



Creativity and Expertise



Creativity

- Some areas of cognitive research
 - What is creativity and how is it assessed?
 - Why is being creative “difficult”?
 - Mood, motivation, and experience
 - Neuroimaging/fMRI studies



Creativity

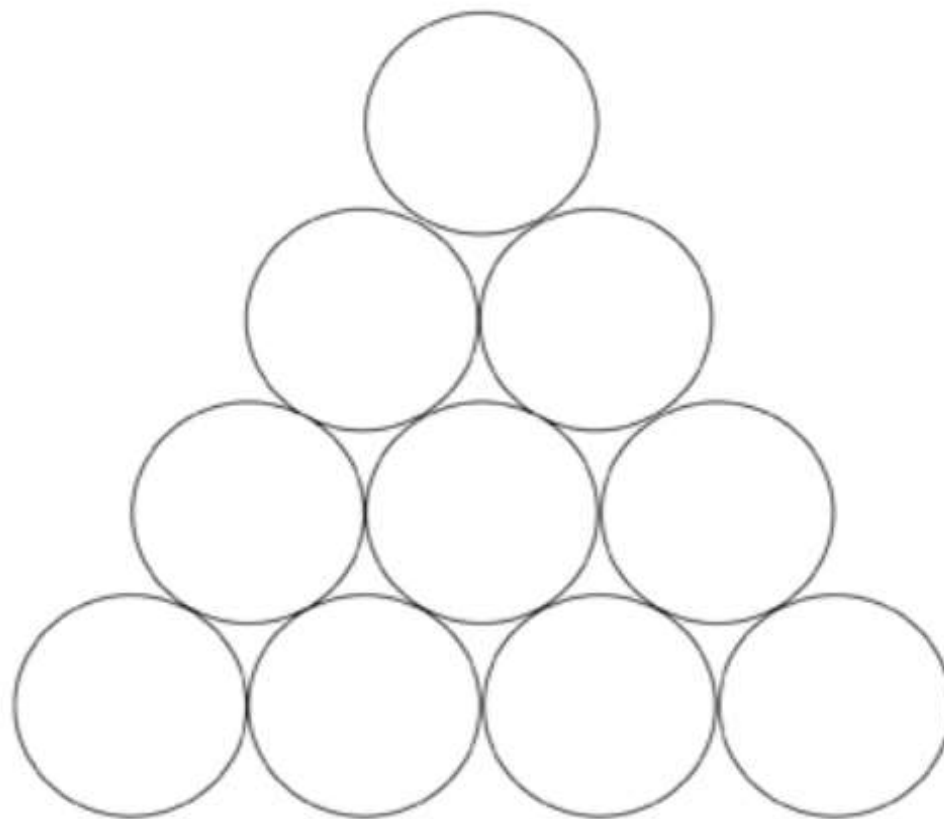
- **Convergent thinking**

- Finding the “correct” answer to a task or challenge

- **Divergent thinking**

- Mental process of generating many possible solutions to a task or challenge

This triangle is constructed from 10 coins.



What is the smallest number of coins that need to be moved to make the triangle point downward?

Board



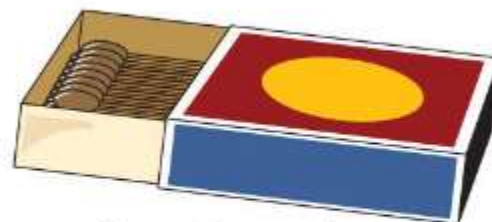
Thumbtack



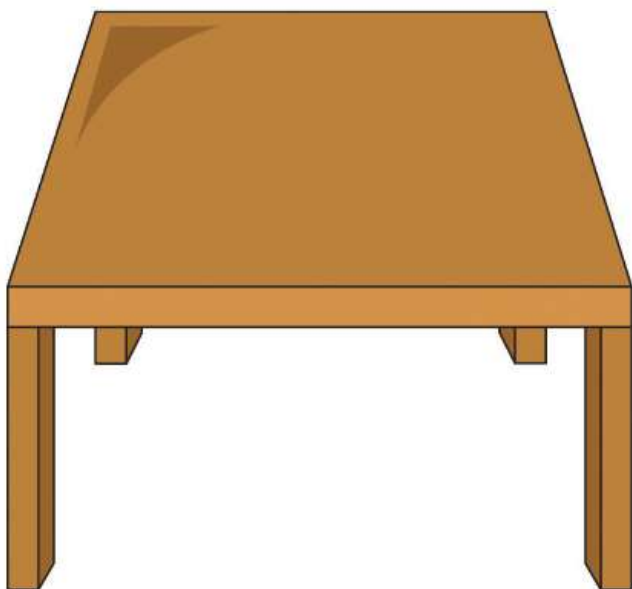
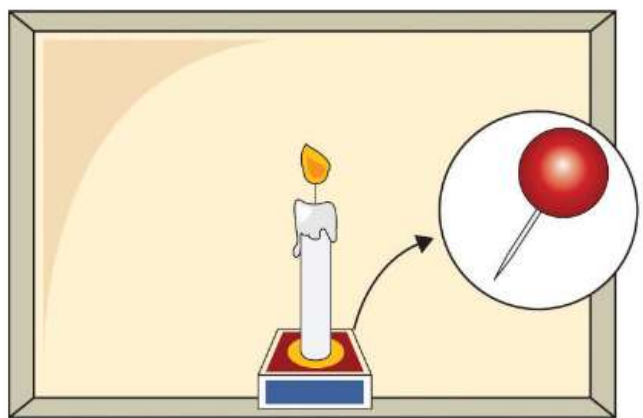
Candle



Table



Box of matches



Many words begin with the letter L and end with N.

In 1 minute, list as many words as possible that form L ____ N.

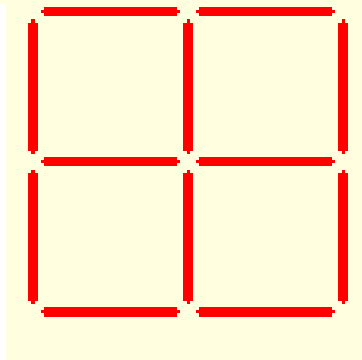
Words can have any number of letters between the L and the N.

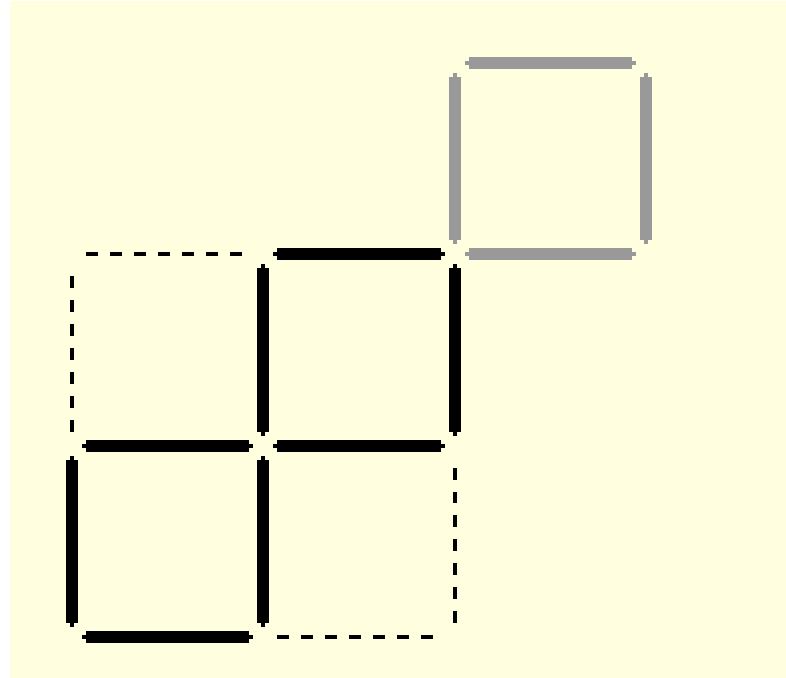
How many uses can you think of for a spoon?

You have two minutes.....

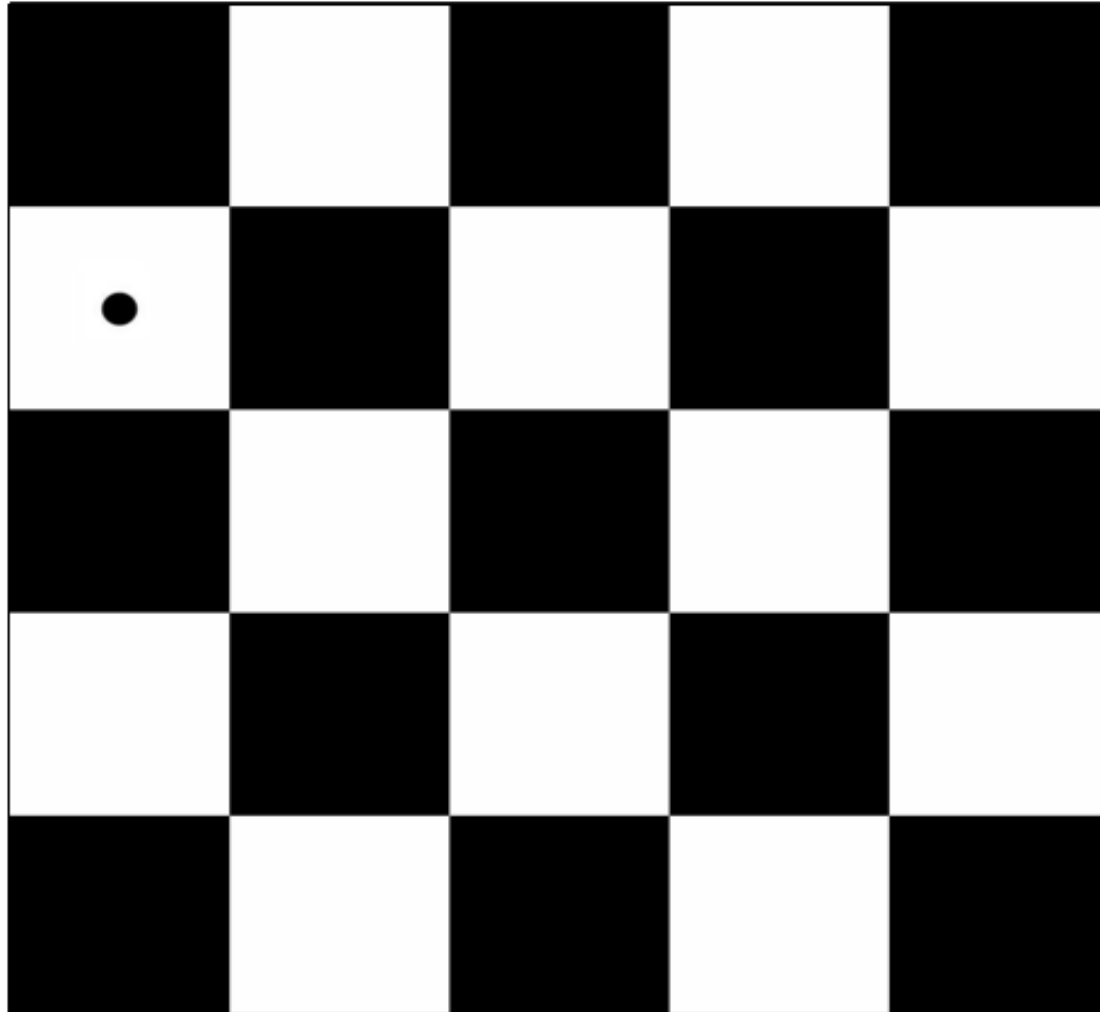
Twelve sticks form four equal squares.

How can exactly four sticks be moved to make three equal squares?

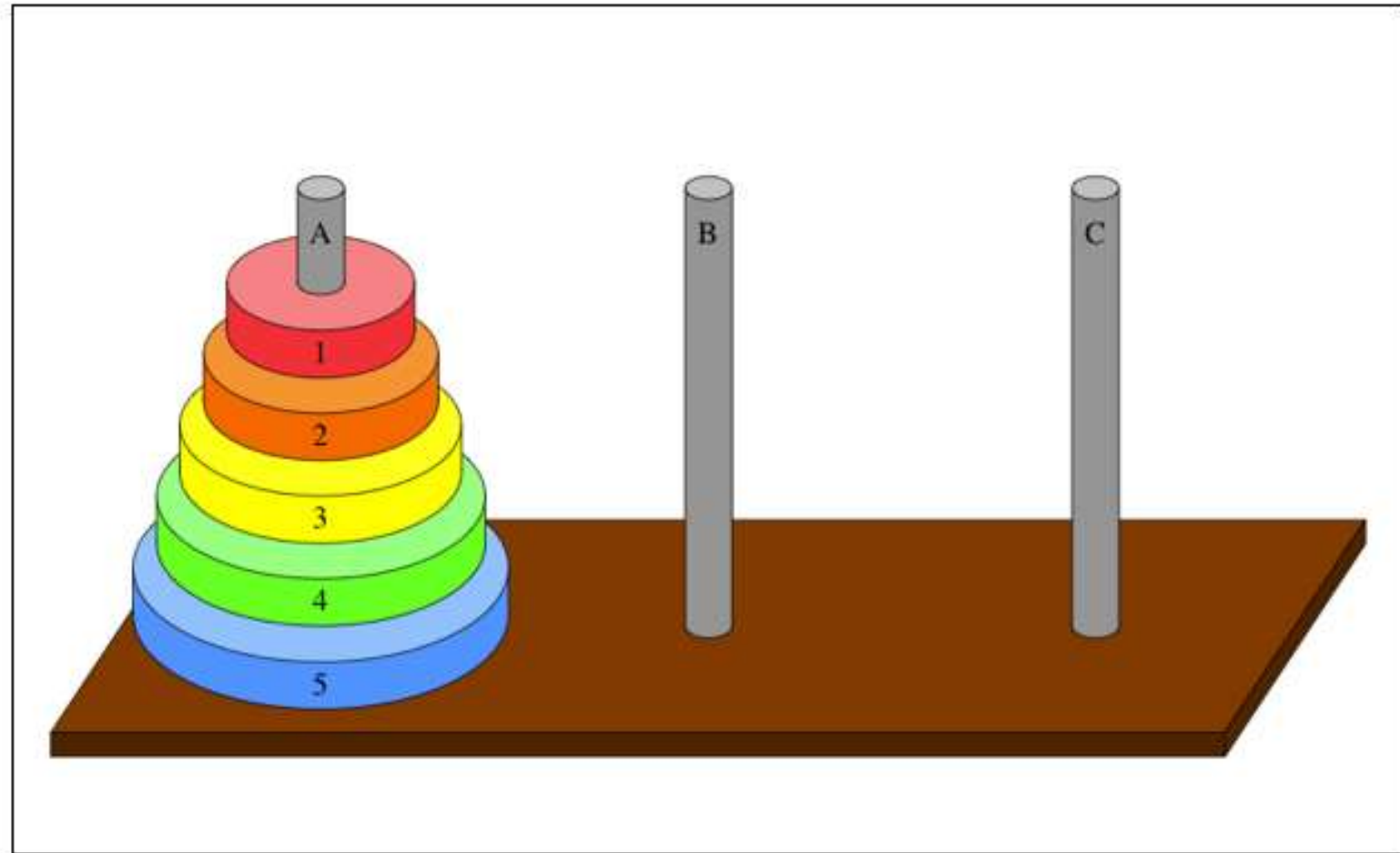




The 5x5 Checkerboard Problem



Tower of Hanoi



For each trio of words, think of a 4th word that is related to each of the first three.

Example: for the trio "snow, down, out" the answer would be "fall"
(snowfall, downfall, fallout)

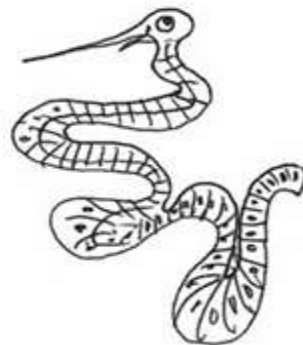
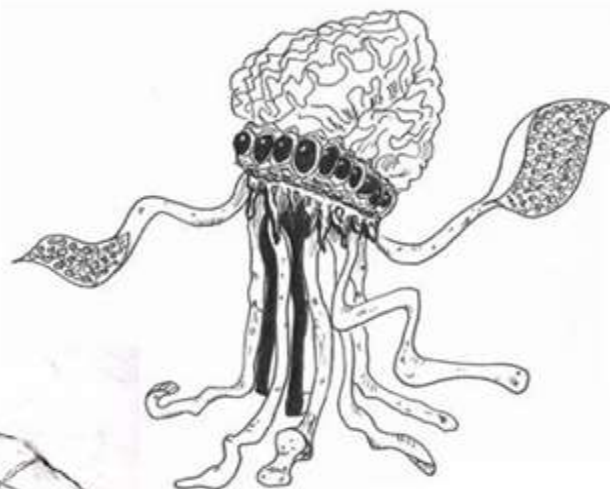
- | | | |
|----------|-------|-------|
| 1. off | top | tail |
| 2. ache | sweet | burn |
| 3. arm | coal | peach |
| 4. gravy | tug | show |



Creativity

- Dimensions of creative thinking
 - *Fluidity* - number of ideas
 - *Flexibility* - number of content category shifts
 - *Originality* - novel ideas

Draw a creature you think might be found on a planet
very different from Earth





Why is it difficult to be creative?

- Creativity requires the generation of something new based on knowledge
 - Many new concepts at least partially rooted in pre-existing schemas
- Time constraints
- Perceptual barriers




Why is it difficult to be creative?



- Motivation

- **Extrinsic motivation** promotes creative thinking....to a point (then it becomes inhibitory)



Exchange Rates: Extra Lives

1  = 

100  = 



EXTRINSIC REWARDS

They are rewards that come from the outside: a set of techniques, design patterns and **mechanics** for users' curiosity, motivation, and behaviors.

They are tangible, expected, and arguably gimmicky. They are the distracting carrot.



ACHIEVEMENTS

Awards
Trophies
Badges



PROGRESS

Levels
Score
Points



CONTENT

Quests
Missions
Virtual Goods



REPUTATION

Leaderboards
Ranking
Rating



Why is it difficult to be creative?

- Motivation

- **Intrinsic motivation** promotes creative thinking



WHAT DO YOU SAY?

A-MEANINGFUL CHOICE.

B-MEANINGFUL CHOICE.

C-MEANINGFUL CHOICE.







Why is it difficult to be creative?

■ **Personality**

- (a) Certain “predispositions” better achieve creativity?
- (b) Curiosity and task persistence as traits?
- (c) Additional factors
 - Need for cognition, need for achievement, tolerance for information overload

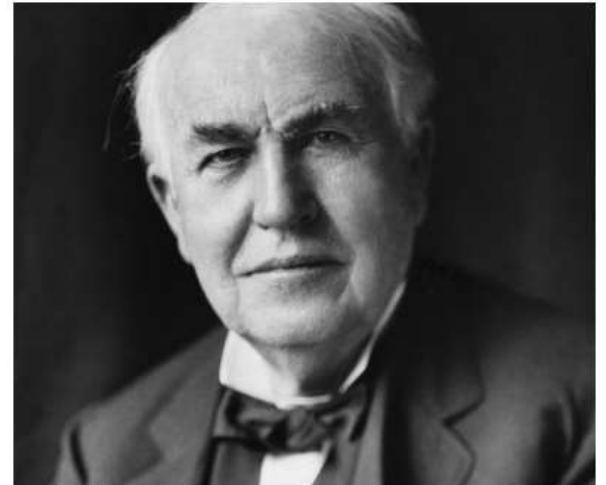


Why is it difficult to be creative?

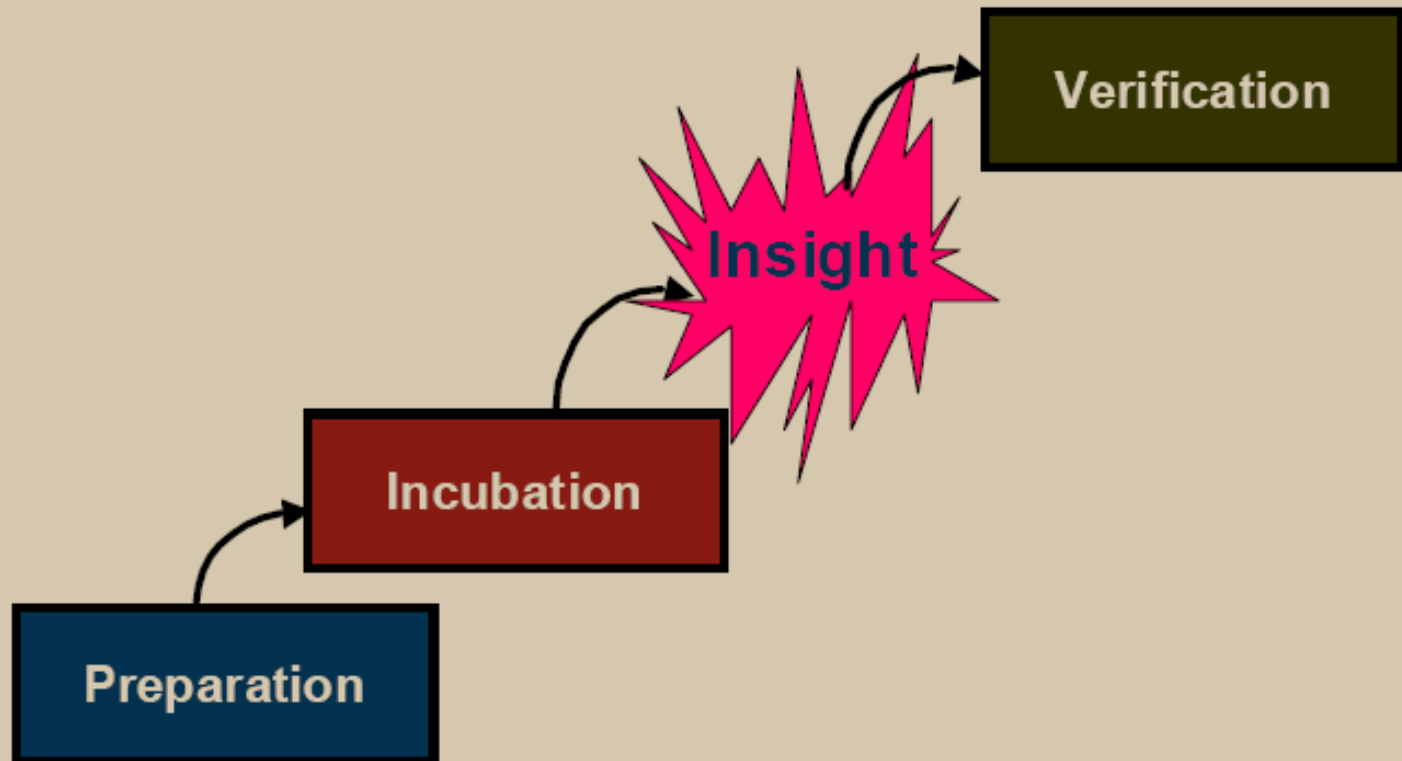
- The brain likes convention
 - Reliance on existing schemas and heuristics
 - Many behaviors are habitual and automatic
 - Environmental factors

Creativity

- New ideas are hard work
 - *Ex:* Thomas Edison
 - Gathered group of engineers to develop light bulb
 - Tested and re-tested materials
 - Thousands of hours
 - Many ‘failures’



Creative Process Model

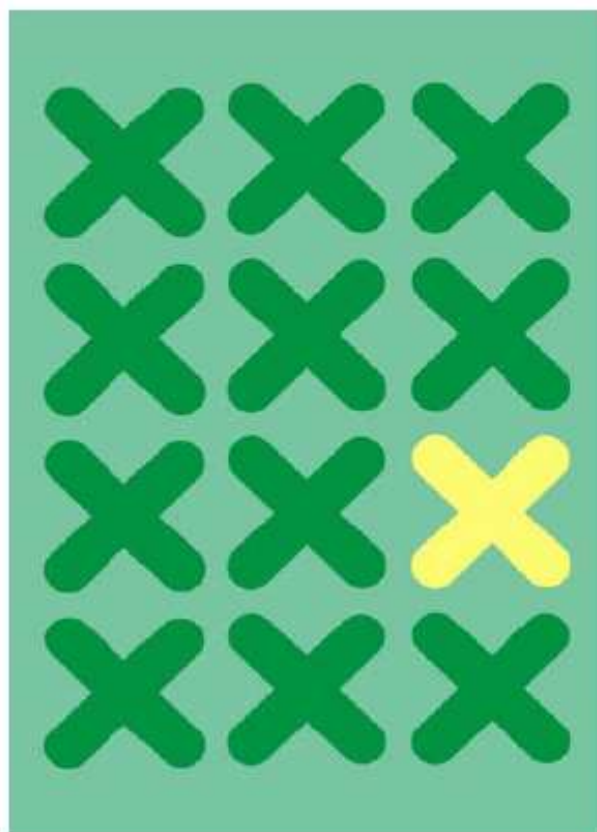




Creativity

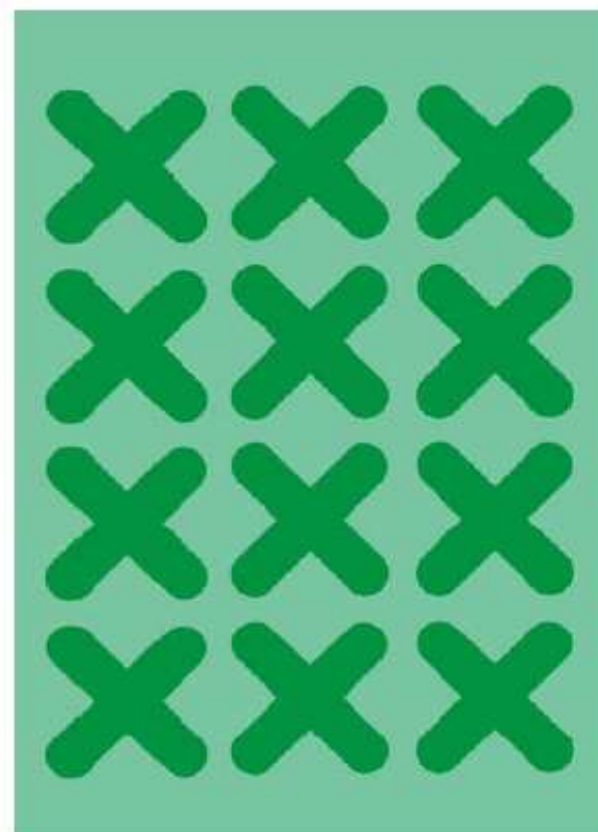
- Activating creative thinking (Forster et al, 2005)
 - Finding creative uses for everyday objects
 - *Independent variable*: Poster type
 - *Dependent variable*: # and originality of ideas





Number of ideas
Creativity of ideas

7.18
5.04



5.53
4.62

(Förster et al, 2005)



The “Four C Model” of Creativity

- *Mini-c*: transformative learning
- *Little-c*: everyday problem solving
- *Pro-c*: professionally creative
- *Big-c*: the ‘creative giants’