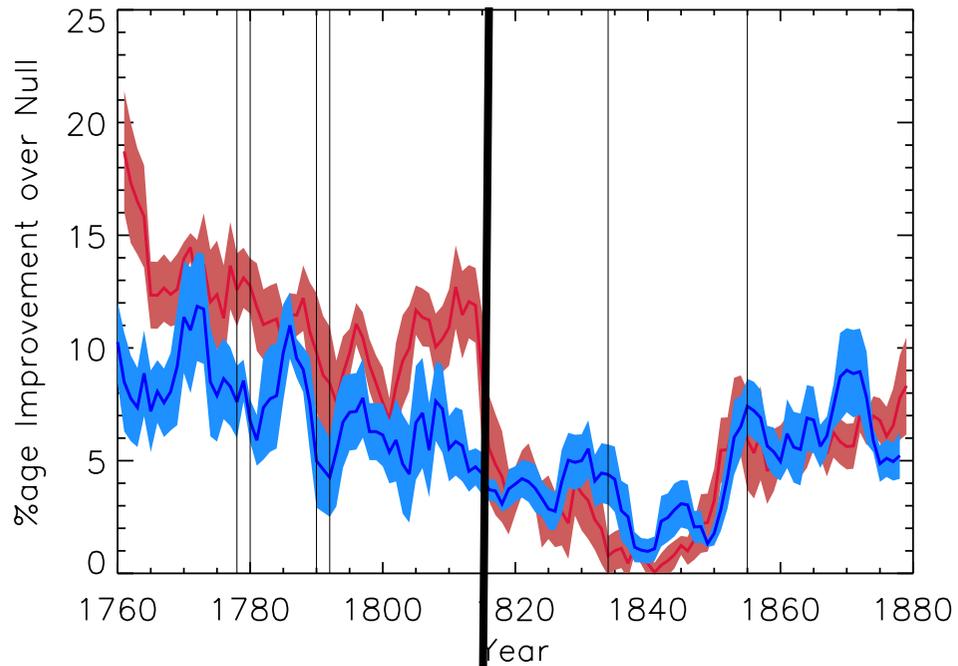
One Explanation



One Explanation

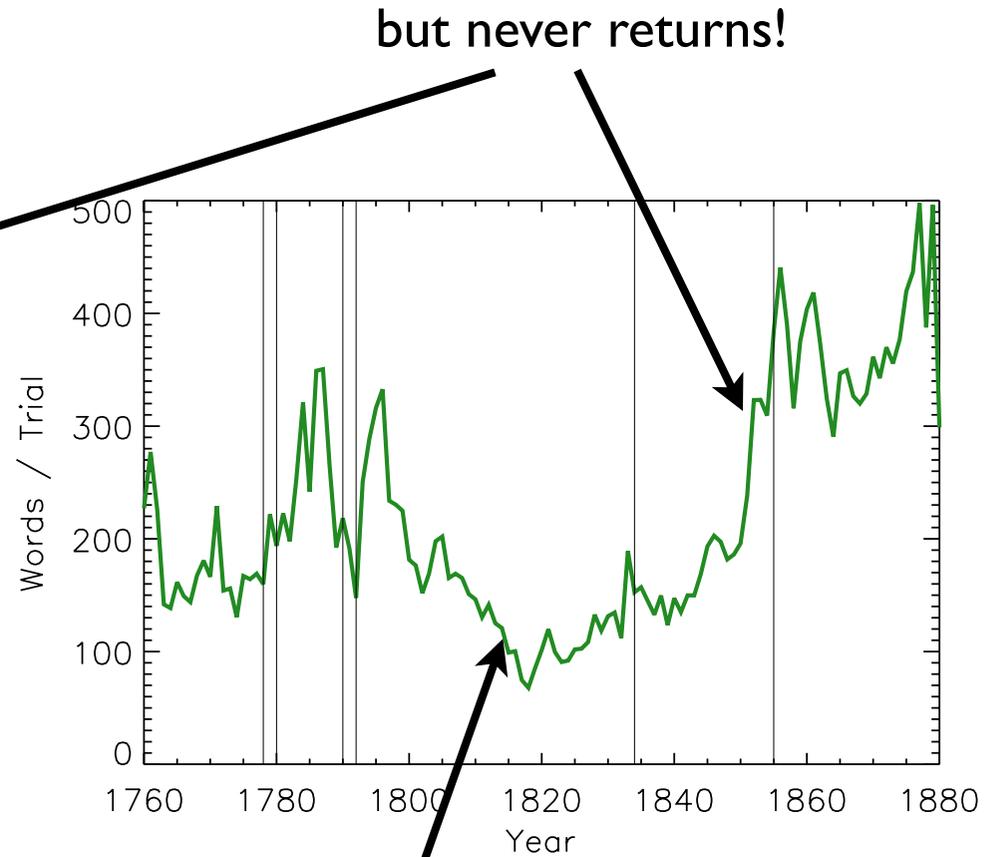
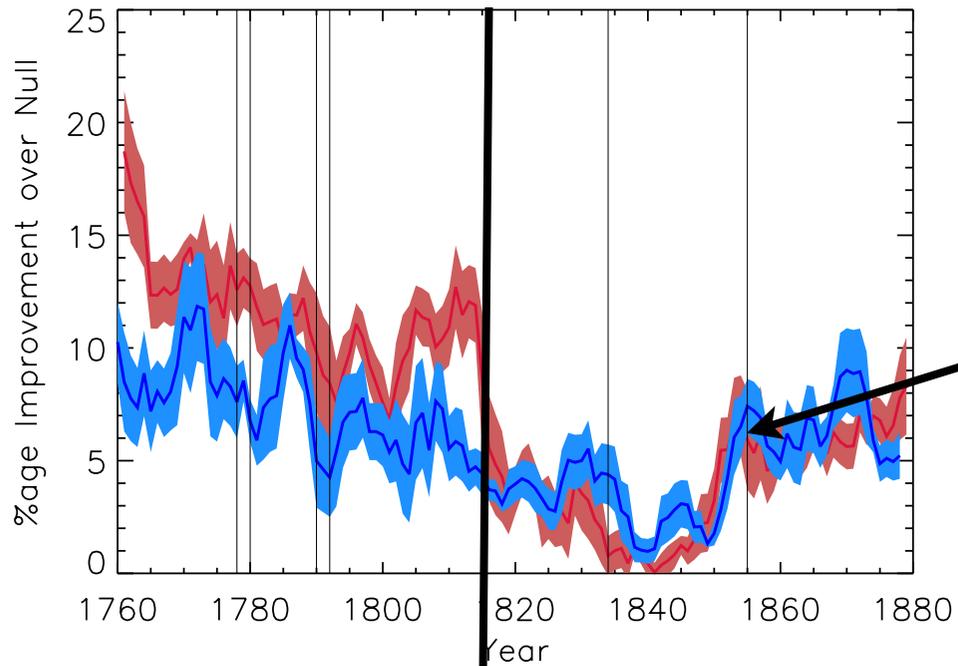


One Explanation



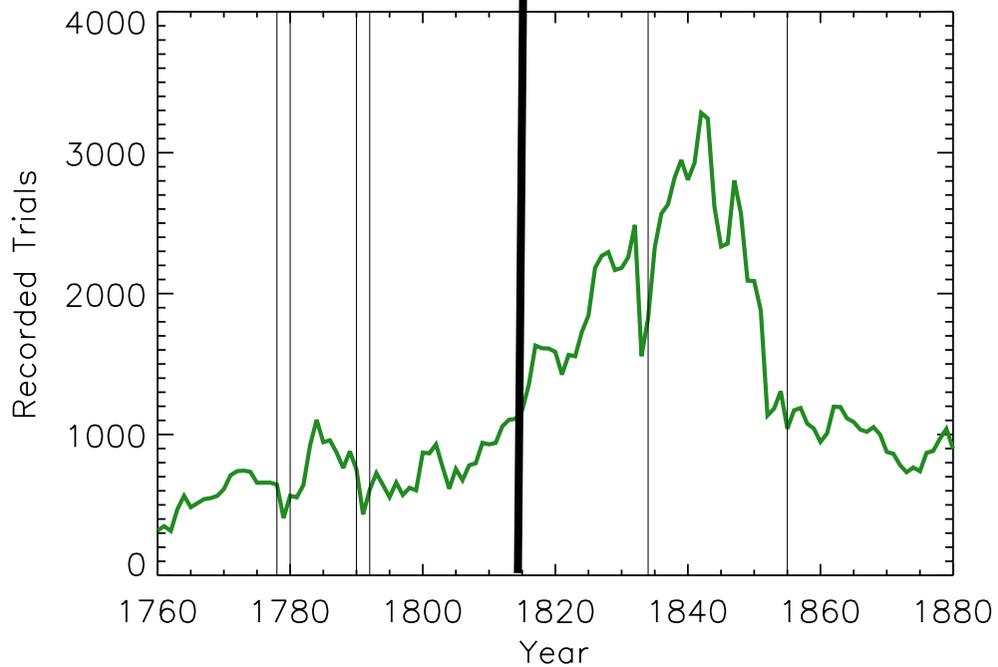
predictability leaves the system
near minimum words/trial

One Explanation

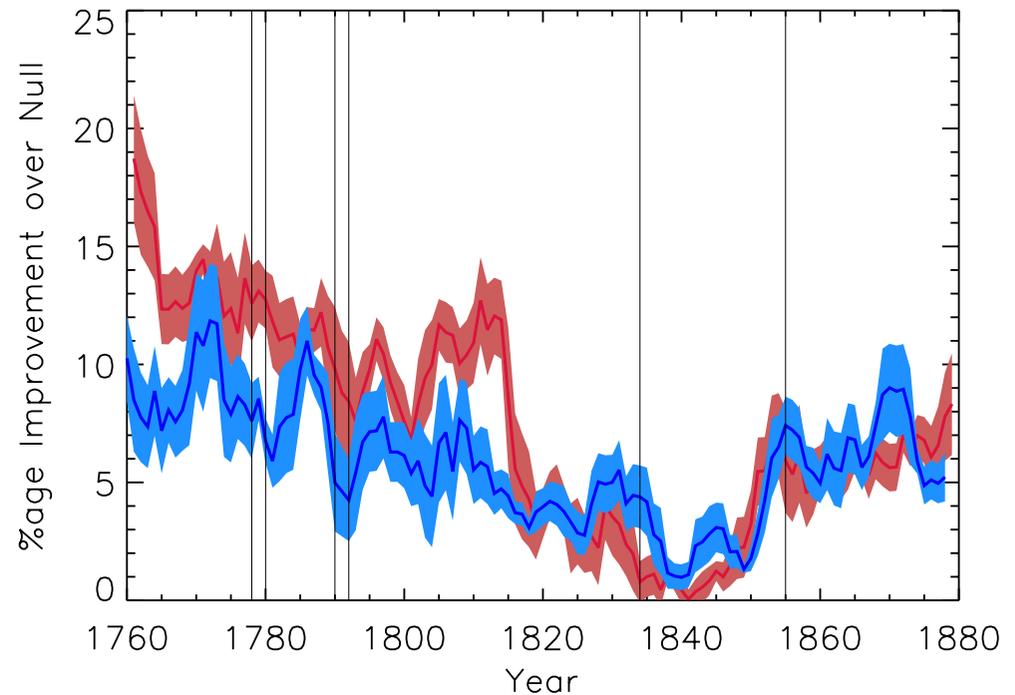


but never returns!

predictability leaves the system
near minimum words/trial



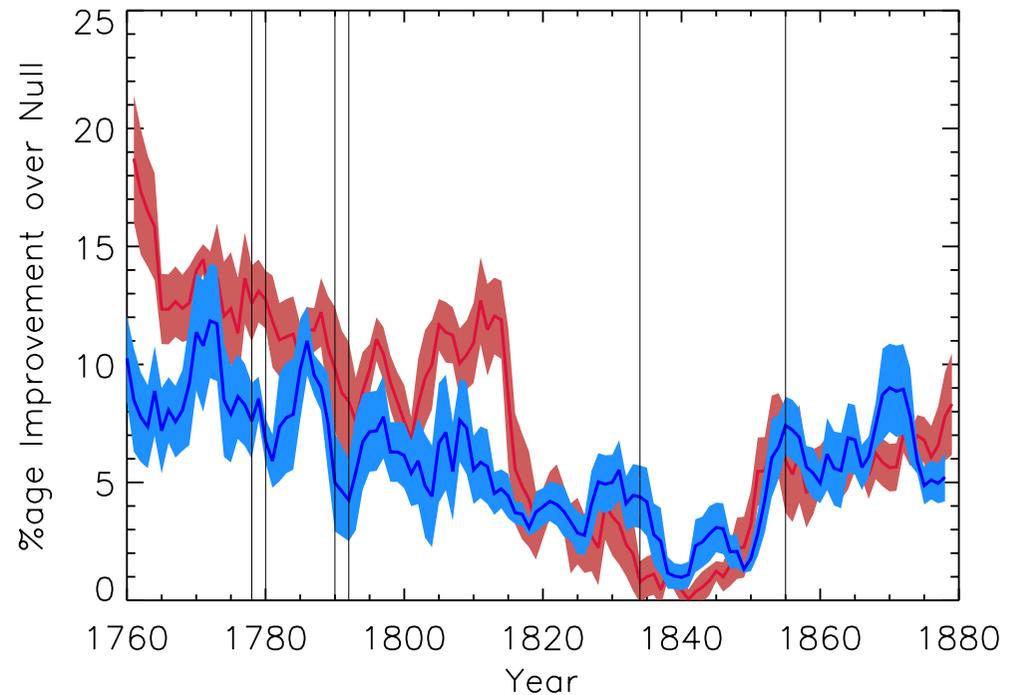
The Pre-History of Information Processing



PRELIMINARY

- Overburdened system ceases information flow
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JAMES BERNARD BERNARD. I am a barrister, and reside in Gray's Inn. On the 15th of June, about nine o'clock in the morning, I was in Castle-street, Bloomsbury—I heard a voice call out "They have picked your pocket." I felt and missed my handkerchief—and at the same time, turning round, I saw two persons running away. I pursued them towards Plumtree-street, into Museum-street, Broad-street, St. Giles's—and there they divided. I secured Hollis, and never lost sight of him. Pike was brought back, and my handkerchief produced.

WILLIAM HATTON. I am eleven years old, and belong to Shelton school; I live in Little Russell-street. On the 15th of June, I was coming out of a dairy in Castle-street with some milk, and saw Hollis draw the handkerchief from Mr. Bernard's pocket and give it to Pike, who followed close behind him. I am certain they are the boys. I immediately called to Mr. Bernard, they both ran away. I went home, and saw them at the office the same day.

JOHN CAREY. I am a shoemaker, and live in Plumtree-street. I was passing from Museum-street to Drury-lane, and saw Pike running with a handkerchief in his hand. I joined in the pursuit—and when he ran across, he threw it into a shop-door. I picked it up, and gave it to the prosecutor—he was stopped directly.

(Property produced and sworn to.)

The prisoners pleaded distress.

HOLLIS—GUILTY. Aged 14.

PIKE—GUILTY. Aged 15.

Transported for Life.

First Middlesex Jury, before Mr. Common Sergeant.

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FiveThirtyEight Forecast

Updated 10:10 AM ET on Nov. 6

President Nov. 6 Forecast	President Now-cast	Senate Nov. 6 Forecast
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Barack Obama

Mitt Romney

313.0

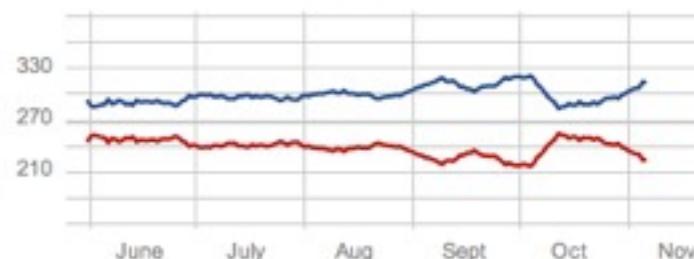
+14.0 since Oct. 30

Electoral
vote

225.0

-14.0 since Oct. 30

270 to win



90.9%

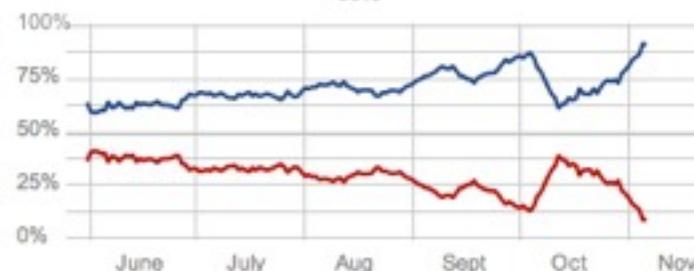
+13.5 since Oct. 30

Chance of
Winning

9.1%

-13.5 since Oct. 30

50%



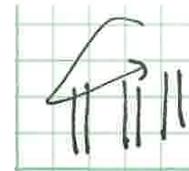
Thank you



National Science
Foundation



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