Creativity

- What is it?
- The magic of the “near possible”
- Can I do it?
- How can I do it better?
Creative expression has been core to the human spirit since the earliest times.

- **77,000 BCE** – Ocre drawing from Blombos Cave, South Africa.
- **43,000–42,000 BCE** – Musical instruments (flutes) from Geissenklösterle Cave, Germany.
- **41,000–37,000 BCE** – Cave paintings from El Castillo, Spain.

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Creativity or Innovation?

Lion man of Hohlenstein Stadel – 40,000 BC
3300 BC – The Birth of Utilitarian Innovation:

Other contenders: wine, metals, tents, arrows, hoes, ropes, fishhooks, canoes, horse bits, saddles, metal production, stirrups, etc.

Estimated World Population: 10 – 15 MM People
The Birth of Entrepreneurship – 2400 BCE

The First Bond – Denominated in Grain
Homer – The Creator – c. 850 BCE
Muses: Triggering Associations (c. 500 BCE)

Nine daughters of Zeus and Mnēmosyne ("Memory")

Common to Greek, Roman and Indian cultures

They inspire creation (songs, dance and poetry) through stimulated association
A different idea

Parmenides
c. 540 BCE – ?? BCE
Parmenides asserted that nothing changed.

The Eleatic School of Philosophy – Views of Reality

• The Way of Truth
  – Change is impossible
  – Existence is timeless, uniform and unchanging

• The Way of Opinion
  – One’s sensory facilities lead to conceptions which are false and deceitful
Plato accepted that view

"Will we say, of a painter, that he makes something?"

Plato answers, "Certainly not, he merely imitates."
And his student Aristotle

Parmenides
c. 540 BC – ?? BCE

Plato
427 BCE – 347 BCE

Aristotle
384 BCE – 322 BCE
Hellenistic Innovations

Eureka! The Discovery of Discovery

Archimedes
287 BCE – 212 BCE
Hellenistic Creativity

Antikythera Mechanism

- Used to calculate position and predict eclipses
- Months and days from the Sothic Egyptian calendar (with leap year days included)
“For the (17th C) Jesuits, the purpose of mathematics was to construct the world as a fixed and eternally unchanging place, in which order and hierarchy could never be challenged.”

Paul Guldin (1577 – 1643)
Science – 14th C
Create – 14th C
Innovation – 15th C
Scientific – 1589
Creative – 1678
Disrupt – 1793

Leonardo da Vinci
1452 - 1519

Machiavelli
1469 - 1527

Michaelangelo
1475 - 1564

Shakespeare
1564 - 1616
Cabinets of Curiosities
Scientific Networks

The Royal Society

Founded 1660
The Concept of Creativity

Acceleration: The 18th Century
William Duff
1732 – 1815
Theory of Genius – Imagination, Judgement & Taste
Rather than “Devine Inspiration”
The Battle of Waterloo
1815
Sarajevo – 1914
As the pace of war slowed, another pattern began to emerge...

De Maupassant (1850 – 1893) invents the short story

Verdi (1813 – 1901) v. Wagner (1813 – 1883)

Bruckner (1824 – 1896), Mahler (1860 – 1911), Sibelius (1865 – 1957) and Satie (1866 – 1925) rising

Gall (1758 – 1828) explains where speech is in the brain

Niépce (1765 - 1833) creates a permanent photographic image

Darwin (1809 – 1882) describes evolution

Maxwell (1831 – 1879) explains electromagnetism

Cauchy (1789 – 1857) develops number theory

Freud (1856 – 1939) defines psychoanalysis
Noah Porter: 7th Yale President

Noah Porter
1811 - 1892

Reconciling: Psychology & the Soul

1869

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“Creativity”
1875
Creation - The Art & Science of the Near Possible
CREATIVITY:

“To associate previously unassociated fields”
CREATIVITY:

“The creative act, by connecting previously unrelated dimensions of experience, enables him to attain to a higher level of mental evolution. It is an act of liberation - the defeat of habit by originality.”

Arthur Koestler, 1963
Associating previously unassociated fields
Sometimes it takes a lot of tries!
“Instead of thoughts of concrete things patiently following one another in a beaten track of habitual suggestion…”

William James (1842 – 1910)
“...we have the most abrupt cross-cuts and transitions from one idea to another, rarefied abstractions and discriminations, unheard of combinations of elements, the subtlest associations of analogy.
In a word, we seem suddenly introduced into a ... seething caldron of ideas, where everything is fizzling and bobbling about in a state of bewildering activity, where partnerships can be joined or loosened in an instant, treadmill routine is unknown, and the unexpected seems the only law."
CREATIVITY:

“To associate two previously unassociated fields”

“Mastering the Arts of the Near Possible.”
Nobody ever said, “I need a ...

These came from the Arts of Mastering the Near Possible.”
Sometimes there are surprises!
Bertrand Russell
1872 - 1970

The Russell Condition:

“The greatest challenge to any thinker is stating the problem in a way that will allow a solution.”
"Genius is finding the invisible link between things."

Vladimir Nabokov
1899 - 1977
Phases of Inspiration

1. Prefatory Glow
2. Tickly Well-Being that banishes awareness of physical discomfort
3. For-feeling what he is going to tell
4. Instant vision that turns into rapid speech
5. A tumble of merging words forming the nucleus of a work which will grow over months or years

Vladimir Nabokov
1899 - 1977
Why am I so productive?

Hermann von Helmholtz
1821 - 1894

Henri Poincare
1854 - 1912
The Wallas Cycle – 1926 – Trial and Error

Preparation

Incubation

Illumination

Hermann von Helmholtz
1821 - 1894

Graham Wallas
The Art of Thought

Henri Poincaré
1854 - 1912

Graham Wallas
1858 - 1932
“Bisociation”

Arthur Koestler
1905 - 1983

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The Jester, the Sage and the Artist (Koestler)

All use the same processes
\[ \sum_{s \in S} \frac{\rho_s(s, \nabla v^\sigma)}{a^2 + (c^2 + b^2 (s, \nabla g_i^\sigma)^2)((s, \nabla u^\sigma)^2 + (s, \nabla v^\sigma)^2)} + \frac{\rho(g_i^\sigma \bar{g}_i^\sigma)}{2(1 \nabla u^\sigma)^2 + 11 \nabla u^\sigma \nabla \bar{g}} \]
“Artmaking is making the invisible, visible.”

Marcel Duchamps
1887 - 1968
The Invisible

Visible

Jaume Plensa
(1955 - )

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Creativity Starts with Curiosity

Ubiquitous Interests
“Abstraction Ability”; exploring beyond the boundaries
Explore Boundaries
Assumptions
Implications
Flaws
Openness
Love for Ambiguity
“A certain immaturity”
“Whoever is devoid of the capacity to wonder, whoever remains unmoved, whoever cannot contemplate or know the deep shudder of the soul in enchantment, might just as well be dead for he has already closed his eyes upon life’
And Proceeds to “Hunches”

Walter B. Cannon (1871 – 1945)

Chair of the Department of Physiology at Harvard Medical School

“The Way of an Investigator, 1945

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And then to associations

- Instinctive Framework Builders
- Psychologically androgynous
- Extroverted & Introverted
- Aggressive and nurturing
- Sensitive and rigid
- Dominant and submissive
- Conservative, yet Risk Seeking
- Humble and Proud
- "Sunny Pessimism"
Associations provide clues to the “near possible”

Delayed commitment to hypothesis formation/“waiting periods”/manipulating data

“Suspend disbelief” for hours, days or months; allows for “selective rearrangements”
Listen for “Small Voices” ...
Clues that the “Near Possible” may be lurking

- Ambiguities – Capable of multiple interpretation
- Illusions – a distortion of the senses
- Paradoxes – “This sentence is false”
- Dilemmas – “Double Propositions”
- Riddles & Puzzles – questions with double or veiled meanings
- Conundrums – Logical postulations that evade resolution
- Enigmas – a mysterious puzzle
- Fallacies – Conclusion based on poor reasoning
I don't know who discovered water... but it certainly wasn't a fish.
Associative Connections – Bricolage – Idea Assembly
Associative Connections – Bricolage - Idea Assembly
Associative Connections – Bricolage – Idea Assembly

Construction of Associative Networks Thinking “Really Slow”
Who Designed Brunelleschi’s Dome?

“Nor can one say that it is the (creative) person who starts the creative process. In reality they were only catalysts for a much more complex process with many participants and many inputs.”

Filippo Brunelleschi
(1377 – 1446)
Modern Associative Networks

World Wide Web + Graph Theory + Digital Library

Larry Page + Sergi Brin + Terry Winograd

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How do you actually do it?
Observation is an Active Process

Curiosity

Collection & Curation

Hyper-Cyclical

Creation

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Collection & Curation: A Hyper Cyclical Process

Gathering Data
Collection and Curation

Gathering Data

Creating Lists
Collection and Curation

Gathering Data  Creating Lists  Organizing Lists into Categories
Collection and Curation

- Gathering Data
- Creating Lists
- Organizing Lists into Categories
- Naming Categories

© Richard N. Foster
Collection and Curation

Gathering Data
Creating Lists
Organizing Lists into Categories
Naming Categories
Structuring Categories
Collection and Creation

Gathering Data
Creating Lists
Organizing Lists into Categories
Naming Categories
Structuring Categories

Comparing Categories to determine Conflicts, Gaps, Errors, Puzzles, Anomalies, and possible Deceptions

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Narrative Generation & Revision

Gathering Data
Creating Lists
Organizing Lists into Categories
Structuring Categories
Creating Associational Networks
Generate Integrating Narrative

Hyper-Cyclical

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Core Processes

Observe
- Broad search
- Periphery
- Anomalies
- Paradoxes
- Analogies
- Direct Experience

Reflect

Assemble

Converse

The "Personal Creativity Cycle"
Core Processes

Observe
- Broad search
- Periphery
- Anomalies
- Paradoxes
- Analogies
- Direct Experience

Reflect
- Zoom In, Zoom Out
- Suspend Judgment
- Find Missing Elements
- Restructure Data
- Juxtapose/Associate
- Sleep

Assemble

Converse

The “Personal Creativity Cycle”

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πνος  Sleep
Hypnagogic  Hypnopompic

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We now know quite a bit about how the brain “thinks”
Sleep and “Collision”


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© Richard Foster
Core Processes

**Observe**
- Broad search
- Periphery
- Anomalies
- Paradoxes
- Analogies
- Direct Experience

**Reflect**
- Zoom In, Zoom Out
- Suspend Judgment
- Find Missing Elements
- Restructure Data
- Juxtapose/Associate
- Use a Muse
- Sleep

**Converse**
- Set the agenda
- Frame the issues
- Discuss Narratives
- Contrast Views
- Set the pace
- Revise the Narratives

**Assemble**
- The "Personal Creativity Cycle"
“Conversations”
Core Processes

Assembly
- Building Associative Hierarchies
- Drafting Alternative Narratives
- Classify and Categorize
- Name
- Select and Revise the Narrative

Conversation
- Use a Muse
- Set the agenda
- Frame the issues
- Discuss Narratives
- Contrast Views
- Set the pace
- Revise the Narratives

Observe
- Broad search
- Periphery
- Anomalies
- Paradoxes
- Analogies
- Direct Experience

Reflection
- Zoom In, Zoom Out
- Suspend Judgment
- Find Missing Elements
- Restructure Data
- Juxtapose/Associate
- Sleep

Collection & Curation
- Creation

The "Personal Creativity Cycle"
The Long Path to a Finished Innovation
Creative Embers Burn Into the Night

Ben Franklin
Bifocals
Age: 78

Giuseppe Verdi
Falstaff
Age: 80

Frank Lloyd Wright
Completed Guggenheim Museum
Age: 91

Michelangelo
Pauline Chapel Frescos
Age: 89
“15 Innovators Who Will Change the World”  
*Time Magazine*

Acusphere  
AIR  
Arsenal  
Arsia  
BIND  
Tarveda (Blend)  
Echo Therapeutics  
Enzytech  

George Biomedical  
InVivo Therapeutics  
Kala  
Living Proof  
Lyndra  
Microchips Biotech  
Momenta  

Bob Langer - MIT
Per our conversation on Friday, you asked me to send you 100 ideas by yesterday.

So far I only have 11 - I am struggling coming up with additional...

...but I am still determined to come complete this exercise.”
FYI - since I sent that email a few hours ago, I gained 13 new ideas!

I think I'm going in the right direction, so I am going to keep at it.

Attached are 103 ideas.
As I was coming up with ideas, my mind already started forming an ontology without me actually physically creating one.

As I created the mental ontology, I started thinking about how you can really treat obesity, and I realized it broke down to a few groups.
As a result of these changes, I am starting to be more cognizant of the meta trends around my creativity.

I am starting to log and organize my observations.

The ideas are flooding in. They haven’t stopped for two weeks now.
Core Processes

**CREATIVITY:**

“To associate previously unassociated fields.”

“The highest order of minds”

“Creativity is a primary measure of our humanity”

- Test the Narrative
- Conduct Analysis
- Classify and Name
- Revise the Narrative

**Observation:**

- Broad search
- Periphery
- Anomalies
- Paradoxes
- Analogies
- Direct Experience

**Reflection:**

- Zoom In, Zoom Out
- Suspend Judgment
- Find Missing Elements
- Restructure Data
- Juxtapose/Associate
- Use a Muse
- Sleep

**Conversation:**

- Set the agenda
- Frame the issues
- Discuss Narratives
- Contrast Views
- Set the pace
- Revise the Narratives

**Assembly:**

- Test the Narrative
- Conduct Financial Analyses
- Classify and Categorize
- Name
- Revise the Narrative

*ORCA*

*CREATIVITY:*

“To associate previously unassociated fields.”

“The highest order of minds”

“Creativity is a primary measure of our humanity”

- William James
- Mihalyi Csikszentmihalyi

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Creativity is not a way of living analysis