



CNS 5037
NEUROPHILOSOPHY

Day - Creativity

Final Project Discussion

- Purpose:
 1. Exploration of a neurophilosophical question:
 - “What does our understanding of the brain and nervous system mean for the nature of _____ (the soul, ancestral wisdom, dreams, archetypal psychology, etc...)_____?”
 2. Reflect on implications this question has on consciousness transformation.
 3. Reflect on what personal significance this may have on your life.
- Presentations: Everyone will be given 7-10 minutes to somehow present...
 - What you researched,
 - How you performed your research,
 - And insights you gained through the research.
- Proposal (due 11/18) - An email with a paragraph that includes....
 - The neurophilosophical question(s) you hope to explore.
 - A brief description of how this question(s) are relevant to your personal life.

Self-Assessment of Day #3

1. According to the happiness equation discussed in class, **circumstances of our lives** account for ____ of our long-term levels of happiness.

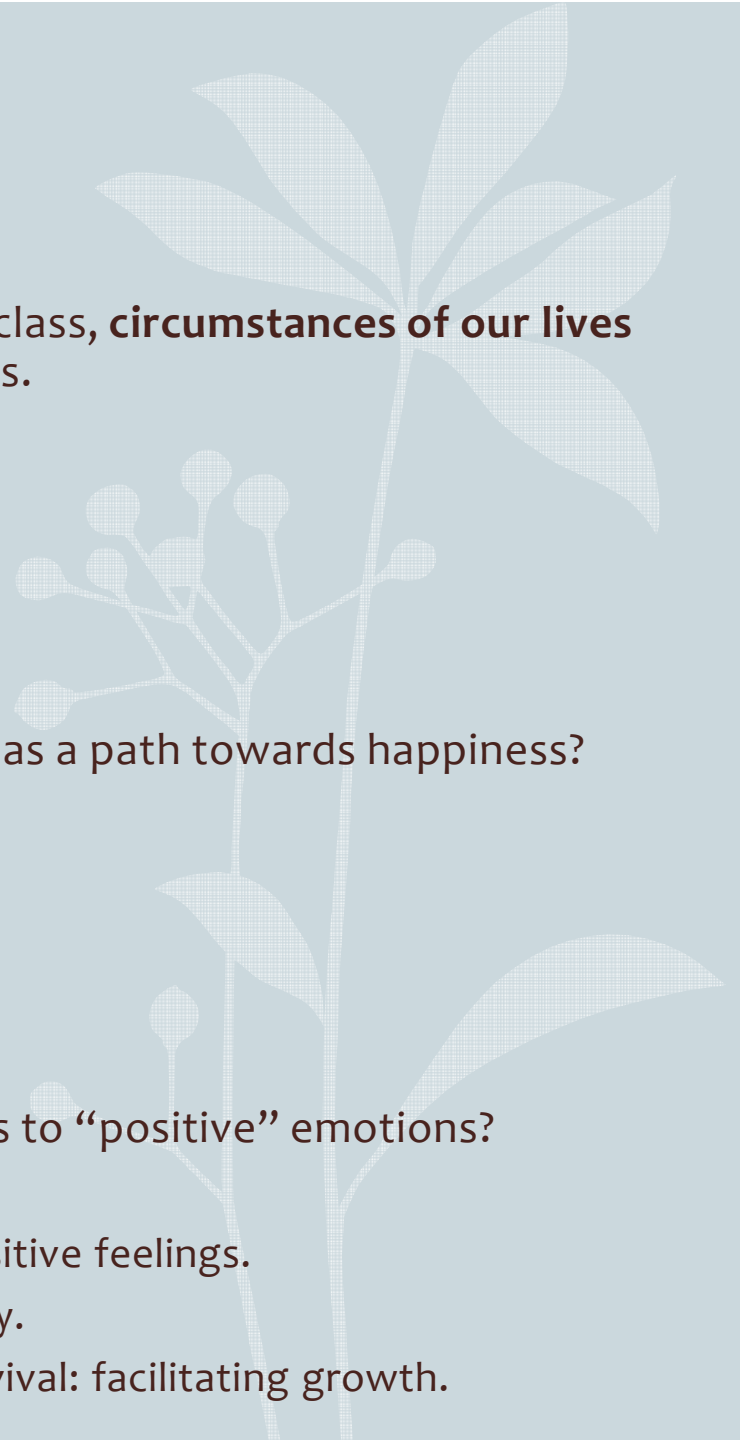
- A. 10%
- B. 40%
- C. 50%
- D. 70%

2. Which of the following was mentioned by Hanson as a path towards happiness?

- A. Taking in the Good
- B. Cooling the Fires
- C. Exercising Strong Intentions
- D. Developing Equanimity

3. Which of the following was discussed with regards to “positive” emotions?

- A. We seem to have dedicated positive brain circuitry.
- B. The brain produces several chemicals related to positive feelings.
- C. Pleasurable sensory experiences can last indefinitely.
- D. Positive emotions may serve a purpose beyond survival: facilitating growth.



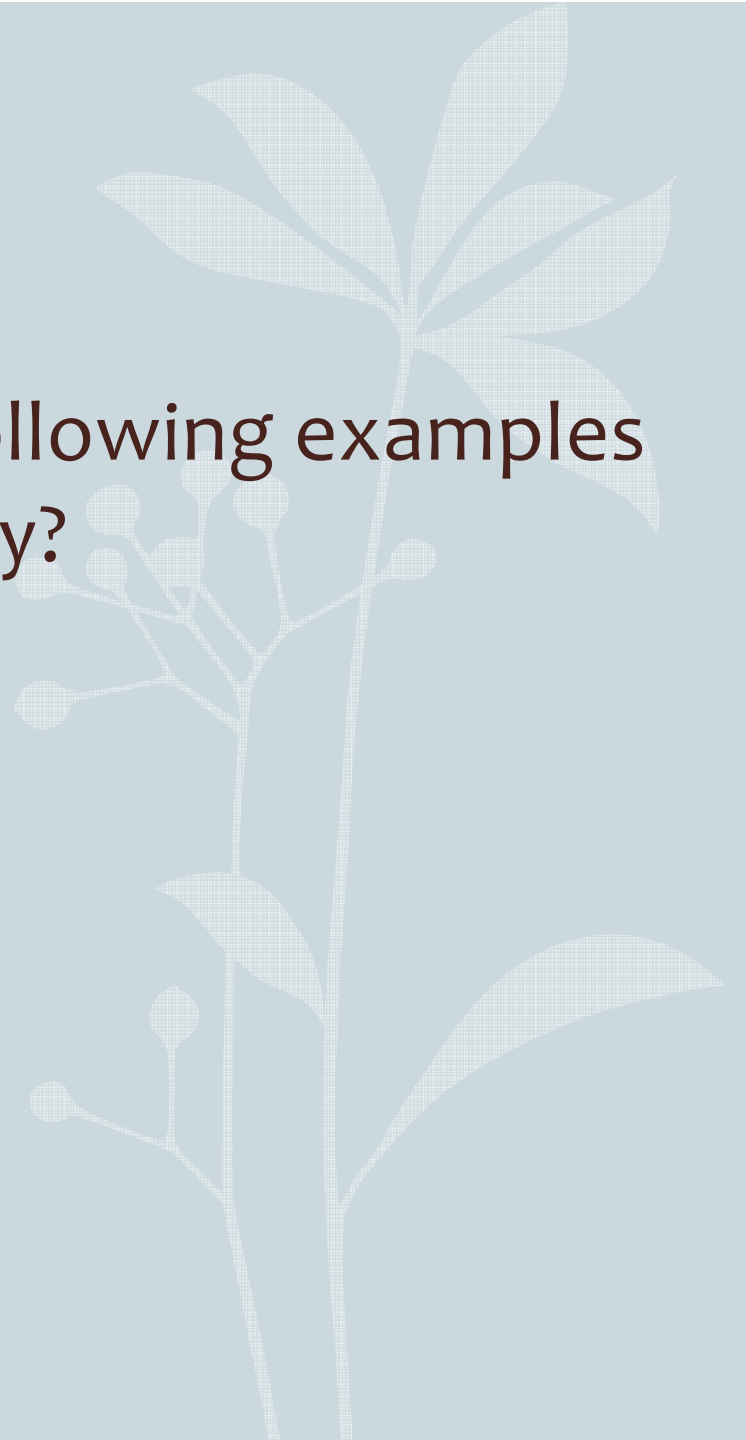
Neurophilosophy of Creativity

What do we mean “Creative”?



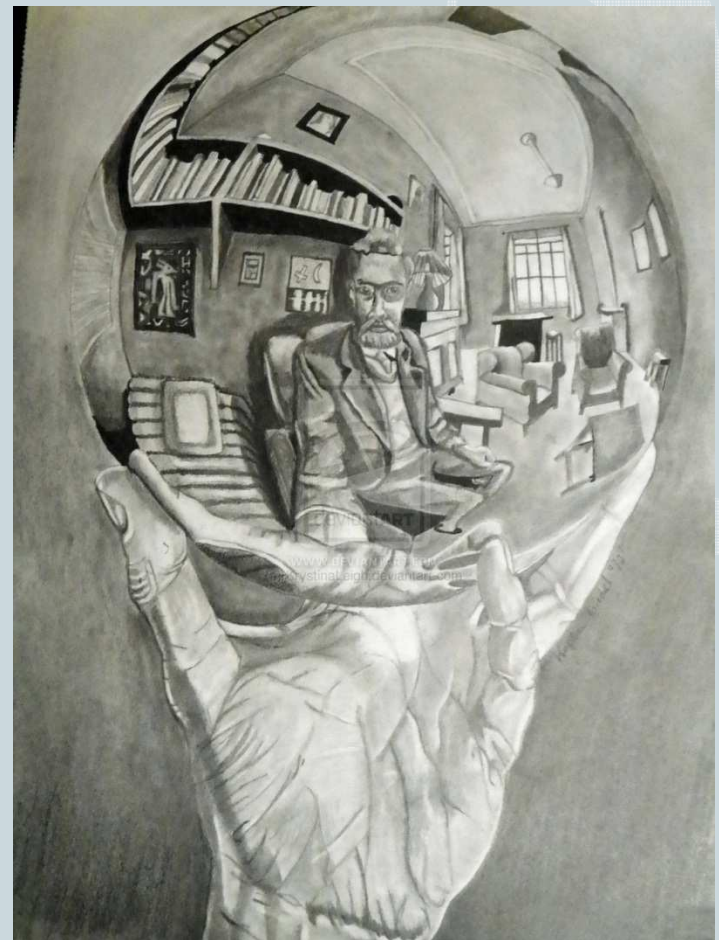
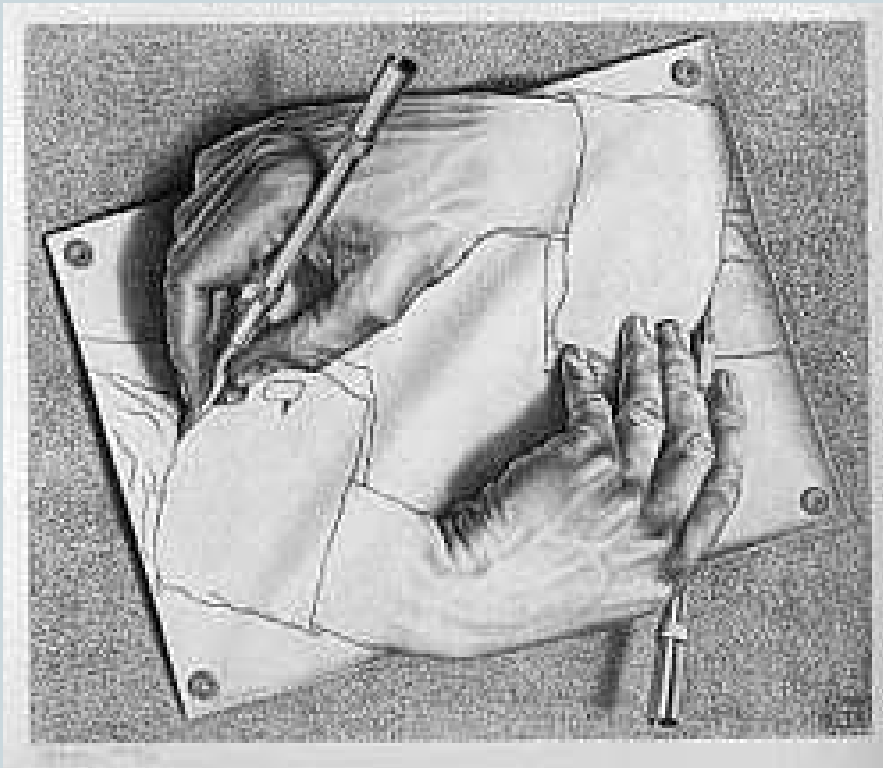
What is creativity?

What makes each of the following examples of creativity?



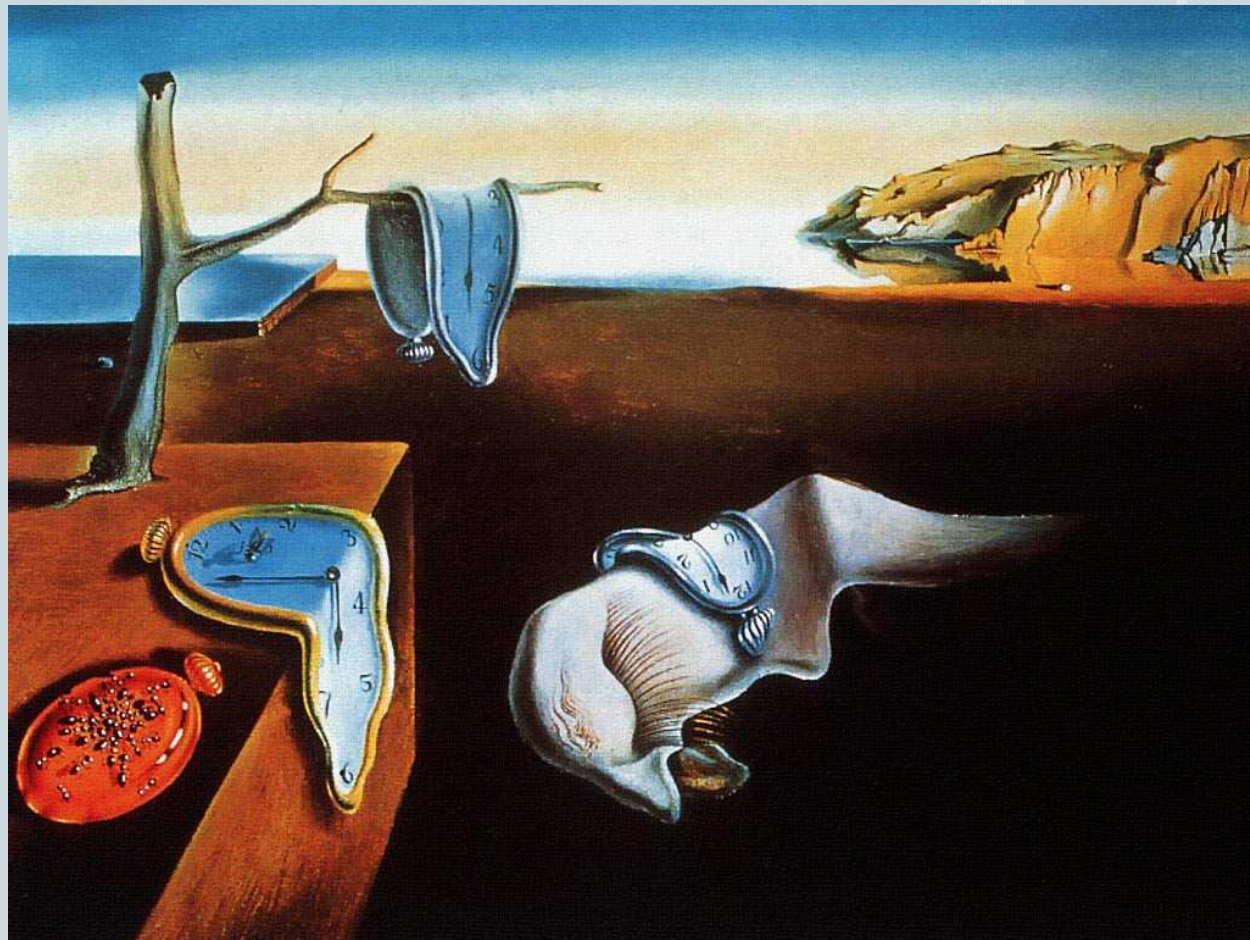
Examples of creativity

MC Escher



Examples of creativity

Salvador Dali



Examples of creativity

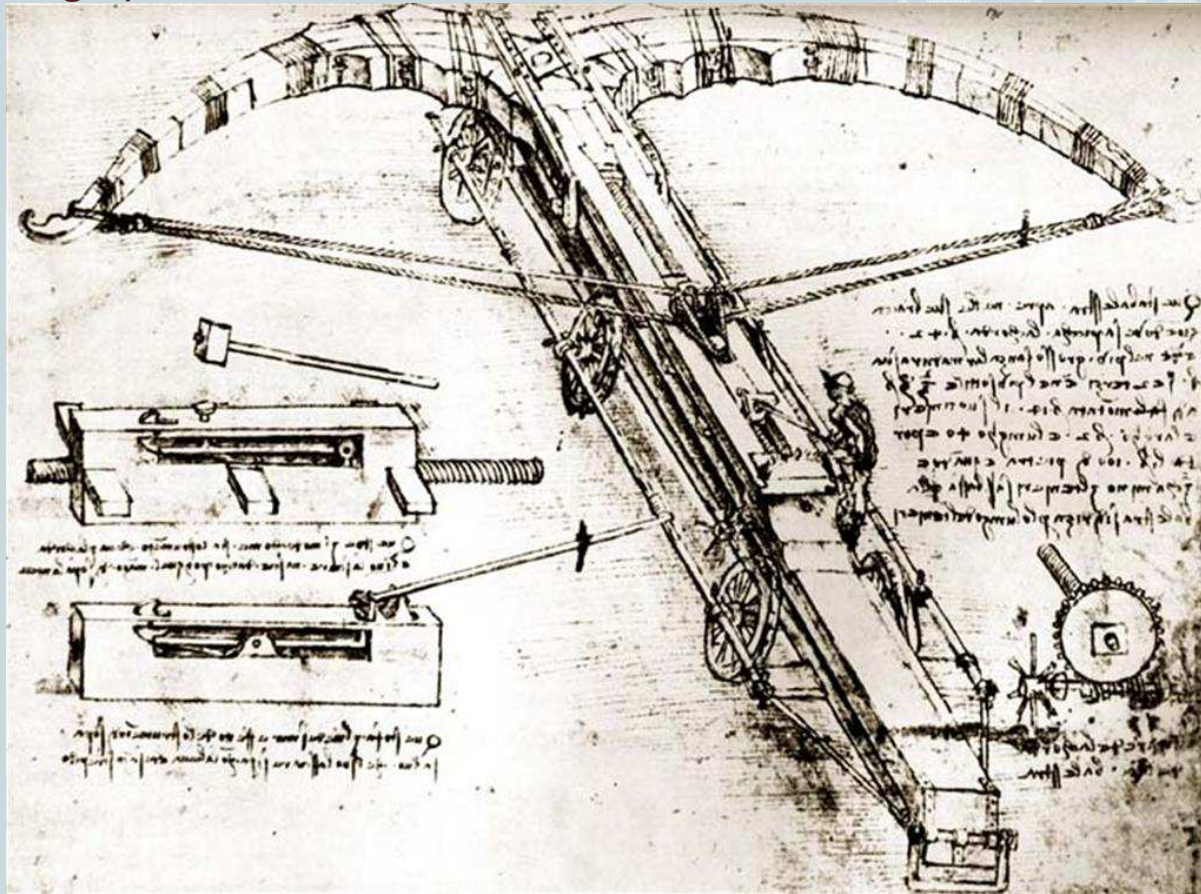
Picasso



Examples of creativity

Leonardo da Vinci (1452-1519)

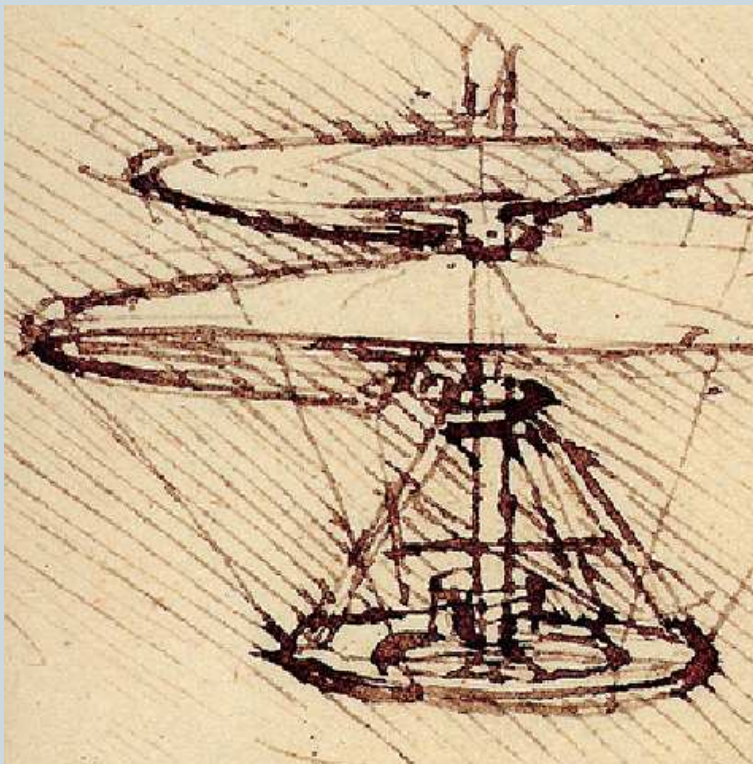
painter, sculptor, architect, musician, mathematician, engineer, inventor, anatomist, geologist, cartographer, botanist, and writer



Examples of creativity

Leonardo da Vinci (1452-1519)

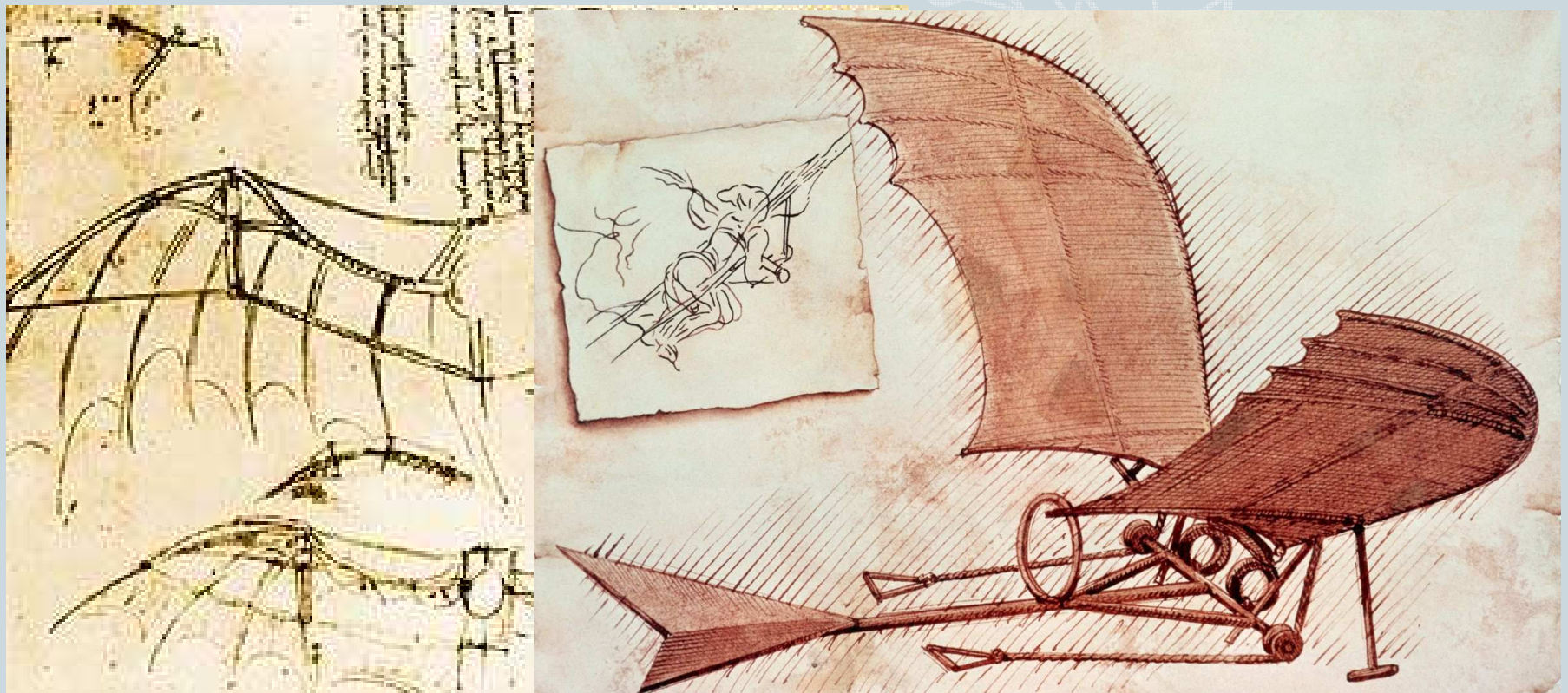
painter, sculptor, architect, musician, mathematician, engineer, inventor, anatomist, geologist, cartographer, botanist, and writer



Examples of creativity

Leonardo da Vinci (1452-1519)

painter, sculptor, architect, musician, mathematician, engineer, inventor, anatomist, geologist, cartographer, botanist, and writer



Examples of creativity

Ella Fitzgerald



Examples of creativity

One Note Samba – Sung by Frank Sinatra



Examples of creativity

One Note Samba – Sung by Ella Fitzgerald

https://www.youtube.com/watch?v=vL6Qmcf_Zb8



Examples of creativity

Dance Choreography

<https://www.youtube.com/watch?v=ttioUuLgQHk>



Examples of creativity



Examples of creativity

Athletic Performance



What is Creativity?

Typical Textbook:

Creativity is “the ability to transcend traditional ideas, rules, patterns, relationships, or the like, and to create meaningful new ideas, forms, methods, interpretations, etc.”

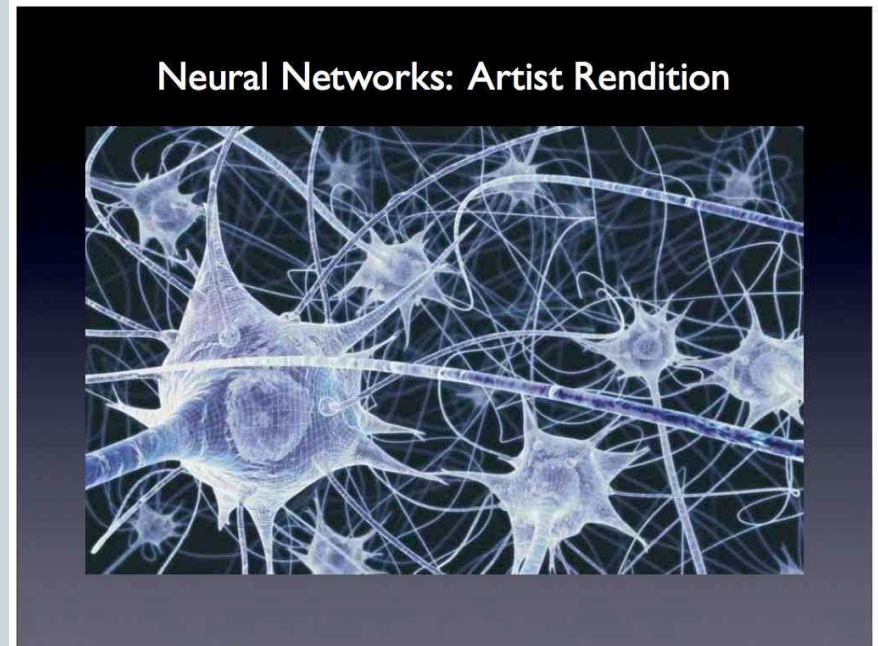
From a Mythological Perspective:

Creativity = going beyond your ordinary world.

What about from a Neuroscientific perspective?

Neuroscience & Creativity

Unique Neural Activation Patterns



1. **New associations.**
2. **New pattern of activity.**

Neurophilosophy of Creativity

Hanson:

Key is sculpting implicit memory. Cooling fires. Intention. Etc...



Neurophilosophy of Creativity

We will explore creativity in terms of the following:

- Unique Ideas/insights
- Improvisation
- Creative Process
- Artistry of Life:
 - Possibilities
 - Choices
 - Consciousness - About having the awareness to make the change Hanson promotes in his book.



Creativity Part I:

Cognitive Flexibility



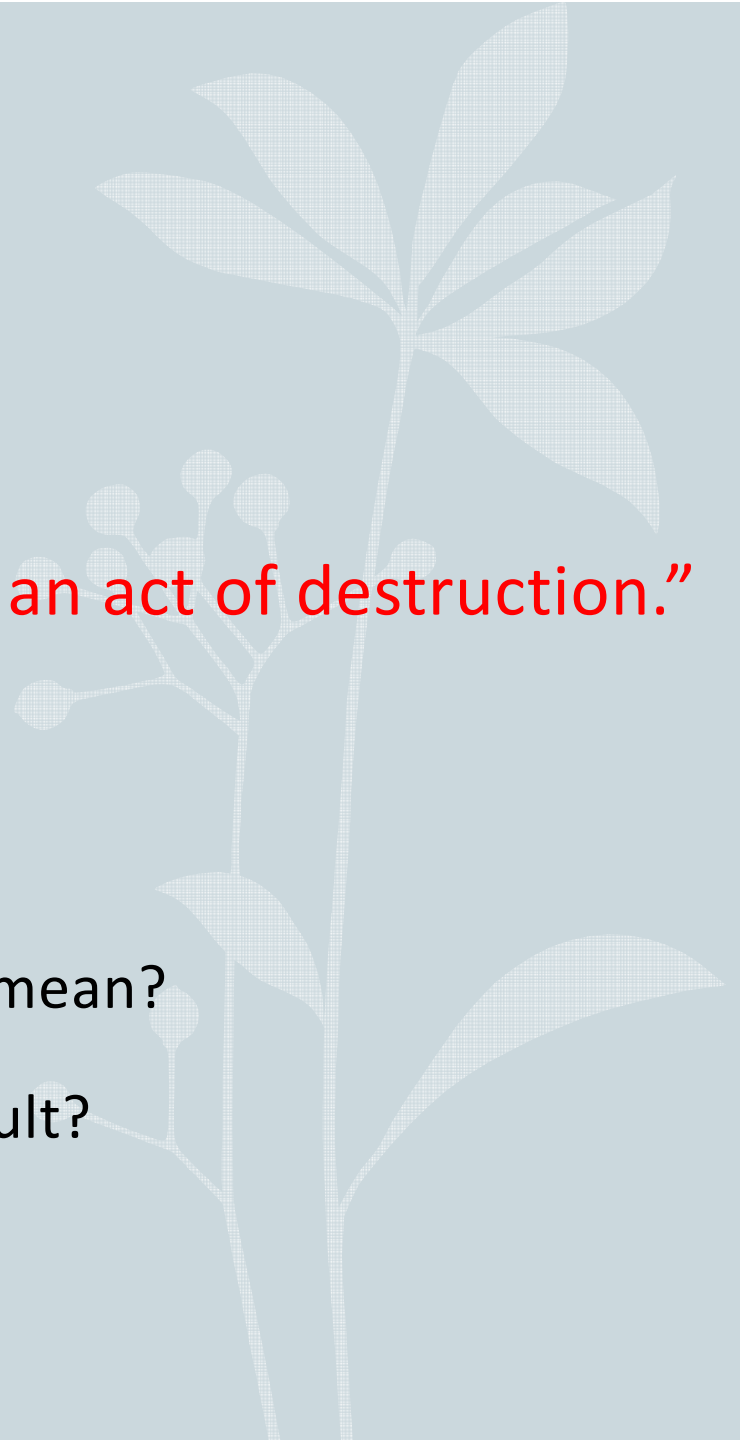
1. Cognitive Flexibility

“Every act of creation is first of all an act of destruction.”

-Picasso

What does Picasso mean?

Why is this difficult?



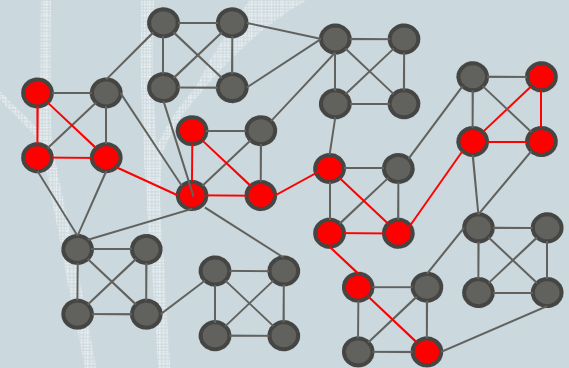
1. Developing Cognitive Flexibility

Unique Neural Activation Patterns

Why is this difficult?

Wiring of the Brain

- Several years (decades) of **conditioning**.
- **Hebbian Learning**
 - the more we reinforce associations the stronger the network
- Tendency to reinforce existing networks.
 - Drive Toward Homeostasis: **Familiarity**
 - **Efficiency!**



1. Developing Cognitive Flexibility

Yellow

Green

Green

Blue

Red

Yellow

A reminder that we are wired to think and behave in certain ways.

Stroop Test

1. Developing Cognitive Flexibility

*How is this related
to creativity?*

Blue

Red

Green

Yellow

Blue

Red

Developing Cognitive Flexibility

Remember This?

A man is born in 1990 and dies in 2010.

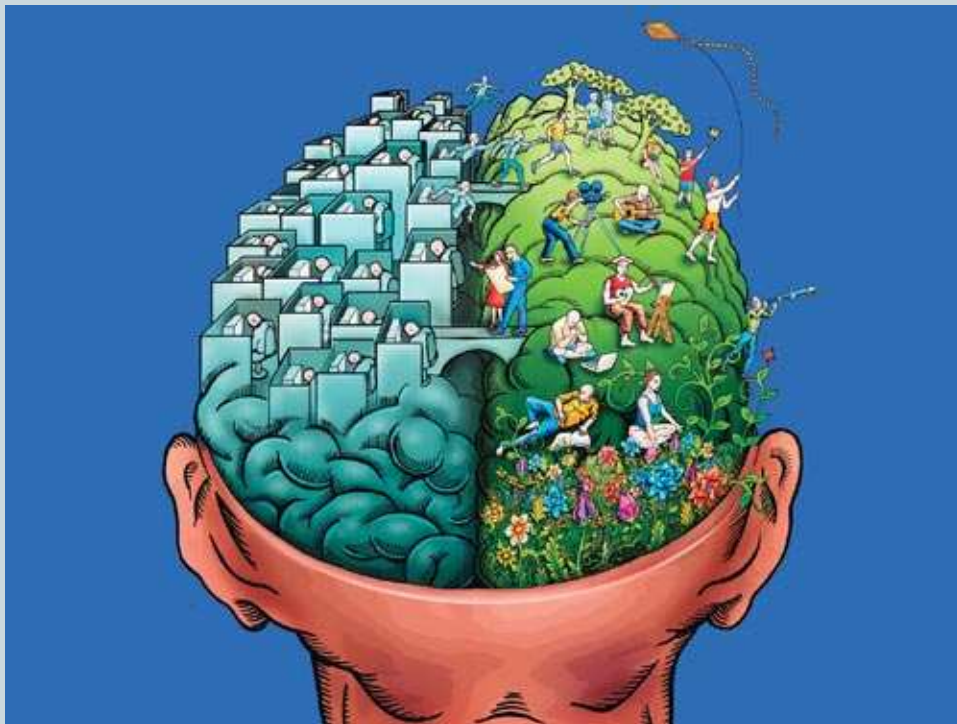
According to his death certificate, the man died when he was 25 years old.

Is this possible?

*What is happening here?
How is this related to creative blocks?*

Developing Cognitive Flexibility

Hemispheres



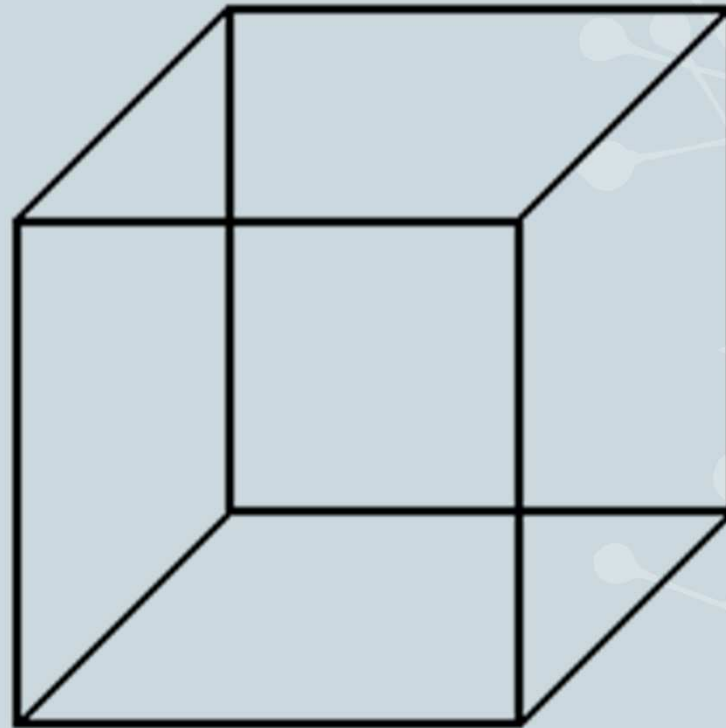
Left:

- Literal; Familiar; Details
- *Mihalyi* – “least effort”?

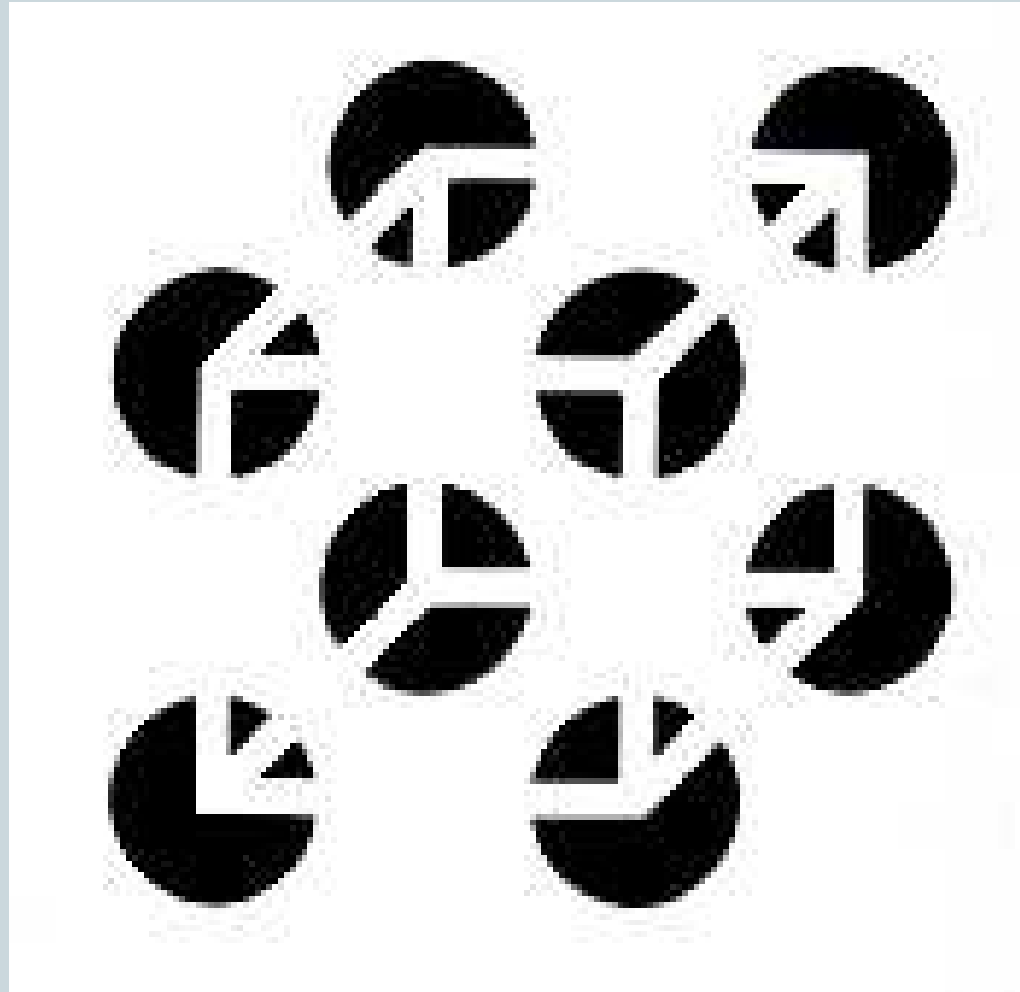
Right:

- Metaphor; Novel; Bigger Picture
- *Mihalyi* – “exploration & discovery”?

Developing Cognitive Flexibility



Developing Cognitive Flexibility



Developing Cognitive Flexibility

RUE



Developing Cognitive Flexibility

WRIST WRIST



Developing Cognitive Flexibility

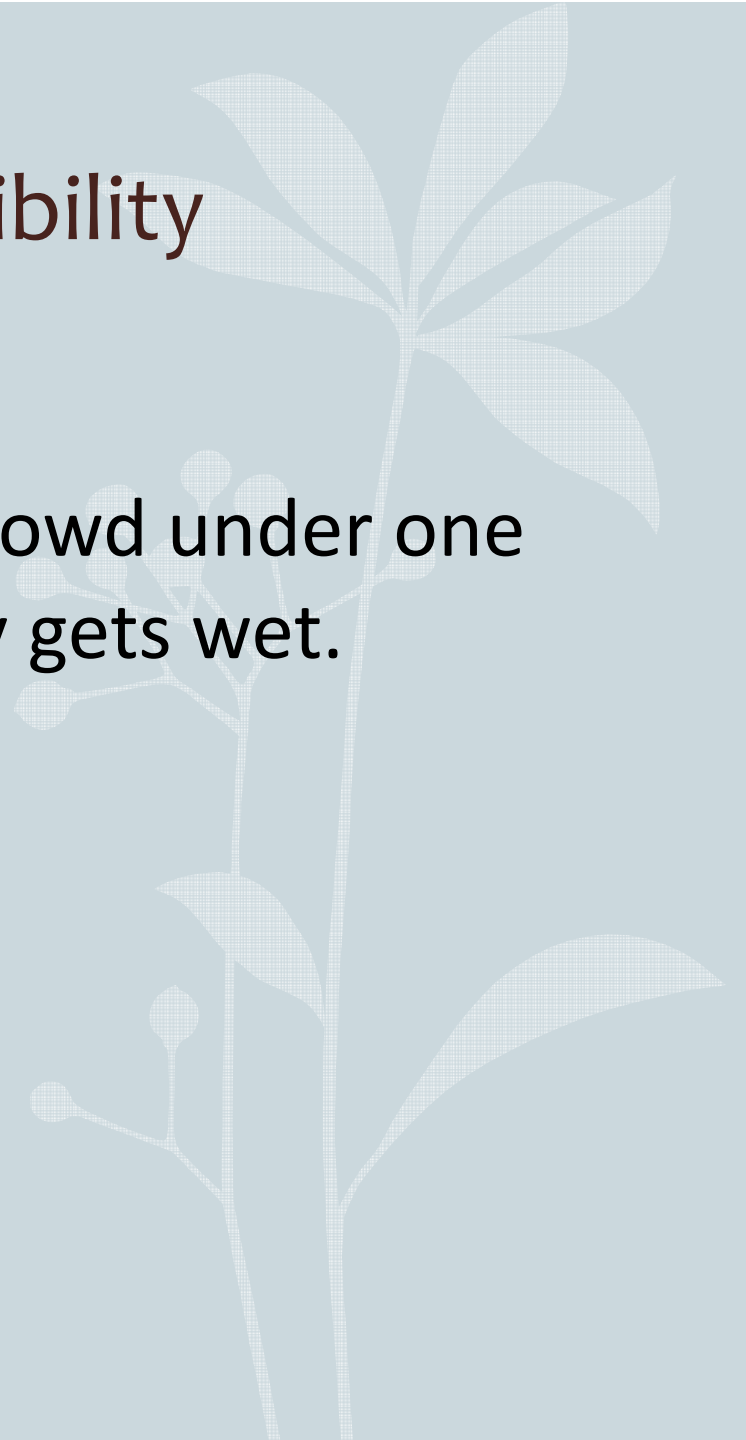
DICE DICE



Developing Cognitive Flexibility

Three large people try to crowd under one small umbrella, but nobody gets wet.

How is this possible?



Developing Cognitive Flexibility



A **truck driver** is going opposite traffic on a **one-way street**.

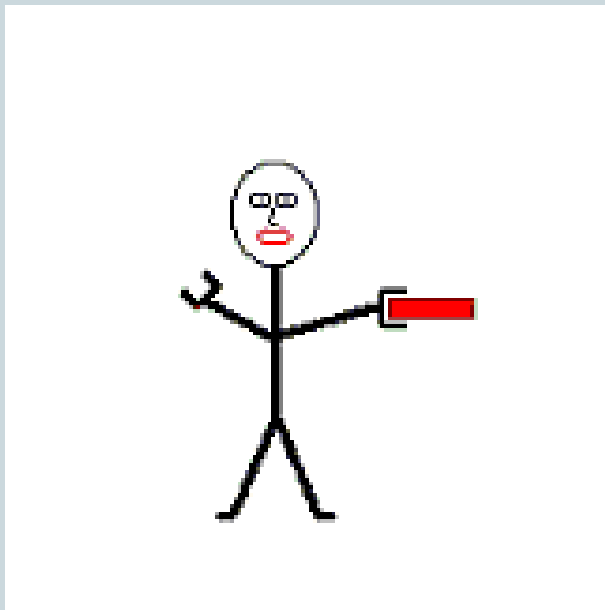
A police officer sees him but doesn't stop him.

Why didn't the police officer stop him?

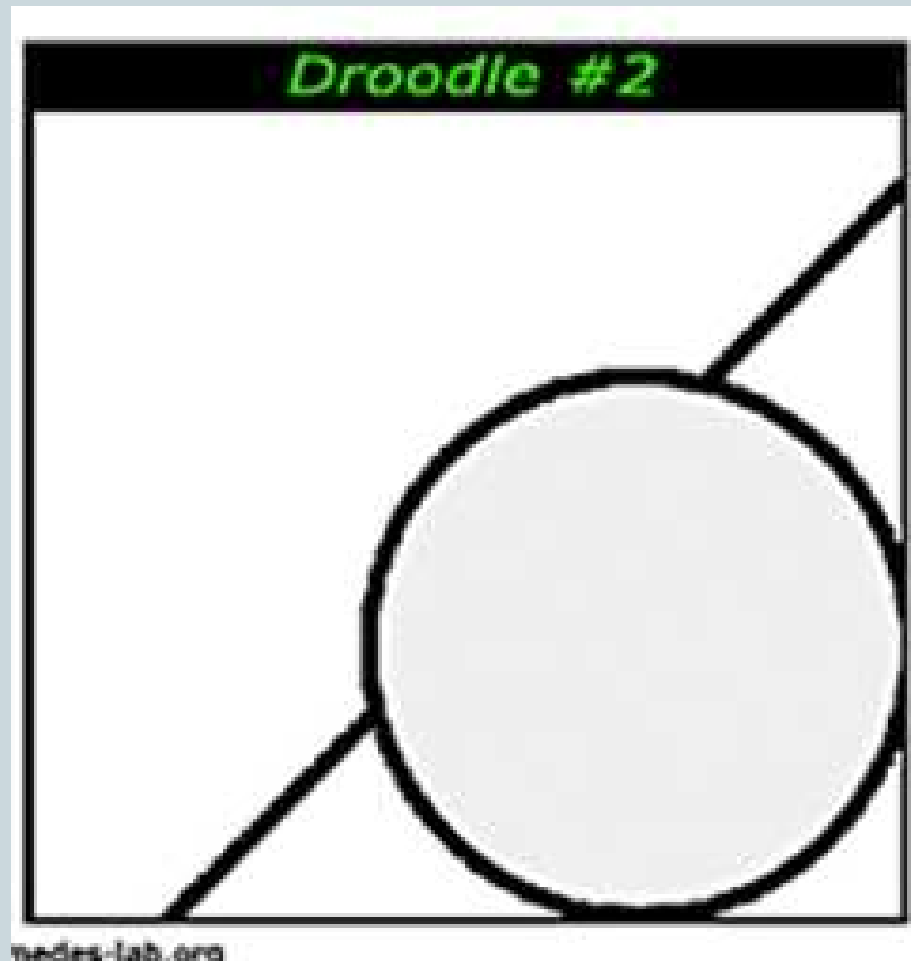
Developing Cognitive Flexibility

Man Holding Brick

What happens if he lets it go?

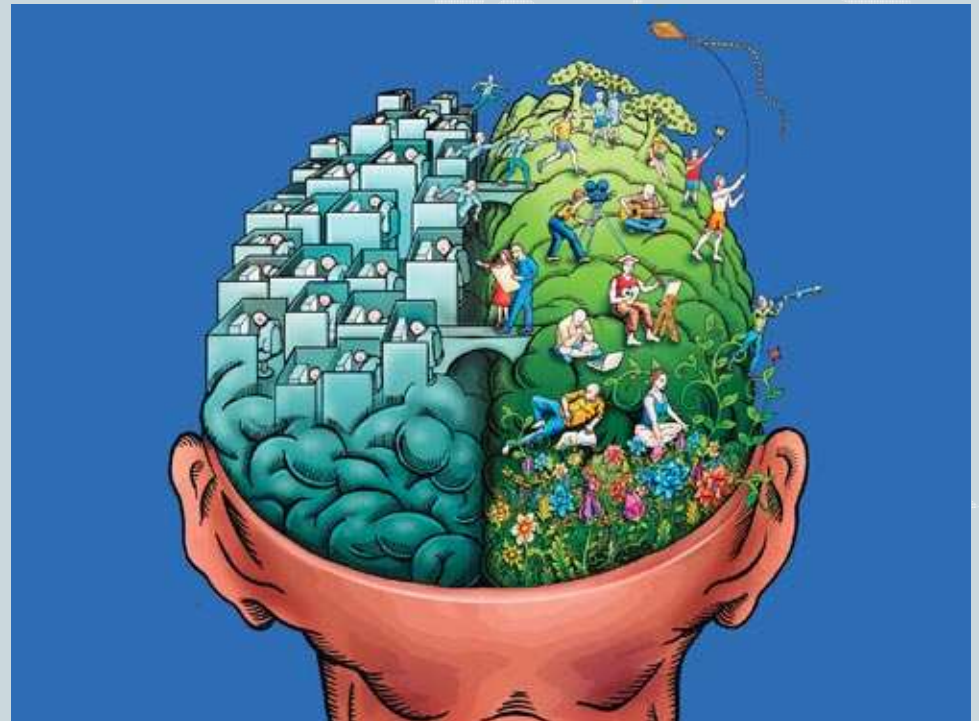
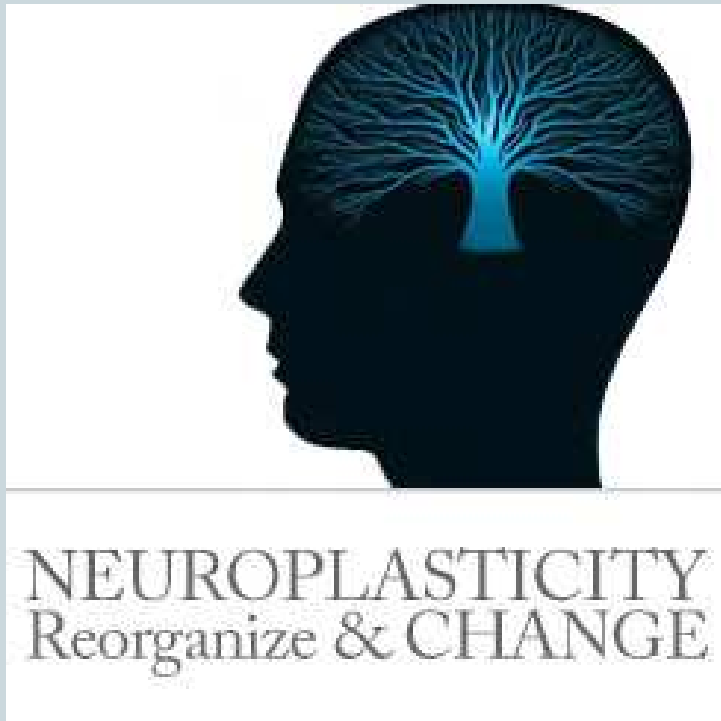


Developing Cognitive Flexibility



Developing Cognitive Flexibility

Built For Creativity?



With this in mind, how might we improve cognitive flexibility, or our ability to make new associations?

Developing Cognitive Flexibility

These activities have shown to particularly engage the right hemisphere.... (R. Ornstein)

- Poetry
- Folktales
- Spiritual Teaching Stories
- Jokes

*What does this imply about alternative paradigms of consciousness?
... About alternative languages to frame one's reality?*

What about the value of ambiguity?

Exercise – Let's practice!

An aspect of creativity is the “playing with ideas” – sketch pads, musical fiddling, free-writing, tinkering, brainstorming.

In groups, you have 5 minutes to come up with as many different possible explanations for the following...

**Q: A baby falls from a 28 story building but survives.
How did the baby survive the fall?**

When did ideas most easily come? What was the difficulty?

Creativity Part II:

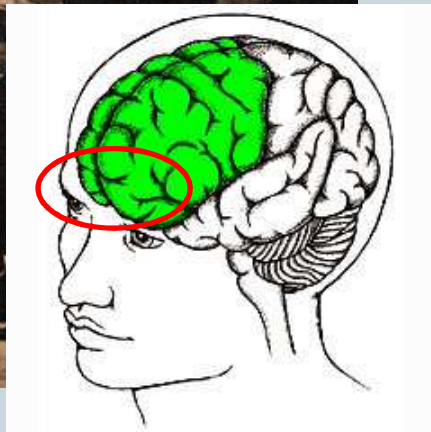
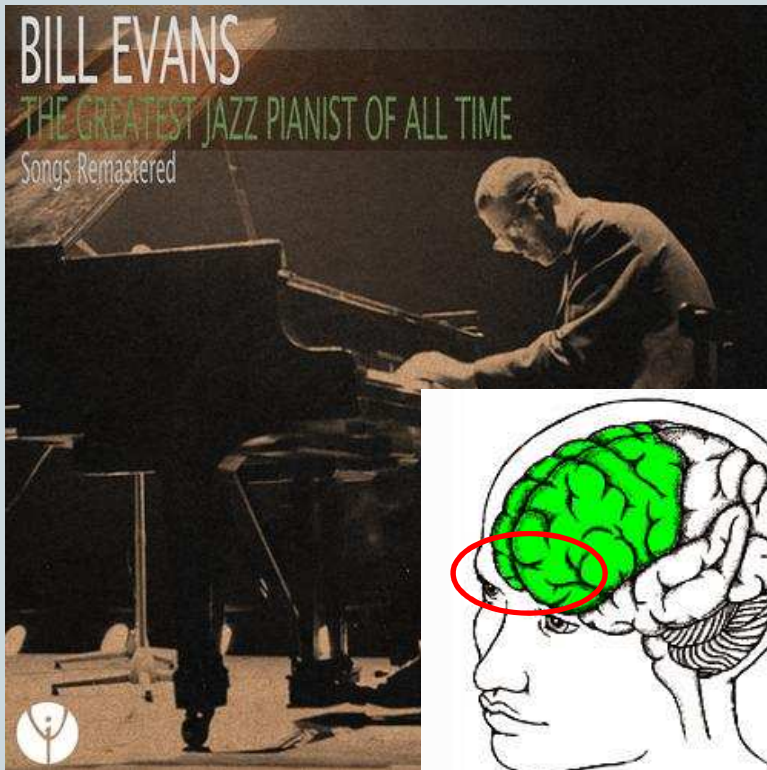
Active Ideation



2. Active Ideation

Charles Limb

(neuroscientist @ John Hopkins University)



- Jazz piano improvisers in fMRI machines
- When pianists was playing memorized tune PFC was active, including DLPFC – (dorsalateral PFC).
- But when pianists improvised, the DLPFC noticeably quiet.
- (DLPFC most closely associated with self-control)

2. Active Ideation

Bruce Miller

(neurologist @ UCSF)



- Has had patients with “frontotemporal dementia” (deterioration of frontal lobe)
- Many “lose their minds” and have difficulty functioning.
- Many extricable moved to paint, draw, sculpt
- In this condition, PFC destroyed fast: nothing repressed, impulse to self-express

2. Active Ideation

Allan Snyder

(neuroscientist @ University of Sydney)



- Experimented with transcranial magnetic stimulation (TMS).
- Used TMS to “silence” left frontal lobe to increase creativity.
- Has shown 40% increase in creative expression (particularly with visual art).

2. Active Ideation

Summary



Why might reduction in frontal lobe activity help with creativity?

- More impulsive – remember PFC is the last to develop.
- Less constraints on self-expression (which may be a constrained impulse).
 - *Less self-censorship.*
- Less directed thoughts. Easier to free-associate.

What does this say about what we may need to do to be more creative?

Who does this naturally?

Exercise – Beyond an active search...

Dunker's Candle Problem:

Fix a lit candle on a wall (a cork board) in a way so the candle wax won't drip onto the table below.

You only can use the following:

- A book of matches
- A box of thumbtacks

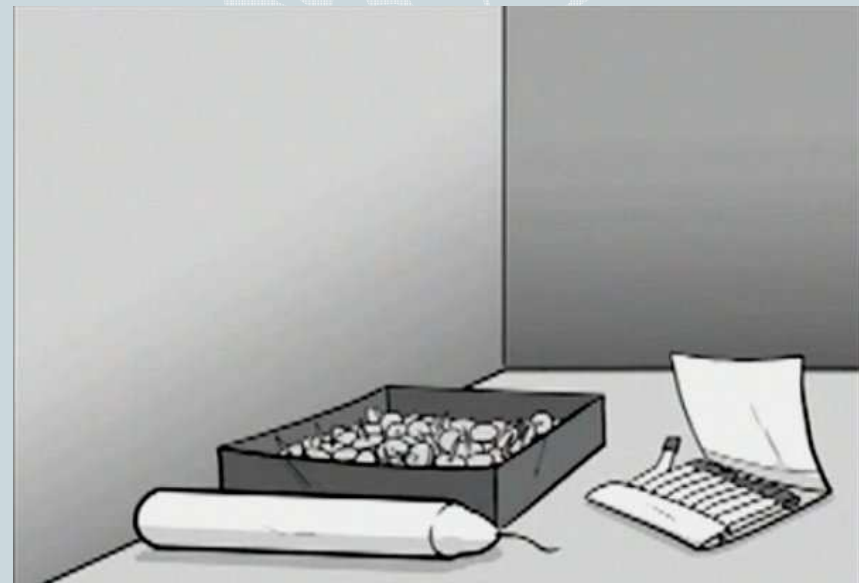
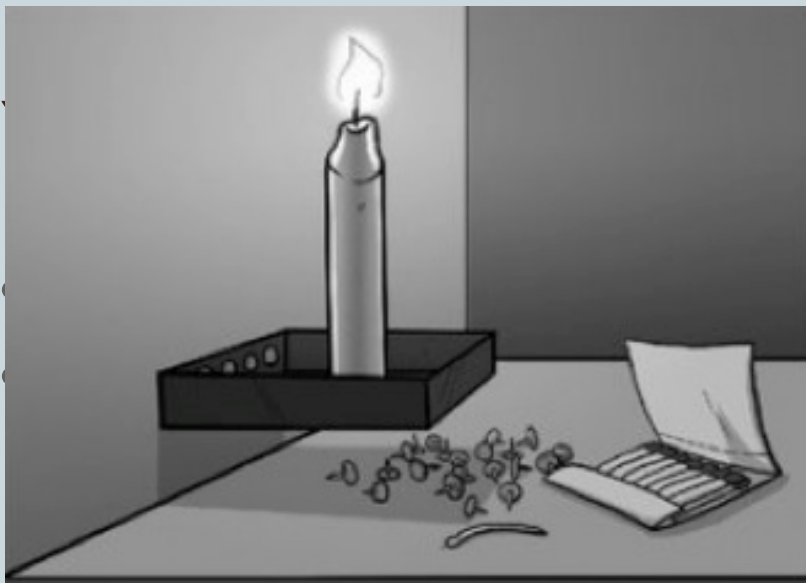
Solution often arrives as a sudden flash of insight.



Exercise

Dunker's Candle Problem:

Fix a lit candle on a wall (a cork board) in a way so the candle wax won't drip onto the table below.



How does this happen?



Creativity Part III:

Passive Ideation – Creative Insight

(What do the following studies imply about insight?)

3. Passive Ideation – Creative Insights

Clue #1

Jonathan Schooler

(psychologist @ UC Santa Barbara)

A giant inverted steel pyramid is perfectly balanced on its point. Any movement of the pyramid will cause it to topple over. Underneath the pyramid is a \$100 bill.

How do you remove the bill without disturbing the pyramid?

- Using specially designed glasses, could show “clues” to one hemisphere.
- When clues given only to left hemisphere, insights did not occur as quickly compared to when given to the right.
- Clues included quick appearing sentences with the word fire and suggestions to think about the meaning of remove.

3. Passive Ideation – Creative Insights

Clue #2

Mark Beeman & John Kounios

(psychologist @ Northwestern U & Drexel University resp.)

Wanted to **see** where insight happens (using fMRI & EEG).

What is the difference between traditional analysis vs. creative insight?

What word can form a compound word or phrase with each of the following three:

age, mile, sand

- Noticed initial activity in left hemisphere. Then dies off when person feels “stumped.”
- When insights occurred, noticed spike/burst in gamma waves (high frequency) right before person feels epiphany.

3. Passive Ideation – Creative Insights

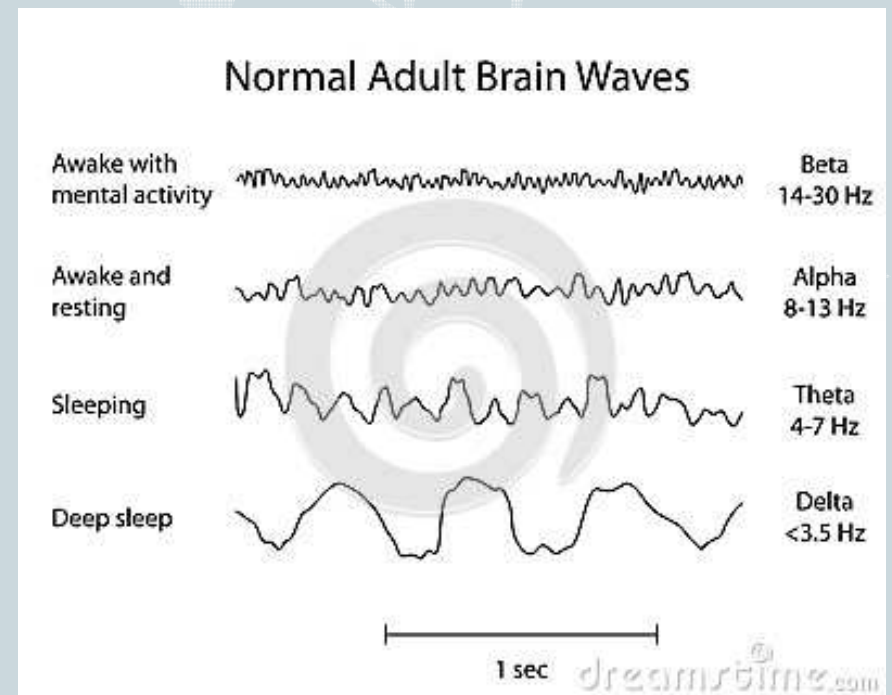
Clue #3

Mark Beeman & John Kounios

(psychologist @ Northwestern U & Drexel University resp.)

Was eventually able to predict when a person would have an insight.

– *Alpha Waves*



3. Passive Ideation (Incubation) – Creative Insights Clue #4

Study: Move a Single Line to Make the Equation Valid

$$IV = III + III$$

- A control group with “healthy” brains
 - 92% success
- A group of brain-damaged patients who had difficulty concentrating
 - 90% Success

3. Passive Ideation – Creative Insights

Clue #4

Study: Move a Single Line to Make the Equation Valid

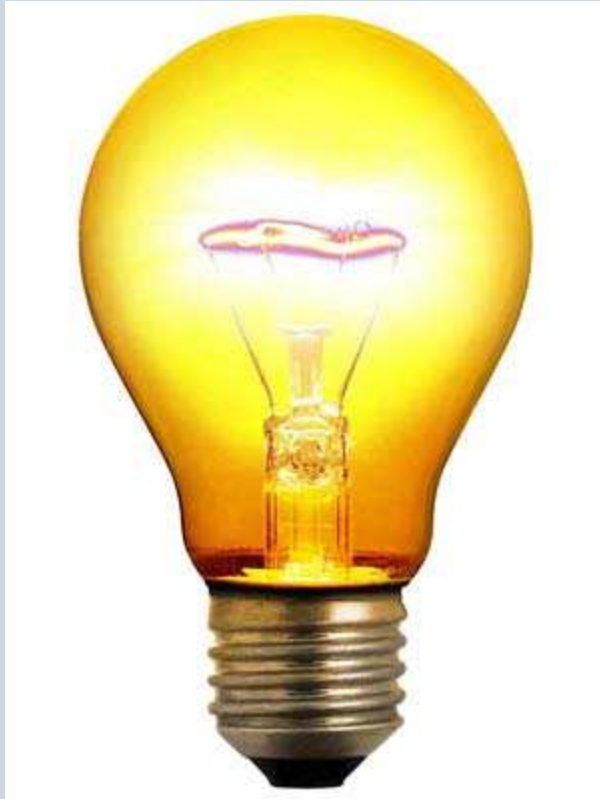
$$||| = ||| + |||$$

- A control group with “healthy” brains
 - 43%
- A group of brain-damaged patients who had difficulty concentrating
 - 82% success

3. Passive Ideation – Creative Insights

Clue #5

Study: Stimulants and Insights



- Lessen chance of insight when stimulants taken (caffeine, Adderall, Ritalin)
- “But it helps me!” – What this might do is help you in the manifestation of an idea, where focus is needed.
- Stimulants can help with focusing: but that’s the problem.
 - We don’t want focused attention for insight, we want *defocused attention*.
 - Lessens our ability to make new wide neural associations.

3. Passive Ideation – Creative Insights

What does all of this imply?

The Need for Relaxation & Defocused Attention

Wider Span of Neural Networks



- Various examples of inspiration while sleeping, or while stepping away...
- Various examples of “aha!” while relaxing.
- Thomas Edison and his metal balls.
- Think of the spotlight of attention...
 - Needs to be turned inward, free to “hear” ideas from the right hemisphere, rather than focusing on the “problem”

Why is this hard? What does this say about what we may need to do to be more creative?


How can this be related to spiritual teachings?

But is creativity supposed to be easy?

“Genius is 1% inspiration and 99% perspiration!”

- Thomas Edison





Creativity Part III:

Whole Brain Creativity

4. Whole Brain Creativity & Corpus Callosum

- Area very active in creativity.
- This is located centrally between the left and right hemispheres of your brain.
- It is a bundle of fibers that connects the left and right hemispheres.
- Insights may occur in right hemisphere, but images show activity in the left hemisphere just when ideas are articulated. Why?

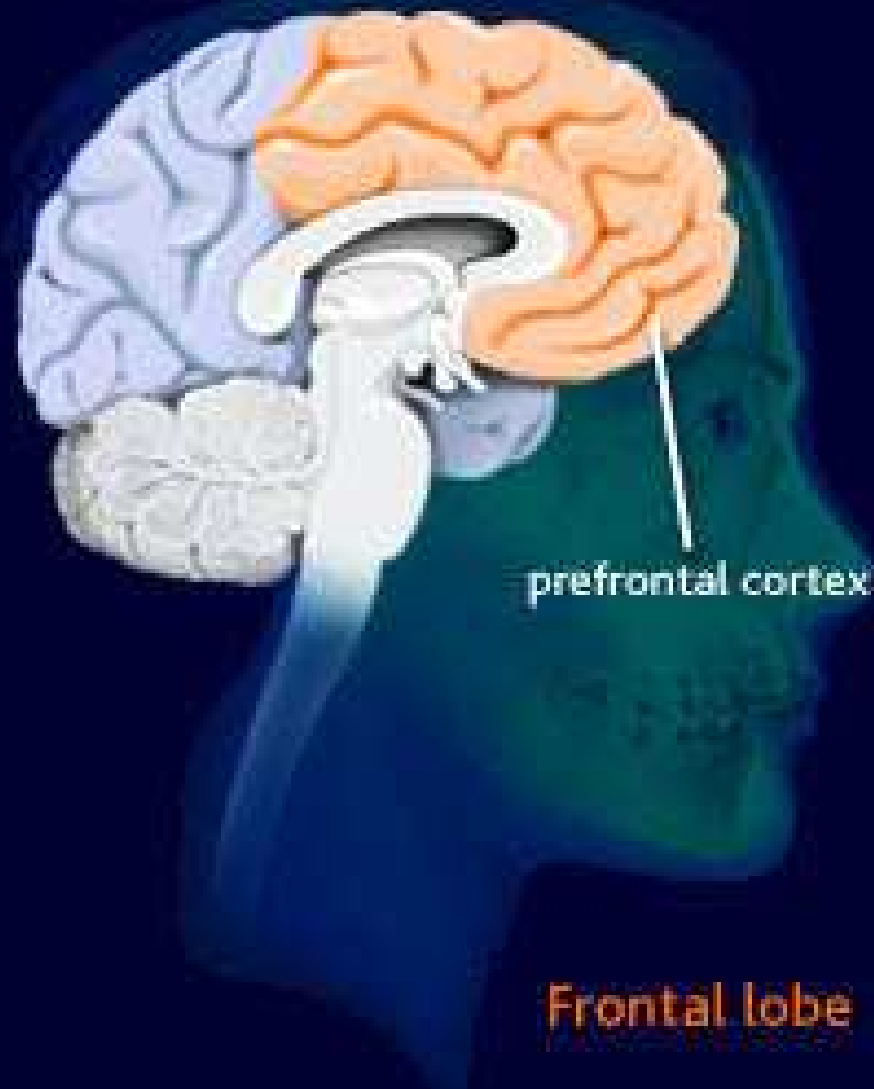


4. Whole Brain Creativity & Left Frontal Lobe

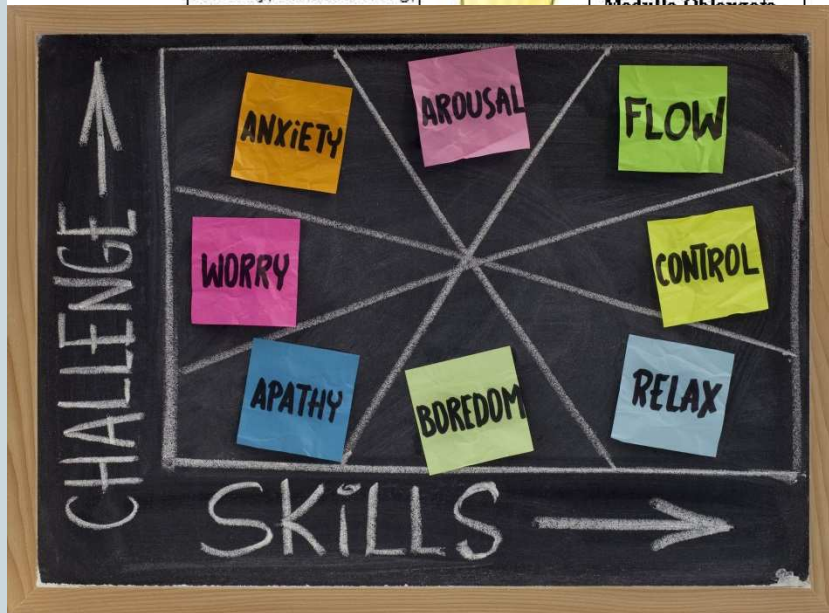
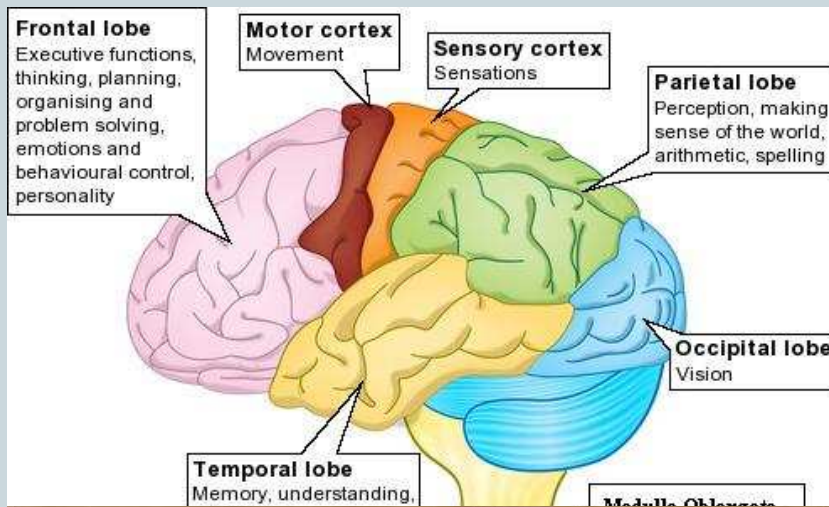
The prefrontal cortex contributes to creative thinking in at least three ways.

Can you think of them?

1. Necessary for judgment about an idea or solution
2. Assists with necessary integrations after an insight occurs
3. Assists with idea implementation



4. Whole Brain Creativity & Flow



Did you feel moments when you were in Flow? Explain.

Why might it be easier here, in this activity?

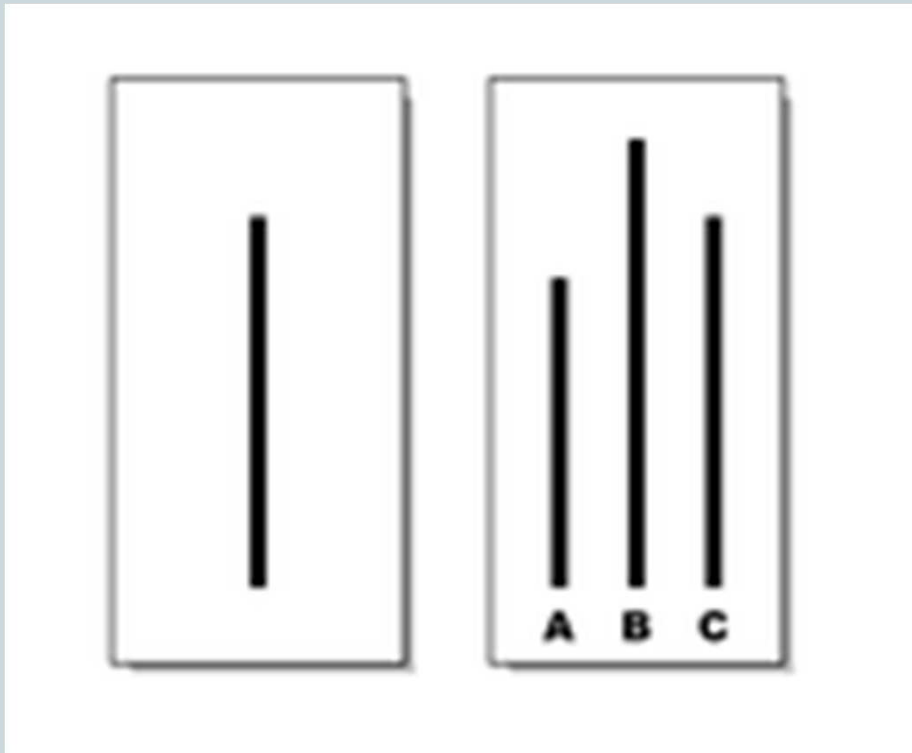
1. One with the activity
2. Distractions excluded from consciousness
3. Times flies by
4. Balance of challenge & skills
5. Continuous feedback
6. Clear goals (You gave it to yourself: your aesthetics)
7. Autotelic – did it for it's own sake.

Studies show intrinsic motivation more beneficial to insights & new ideas.

8. **No worry of failure**
9. **Self-consciousness disappears.**

Creative Social Conformity

Solomon Asch Conformity Experiment (1950s though replicated afterwards)



- 75% of people conformed at least once.
- When another agreed with them, percentage is only 5%
- What does this say about what is needed sometimes for creativity?
- Courage &/or Support