



GE105  
Introduction to Engineering Design  
College of Engineering  
King Saud University

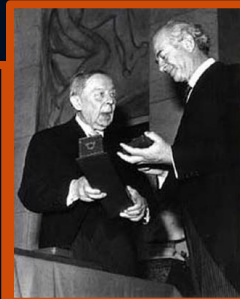
# Lecture 8 Creativity: Thinking Outside the Box

2014-2015

## Before We Start

"The best way to have a good idea is to have **a lot of ideas.**"

Linus Pauling (Nobel Laureate)



"Nothing is more dangerous than an idea when it is the **only one** you have."

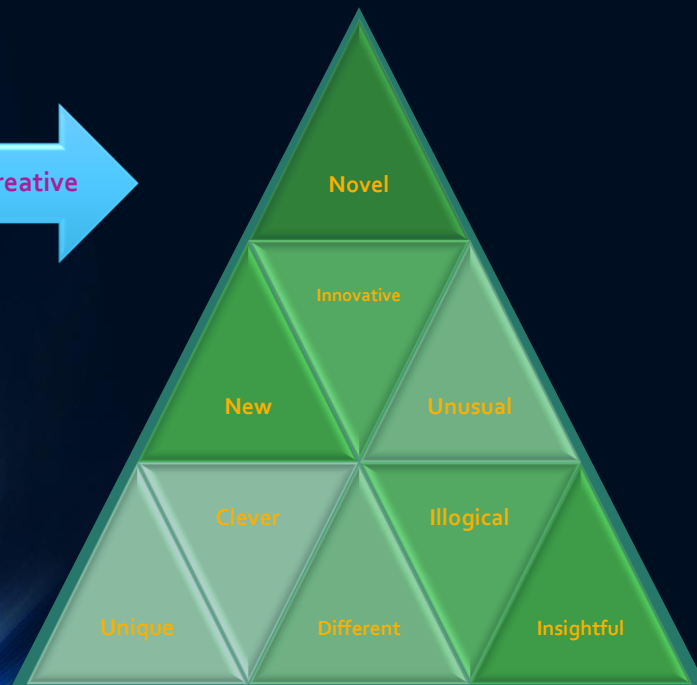
Emile Chartier (French Philosopher)

## Creativity

- A mental process involving the generation of new ideas or concepts, or new relations between existing ideas or concepts
- It is both: an *art* and a *science*
- It is doing things in a “non-normal” way



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Creativity

Innovation

Invention

**Creativity** is the capability or act of conceiving something original or unusual.

**Innovation** is the implementation of something new.


**Invention** is the creation of something that has never been made before and is recognized as the product of some unique insight.

Creativity is a skill; innovation is a process

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## Thinking Outside the Box

A “box” confines and **restricts thinking**.  
A creative person is not confined to a box, but sees opportunities outside the box.



**Creative thinking**  
**(Lateral)**

- Divergent
- Right brain (global, parallel, emotional, subjective)
- Synthesis

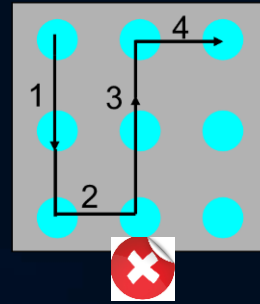
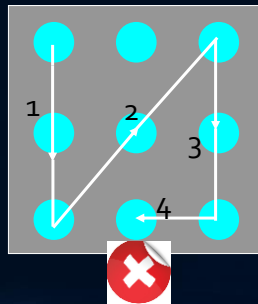
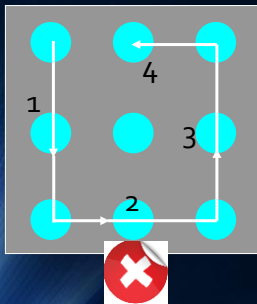
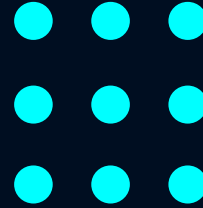
**Critical thinking**  
**(Logical)**

- Convergent
- Left brain (analytic, serial, logical, objective)
- Evaluation

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## Lateral Thinking Example

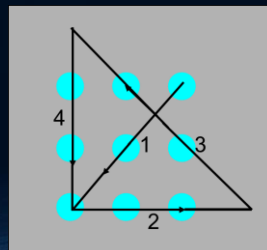
- Without lifting your pencil from the paper, draw four and only four straight lines that connect all nine dots



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If you did not get the correct answer that is because:

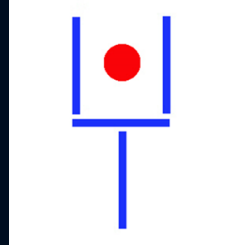
- You used logic ; you did not think outside the box
- You may have assumed that you needed to stay within the boundaries
- You made false assumptions in order to fit the problem to your previous experience



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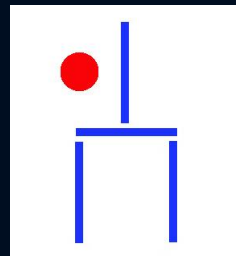
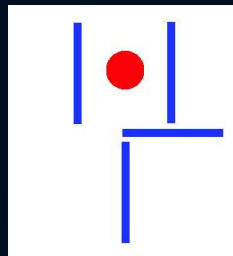
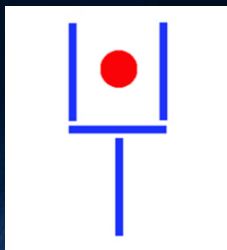
## Another Example

Think of this as a shovel with a coin inside. Move just **two sticks** so that the coin is no longer inside, but there is still a shovel.



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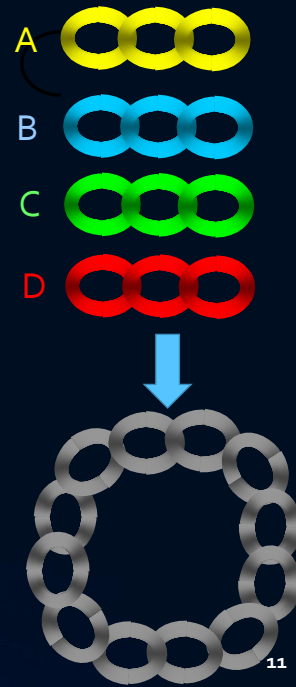
Using **lateral thinking** and thinking **outside the box**, you should get:



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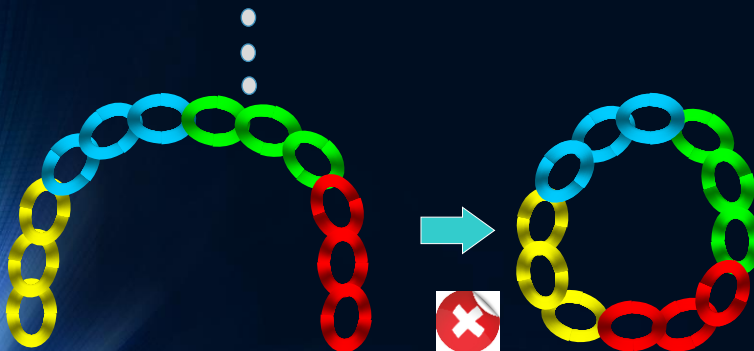
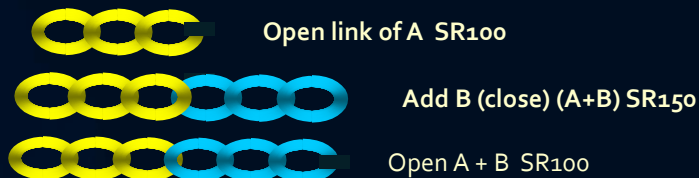
## A Final Example

- You are given 4 separate pieces of chain that are 3 links in length, each
- It costs **SR100** to open a link and **SR150** to close a link
- All links are closed at the beginning of the problem
- Your goal is to join all 12 links of chain into a single circle
- Your total budget for forming the single circle is **SR750**.



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## Solution (not creative/not correct)





**TOTAL SR1000!**  
Not 750


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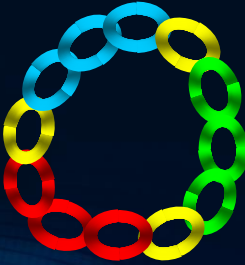
## Creative Solution

Break the assumption that when you open a link, you are limited to inserting only one link into the opening


Step 1:  Open all links in A SR300

Step 2:  Use A to combine B+C SR150

Step 3:  Use A to combine D SR150

Step 4:  Use final link to combine chain SR150

**Your assumption eliminated the solution**




**TOTAL \$750!!!**

## Outside the Box Thinking


To be creative you need to be able to view things from **different perspectives**; you must have **flexibility** and a **tolerance** of ambiguity!

### Mental locks



- There is one right answer
- That is not logical
- Follow the rules
- That is not my area
- Don't be foolish
- To err is wrong
- I am not creative
- Premature Judgment

### Mental Unlocks

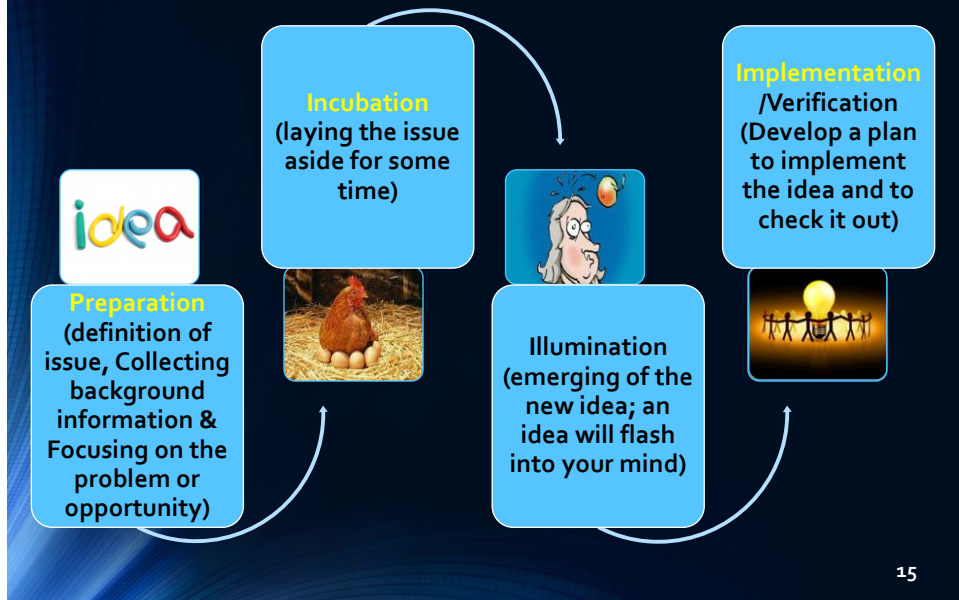


- Think Laterally
- Don't impose assumptions
- Work when your mind is fresh
- Work fast and short periods
- Focus
- Push hard
- Have fun
- No fear

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## Creativity as a Process



## Characteristics of Creative People





## Some Final Thoughts

- Creativity must be experienced, to be understood
- Hints to becoming more creative
  - Hangout with creative people
  - Practice mental drawing
  - Keep a journal
  - Keep an open mind
  - Maintain a positive attitude
  - Try new things
  - “Think Outside the Box”
  - Practice creativity-enhancing exercises
  - Stay alert for opportunities

