

By the time you finish this class you will be a different person.

I am simply referring to the fact that the cells in your body, including the neurons of your brain, are continuously changing. By the time you finish this class you will literally be a different body and a different brain. By the time you finish this class only a tiny part of your body and of your brain will still be the same that it is now.

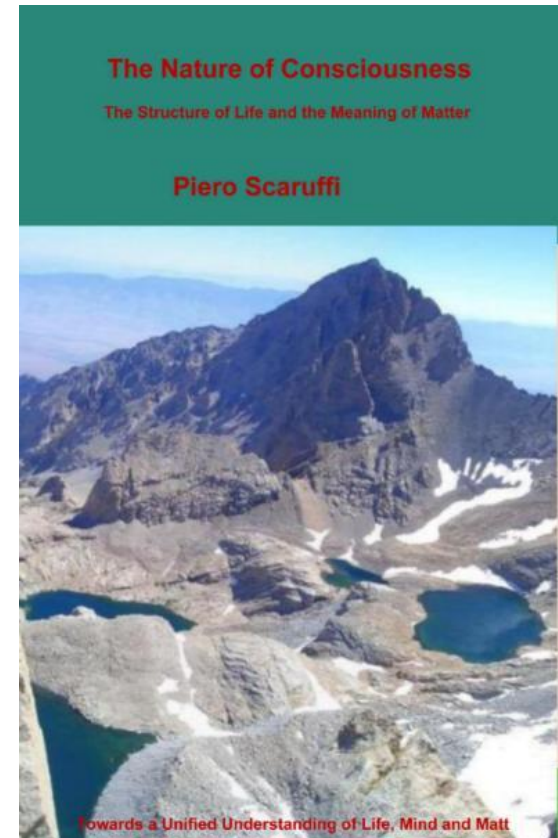
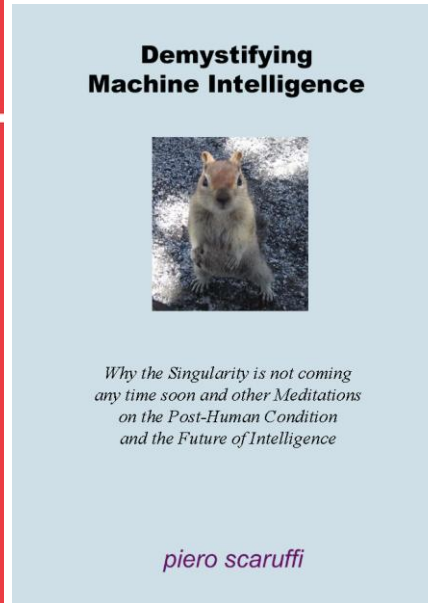
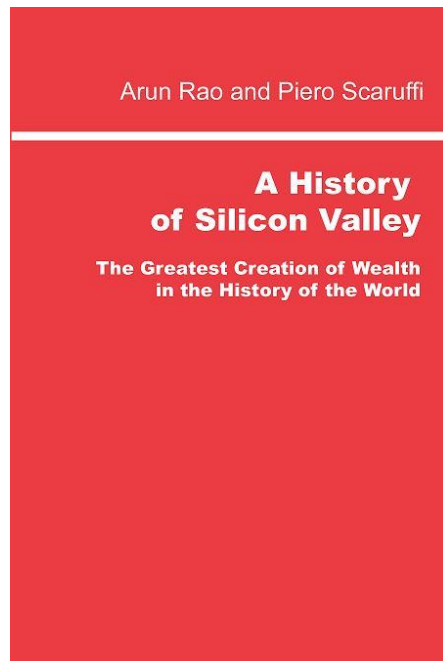
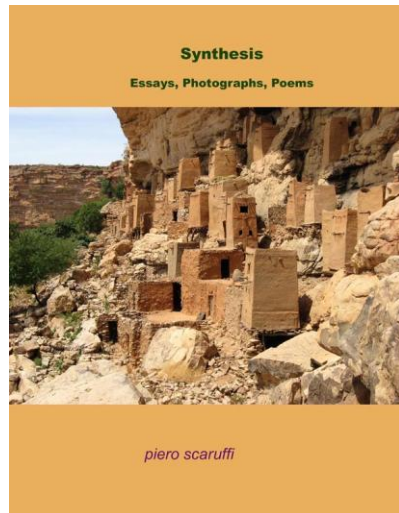
Every word that you read is having an effect on the connections between your neurons. And every breath you take is pacing the metabolism of your cells.

This class is about what just happened to you... I mean... to the former "you".

Who I Am

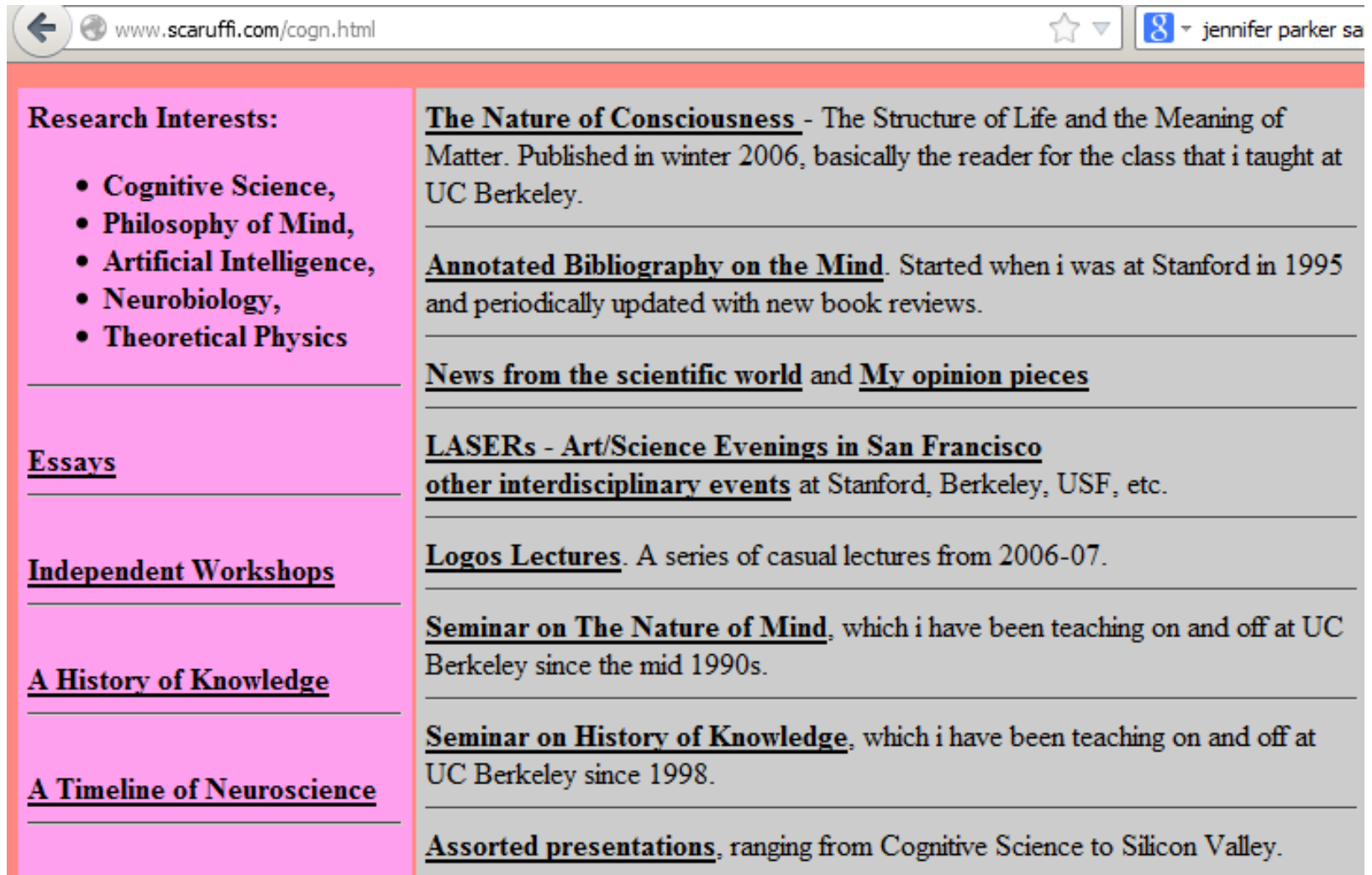


- Piero Scaruffi
 - 27 years in Artificial Intelligence/Cognitive Science
 - Editor of scaruffi.com
- Email: scaruffi.com/email.html



Who I Am

- www.scaruffi.com -> Science



The screenshot shows a web browser window with the address bar displaying "www.scaruffi.com/cogn.html". The page has a pink sidebar on the left and a grey main content area on the right. The sidebar contains links to "Research Interests:", "Essays", "Independent Workshops", "A History of Knowledge", and "A Timeline of Neuroscience". The main content area lists several topics: "The Nature of Consciousness", "Annotated Bibliography on the Mind", "News from the scientific world and My opinion pieces", "LASERs - Art/Science Evenings in San Francisco", "Logos Lectures", "Seminar on The Nature of Mind", "Seminar on History of Knowledge", and "Assorted presentations".

Research Interests:

- Cognitive Science,
- Philosophy of Mind,
- Artificial Intelligence,
- Neurobiology,
- Theoretical Physics

Essays

Independent Workshops

A History of Knowledge

A Timeline of Neuroscience

The Nature of Consciousness - The Structure of Life and the Meaning of Matter. Published in winter 2006, basically the reader for the class that i taught at UC Berkeley.

Annotated Bibliography on the Mind. Started when i was at Stanford in 1995 and periodically updated with new book reviews.

News from the scientific world and My opinion pieces

LASERs - Art/Science Evenings in San Francisco
other interdisciplinary events at Stanford, Berkeley, USF, etc.

Logos Lectures. A series of casual lectures from 2006-07.

Seminar on The Nature of Mind, which i have been teaching on and off at UC Berkeley since the mid 1990s.

Seminar on History of Knowledge, which i have been teaching on and off at UC Berkeley since 1998.

Assorted presentations, ranging from Cognitive Science to Silicon Valley.

Thinking about Thought

- *An interdisciplinary survey of theories of
 - mind,
 - consciousness
 - and life*
- *emerging from Neurophysiology, Cognitive Psychology, Philosophy, Artificial Intelligence, Evolutionary Biology, Genetics, Mathematics, Physics...*
- *...for an audience of intellectually curious professionals and students with no specific training or background in these fields*
- *...exploring a multitude of exciting and often contradictory new theories that border on several different disciplines*

Thinking about Thought

- *...that will help you meditate on the ultimate meaning of human being and about what and who humans are.*

WHAT I AM GOING TO TELL YOU

- State Of The Nation
 - Raging debate on mind, cognition, consciousness
 - Old disciplines and new disciplines
 - 1000s of theories
 - Increasingly interdisciplinary
 - Increasingly experimental
 - Vast pool of brain data
 - Confusing terminology
 - Intelligence?
 - Mind?
 - Consciousness?



WHAT I AM GOING TO TELL YOU

- State of the Nation
 - Different historical paths
 - Philosophy (since its beginning)
 - Psychology (since its beginning)
 - Logic (since Frege, 1884)
 - Biology (since the discovery of neurons, 1891)
 - Comp. Math (since the Turing Test, 1950)
 - Computer Science (since A.I., 1955)
 - Linguistics (since Chomsky, 1957)
 - Physics (recently, 1980s)

WHAT I AM GOING TO TELL YOU

Towards a “science” of mind

Based on empirical data

Predictable behavior

Mathematical model

Disprovable

Balance between formal approaches and

Plausible results

Math: very formal, not always plausible

Psychology: not too formal, but usually plausible

Biology: quite formal, quite plausible

WHAT I AM GOING TO TELL YOU

- Alas...
 - You can't really study the Mind without studying the Brain
 - You can't really study the Brain without studying Life
 - You can't really study Life without studying Matter

WHAT I AM GOING TO TELL YOU

- What this entails for you
 - Theories of Mind
 - Theories of Cognition
 - Theories of Brain
 - Theories of Language
 - Theories of Life
 - Theories of Logic
 - Theories of Computing
 - Theories of Physics

WHAT I AM GOING TO TELL YOU

Liabilities of this seminar

- Lots of terminology

- Lots of theories

- Lots of names

- Lack of depth

- No conclusions

Assets:

- Truly interdisciplinary

- Breadth (truly breathtaking!)

- Current (not just the classics)

- No single book in print covers this much ground

- Modular (you can miss any lecture)

WHAT I AM GOING TO TELL YOU

Requirements

- English language

- Open mind

- Patience

- Stamina

Pluses

- Analytical mind

- Familiarity with the mind-body debate

- Basic knowledge of 20th century science

WHAT I AM GOING TO TELL YOU

My goals

Teach you what i know

Not my goals

Convince you one way or another

Promote one discipline over the other

Take sides

Etc

WHAT I AM GOING TO TELL YOU

Who is it for?

Casual readers
Intellectuals
Philosophers
Psychologists
Computer Scientists
Sci-fi fans :-)



Who is it not for?

I know how the brain works, what the mind is, and where consciousness comes from



WHAT I AM GOING TO TELL YOU

My standard grading algorithm:

Exam (25%)

Weekly quizzes (25%)

Project/essay (25%)

Participation (25%)

Thinking about Thought

Session One: Today's introduction

Thinking about Thought

Session Two: The Contribution of Philosophy

Mind-body Debate

Monism

Materialism

Idealism

Dualism

Functionalism

Panpsychism

Etc

Thinking about Thought

Session Three: The Contribution of Biology

Evolution

Variation and Selection

Ecological Realism

Situated Cognition

Design Without a Designer

The Extended Phenotype

Memes

Altruism

Thinking about Thought

Session Four: The Contribution of Mathematics

Formal Systems

Universal Turing Machine

Goedel's Theorem of Incompleteness

The Turing Test

Alternative Logics

Thinking about Thought

Session Five: The Contribution of Computer Science

The Mind As a Symbol Processor

Formal Theories of Human Knowledge

Knowledge Processing

Common-sense Knowledge

Neural Networks

Thinking about Thought

Session Six: The Contribution of Linguistics

Competence Vs Performance

Pragmatics

Metaphor

The Origin of Language

Thinking about Thought

Session Seven: The Contribution of Psychology

Reconstructive Memory

Fundamental Unity of Cognition

The Self

Thinking about Thought

Session Eight: The Contribution of Neurophysiology

Connectionism

The Brain Is an Evolutionary System

The Dance of Genes and Experience

Neural Darwinism

Space-based Binding

Time-based Binding

Mirror Neurons

Thinking about Thought

Session Nine: The Contribution of Physics

Entropy and Life

Nonequilibrium thermodynamics

Self-organizing systems

The Observer in Relativity and Quantum Physics

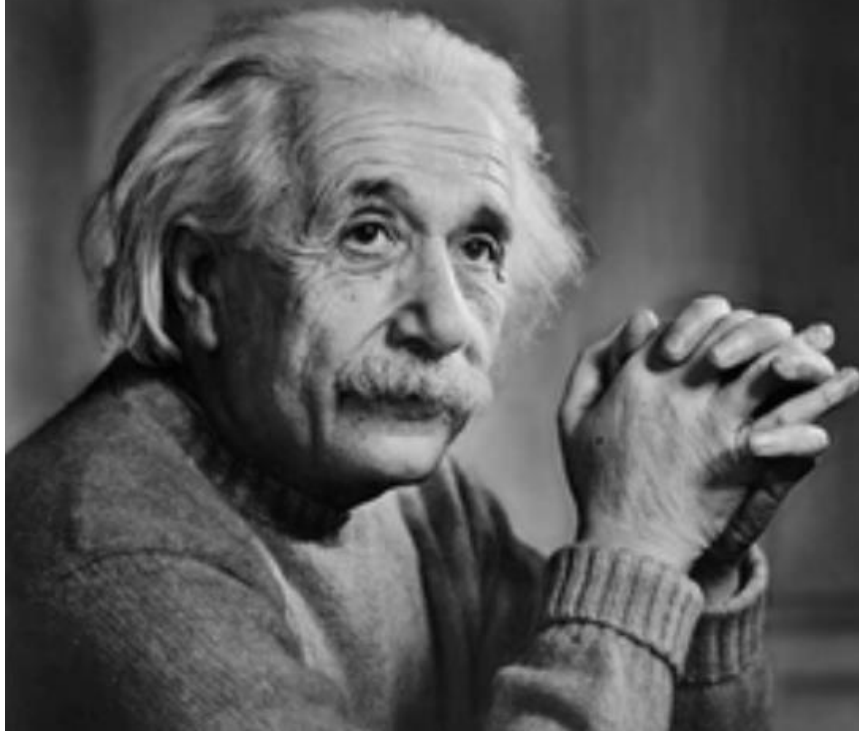
Uncertainty

No theory of the universe can claim to be complete if it
doesn't predict the emergence of me (Consciousness)

Thinking about Thought

If you can't explain it **simply**, you don't understand it well enough.

– Albert Einstein



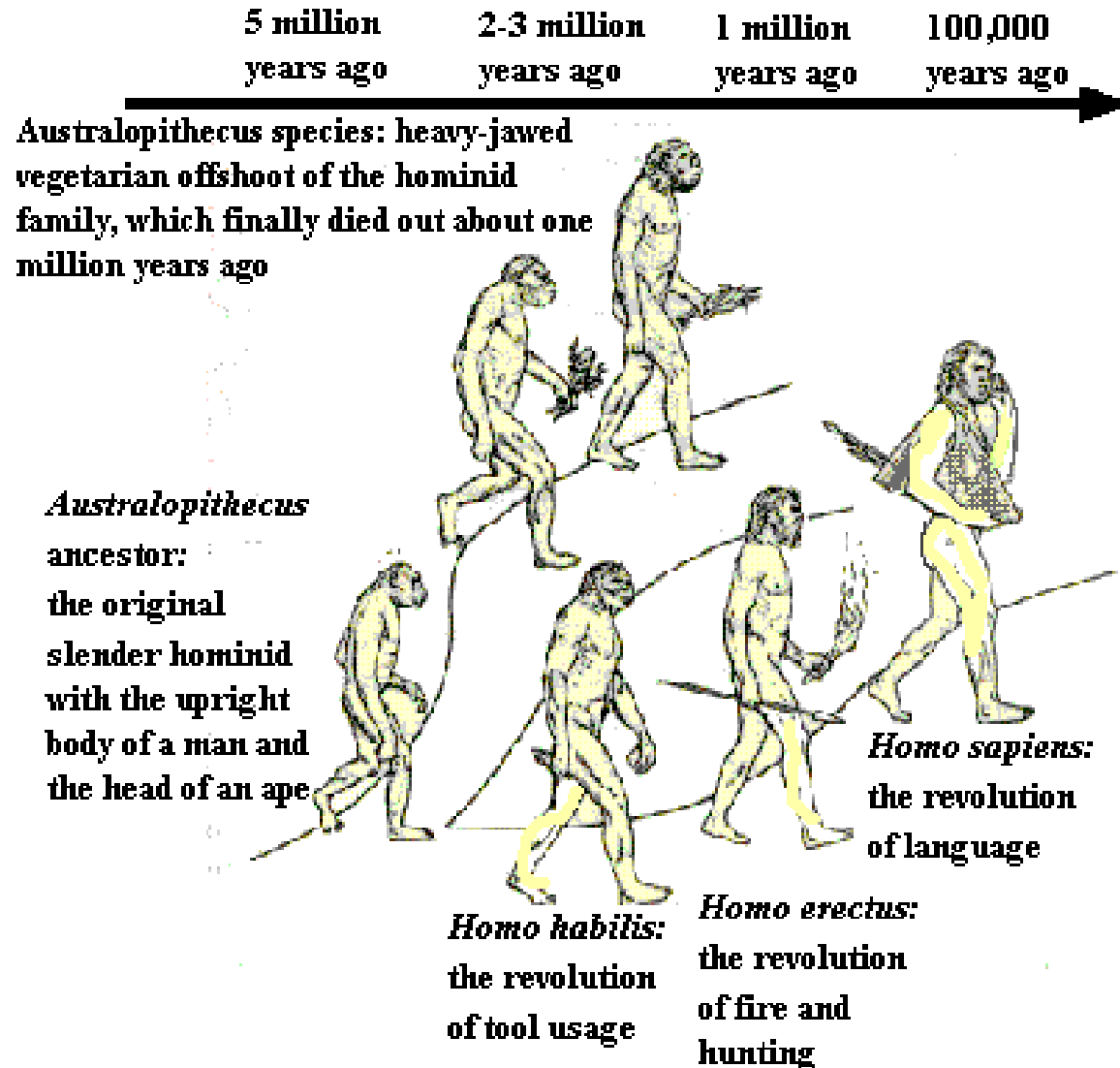
Thinking about Thought

Session Ten: Final discussion: Towards a Science of Consciousness

Who are you?
(and why are you here?)



Paradigm Shifts



Paradigm Shifts

- Darwin's Design Without A Designer
- James' Connectionism
- Hilbert's Formal Systems
- Whorf's Hidden Metaphor Of Language
- Bartlett's Reconstructive Memory
- Turing' Universal Machine
- Chomsky's Generative Grammar
- Simon's Mind As A Symbolic Processor
- Grice's Conversational Maxims
- Gibson's Ecological Realism
- Rosch' Basic Level Categories

Paradigm Shifts

- Prigogine's Nonequilibrium Thermodynamics
- Maturana's Autopoiesis
- Jaynes' Evolution Of Consciousness
- Lakoff's Metaphorical Thought
- Edelman's Neural Group Selection
- Stapp's Quantum Idealism
- Margulis' Endosymbiosis Dawkins' Memes
- Hobson/Winson's Dreams As Offline Processing
- Calvin's Cerebral Code
- Llinas' Time-based Binding

Conclusions?



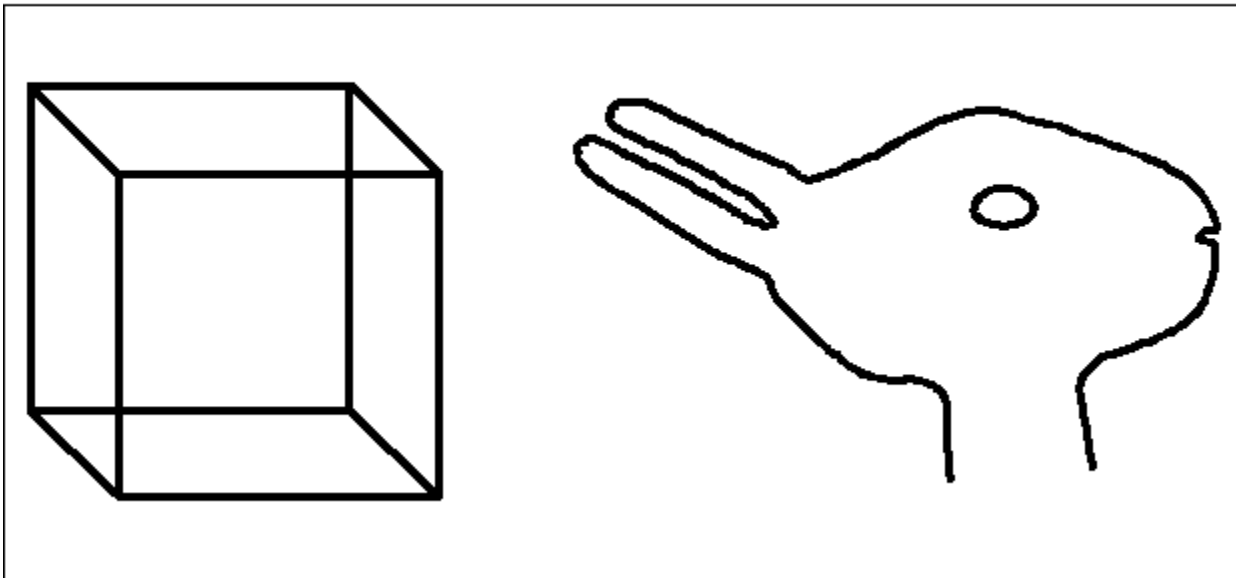
The Co-evolution Of:
Tools
Language
Memes
Emotions
Body

The Factory of Illusions

<Insert picture of you here>

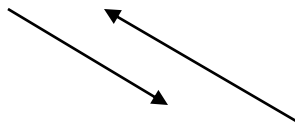
The Factory of Illusions

Figure 4

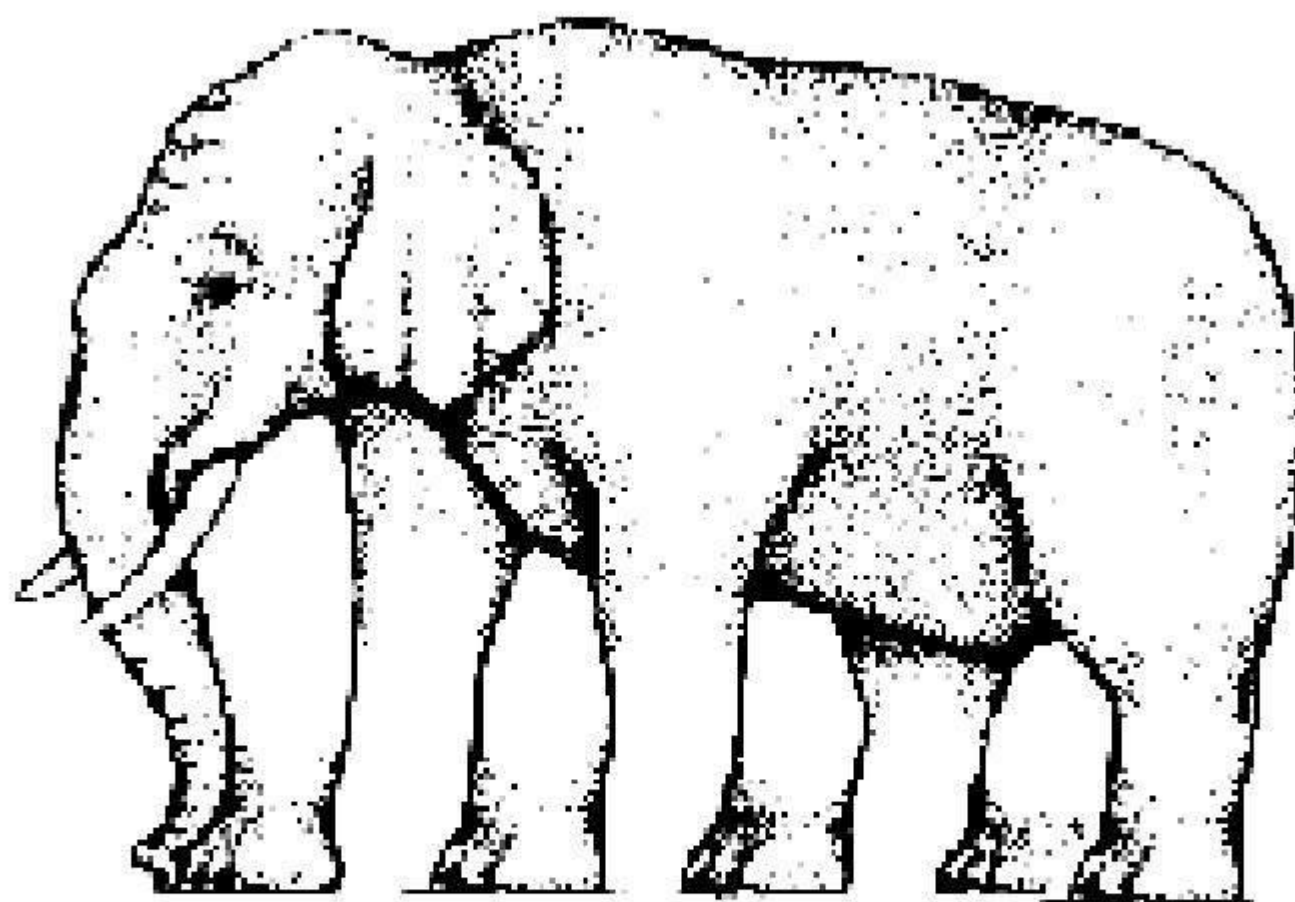


Which direction?

Duck or rabbit?

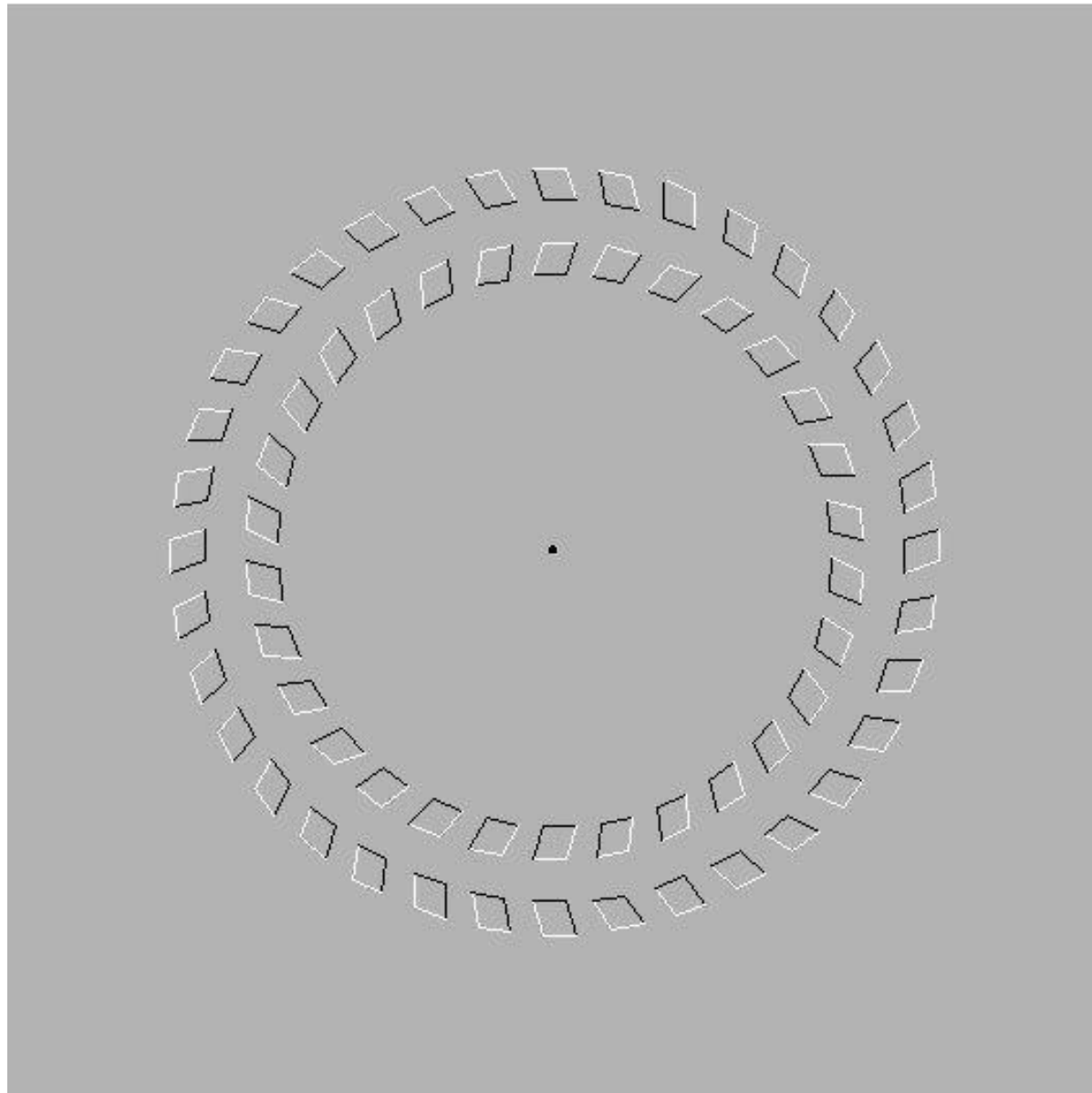


How long does it take you to switch
from one illusion to the other one?

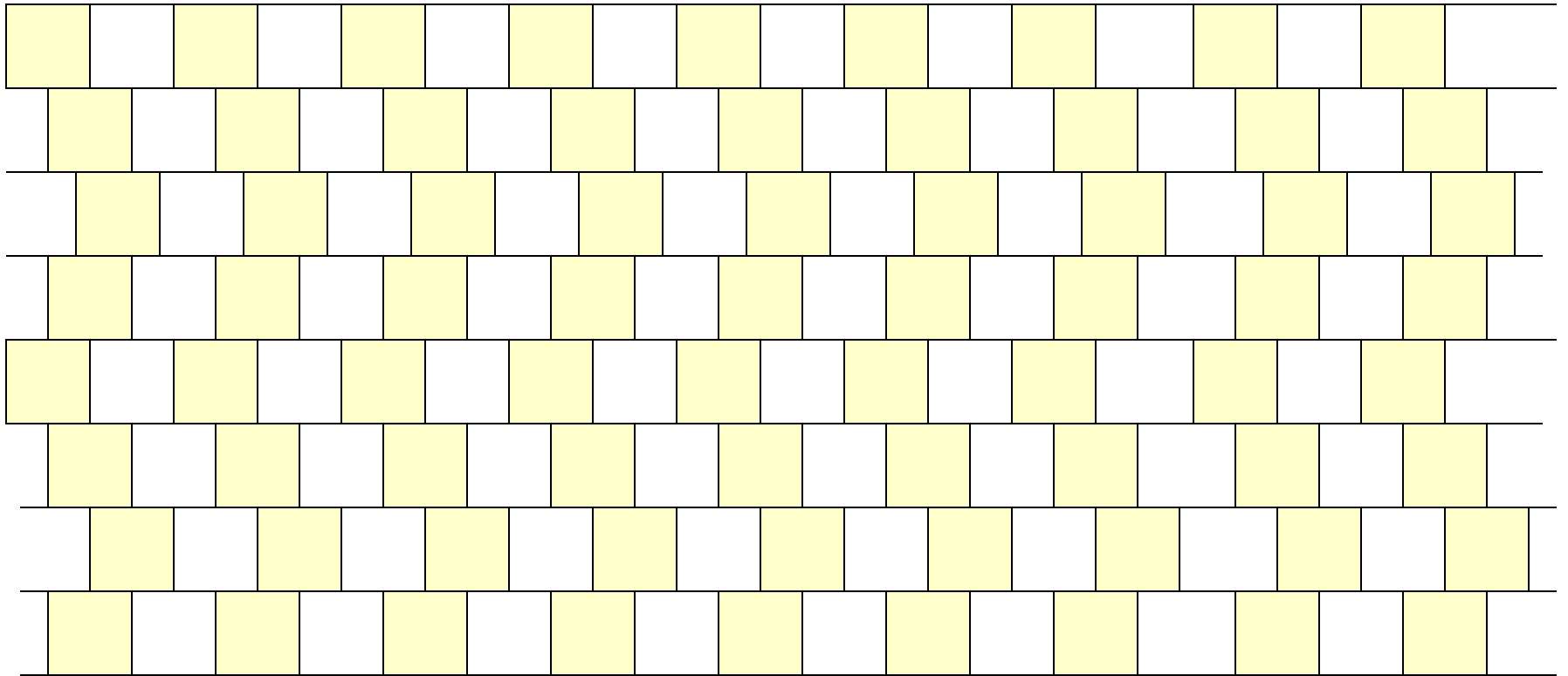


How many legs does this elephant have?

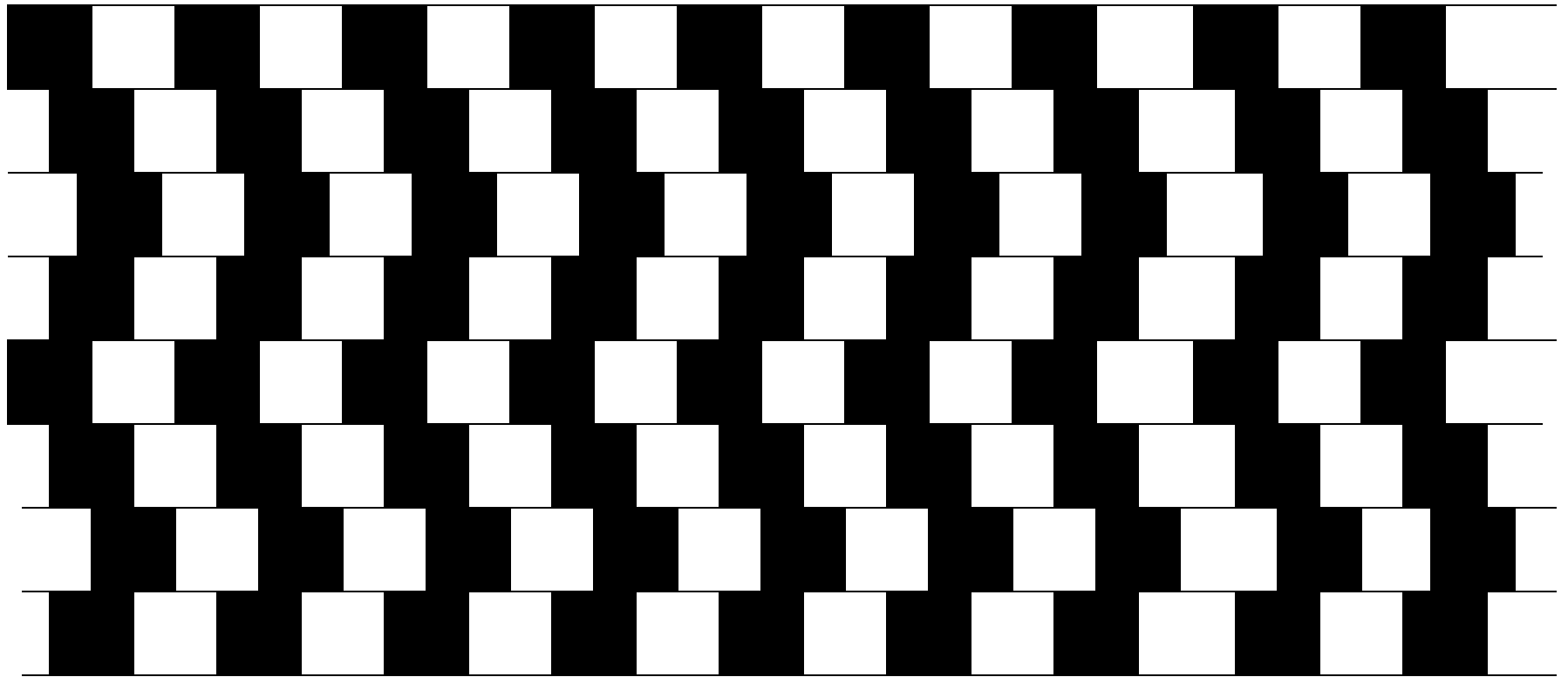
The Factory of Illusions



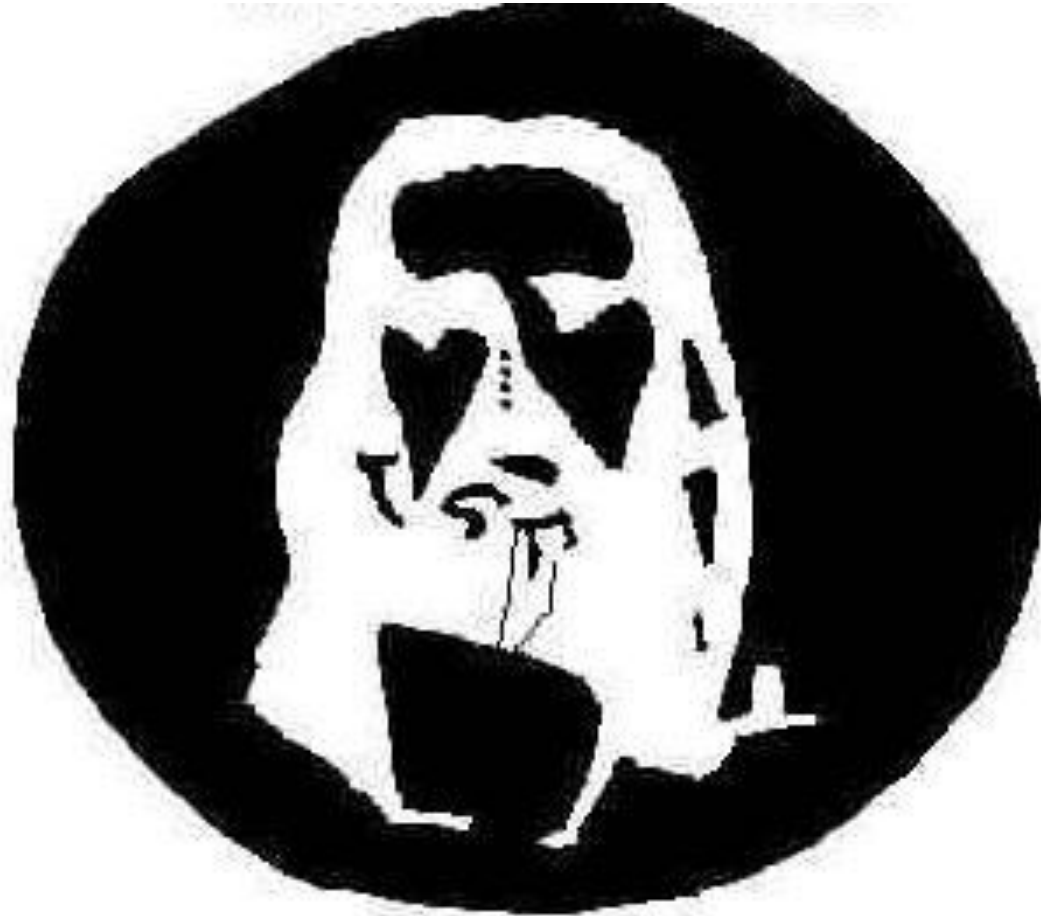
The Factory of Illusions



The Factory of Illusions



The Factory of Illusions

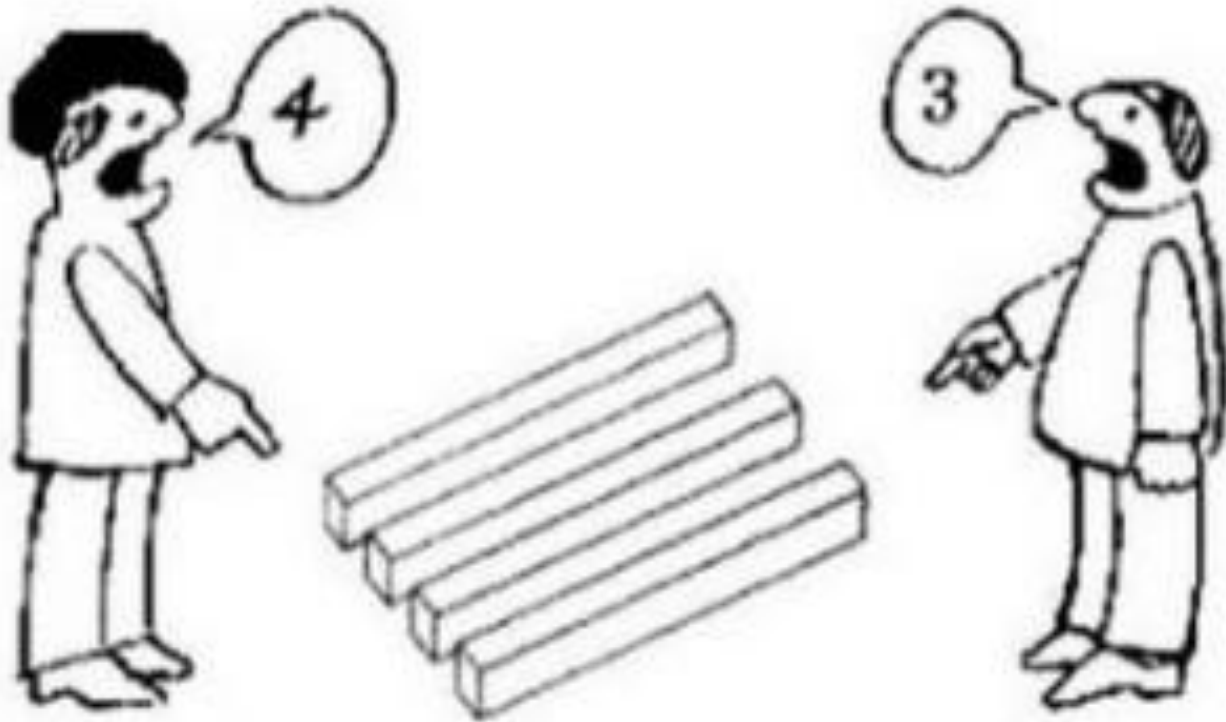


Focus on the four dots for 30 seconds
Look at a wall and blink your eyes
Keep staring at the wall

The Factory of Illusions

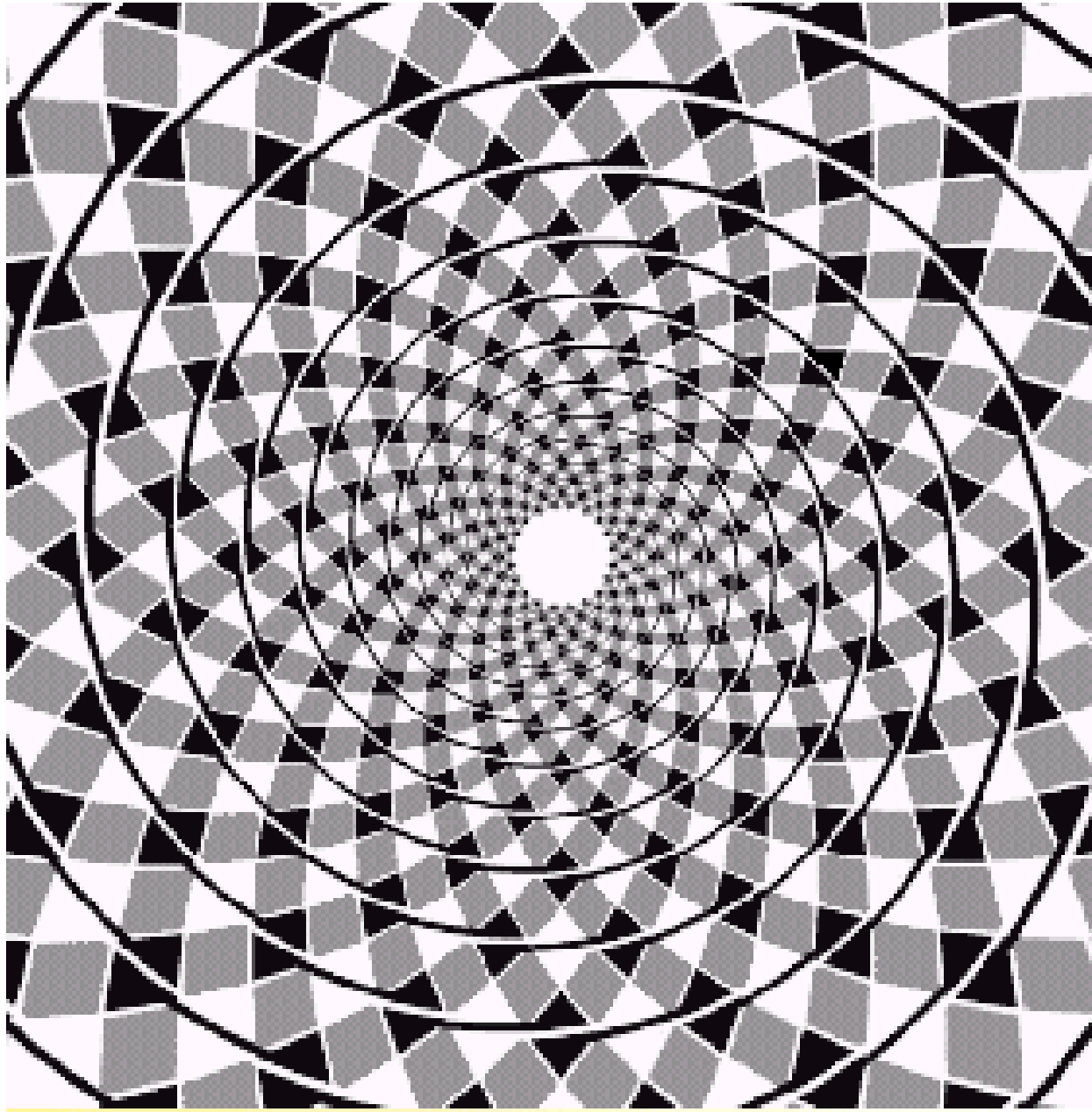


The Factory of Illusions



The Factory of Illusions

There is no spiral,
just concentric circles







QUESTION YOUR INTELLIGENCE

If you overtake the second runner in a race, in what position are you now?

What if you overtake the last runner?

Mary's father has five daughters: 1. Nana, 2. Nene, 3. Nini, 4. Nono. What is the name of the fifth daughter?

A mute person goes into a shop and wants to buy a toothbrush. By imitating the action of brushing his teeth he successfully expresses himself to the shopkeeper and the purchase is done.

Next, a blind man comes into the shop who wants to buy a pair of Sunglasses: how does he indicate what he wants?

QUESTION YOUR INTELLIGENCE

DAVID COPPERFIELD

*You can see 6 different cards.
Think on one.
Just think on it.
Do not touch it
Do not click on it.
I will find the card on your mind*



QUESTION YOUR INTELLIGENCE

DAVID COPPERFIELD

*¡Look!
¡¡Your card is
gone!!*



Humor



Humor

Those are my principles.
If you don't like them I have others.

I never forget a face,
but in your case
I'll be glad to make an exception.

A child of five could understand this.
Fetch me a child of five.

From the moment I picked your book up
until I laid it down
I was convulsed with laughter.
Someday I intend reading it.

Why should I care about posterity?
What's posterity ever done for me?

Military justice is to justice
what military music is to music.

Remember men:
we're fighting for this woman's honour;
which is probably more than she ever did.

Behind every successful man is a woman,
behind her is his wife.

Quote me as saying I was mis-quoted.

(Groucho Marx)

Humor

ATTORNEY: This myasthenia gravis, does it affect your memory at all?

WITNESS: Yes.

ATTORNEY: And in what ways does it affect your memory?

WITNESS: I forget..

ATTORNEY: You forget? Can you give us an example of something you forgot?

ATTORNEY: The youngest son, the 20-year-old, how old is he?

WITNESS: He's 20, much like your IQ.

ATTORNEY: Were you present when your picture was taken?

ATTORNEY: How was your first marriage terminated?

WITNESS: By death..

ATTORNEY: And by whose death was it terminated?

WITNESS: Take a guess.

ATTORNEY: So the date of conception (of the baby) was August 8th?

WITNESS: Yes.

ATTORNEY: And what were you doing at that time?

WITNESS: Getting laid

Excerpts from Charles Sevilla's book "Disorder in the Court: Great Fractured Moments in Courtroom History" (1999) which are exchanges that actually took place in court as documented by court reporters

QUESTION YOURSELF

DO YOU LIVE IN EINSTEIN's WORLD?

Is the universe infinite? Is time absolute? How fast do sounds/images travel?

DO YOU LIVE IN QUANTUM THEORY's WORLD?

Is the universe continuous? Can you predict the future? Can you measure things?

DO YOU LIVE IN NEWTON's WORLD?

Can you solve Zeno's paradox?

<u>A0</u>	<u>T0</u>	
	<u>A1</u>	<u>T1</u>
		<u>A2</u> T2

DO YOU LIVE IN GOEDEL's WORLD?

Can everything be proven eventually?

DO YOU LIVE IN TARSKI's WORLD?

Can you solve the liar's paradox?

"I am lying"

Thinking about Thought

- Introduction

- Philosophy of Mind
- Cognitive Models
- Machine Intelligence
- Life and Cognition

- The Brain
- Dreams and Emotions
- Language
- Modern Physics
- Consciousness