

# CREATIVITY AND YOGA

**Presenter**

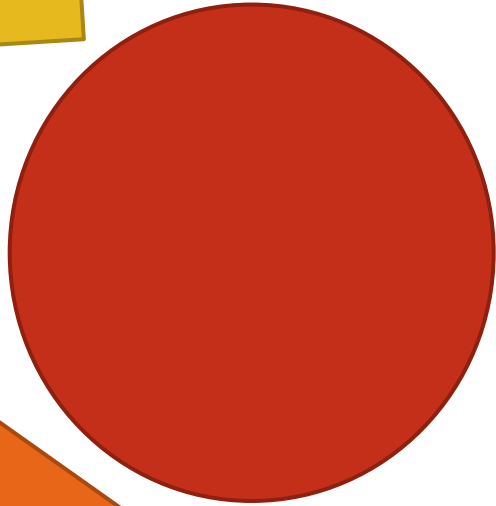
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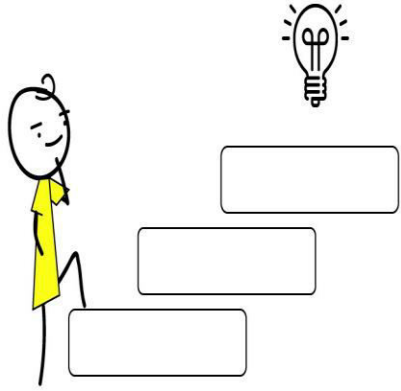
# OUTLINE

- ▶ Basics - definition, basis and benefits of creativity.
- ▶ Approaches to measure creativity - Scales and tests used.
- ▶ Elements involved in creativity - Mental process and creativity - Neurobiology
- ▶ Meditation may enhance creativity - Neurobiology.
- ▶ Methods to improve creativity.
- ▶ Methodological issues.
- ▶ Future direction.
- ▶ Yoga and Creativity.



**TASK:  
CREATE AS  
MANY  
ITEMS U  
CAN**





# BASICS OF CREATIVITY

# DEFINITION

- ▶ ‘*Creatio*’ came to designate God's act of "creation from nothing."
- ▶ Production of something both novel and useful.
- ▶ Ability to produce original, unusual, flexible, and valuable ideas or behaviours that override an established mental habit (Stein, 1953; Martindale, 1999; Runco and Jaeger, 2012).
- ▶ Creativity is the highest form of application of intelligence (Gardner, 1983)
- ▶ Creativity is the act of connecting things in unexpected ways. (Jason, 1997)

# DEFINITION

- ▶ A sense of wonder that invites exploration and the discovery of new possibilities.
- ▶ Sense of wonder sparked by a need, a problem, an opportunity, a request, an assignment, and even pure inspiration. (Beverly Davis)
- ▶ Creativity is any act, idea, or product that changes an existing domain, or that transforms an existing domain into a new one. (Robert E. Franken)
- ▶ Giving the world something it didn't know it was missing. (Daniel Pink)
- ▶ A work is said to be creative if it is original and purposeful and is in harmony with other human purposes and values. (Gruber)

# BASIS OF CREATIVITY

- ▶ **Novelty and appropriateness**

(Morgan (1953), Sternberg and Lubert (1995)).

- ▶ The tools and product - plastic injection into bodily tissue to preserve human tissue
- ▶ The people - Some people are born creative; some seek guidance
- ▶ The motivation - and/or the processes - it can be sometimes due to pressure
- ▶ Novelty and appropriateness - destructive way is **not** creativity.

# BENEFITS OF BEING CREATIVE

- ▶ *Creative thinking* - solve problems with a new perspective.
- ▶ *Creative practices* - exacerbate emotional scars before transformation or release.
- ▶ *Creative process* - may begin with hardship - understand the relationship between hardship and creativity.
- ▶ **Creativity - enhances mindfulness and vice versa.**
- ▶ *Creativity* - heals - increases the ability to manage intense feelings.



Present Media



# APPROACHES TO MEASURING CREATIVITY

Instruments	Focus	Advantage	Weaknesses
Wallach-Kogan Creativity Tests; Torrance Tests of Creative Thinking;	<b>Creative processes or skills</b> associated with creativity	Widespread utility <b>High reliability</b> Standardized criteria for interpreting scores	<b>Limited scope of measurement</b> conflicting evidence for validity
How Do You Think? Creative Personality Scale and How Creative Are You?	<b>Personality traits</b> or creative achievements	Ease of use <b>High reliability</b> Standardized criteria for interpreting scores	Limited scope of measurement Low validity of self-reports
Creativity Assessment Packet	<b>Creative products</b>	Similar to evaluating creativity in real-life <b>High reliability</b> High validity	Limited scope of measurement Difficulty in selecting judges Bias due to judges Expensive and time consuming Lack of standardized criteria
Siegel Scale of Support of Innovation, the Work Environment Scale	<b>Work environment</b> or climate	Explore whether a work environment is supportive or inhibitive of creativity	Limited scope of measurement Lack of research-based evidence Debate about “climate”

# FUNDAMENTAL QUESTION

1. What is the mental processes - their critical elements - process - that yield creative thoughts?

2. The underlying mechanisms (cognitive or neural) that has enabled human beings to be creative.

(Arne, 2006)



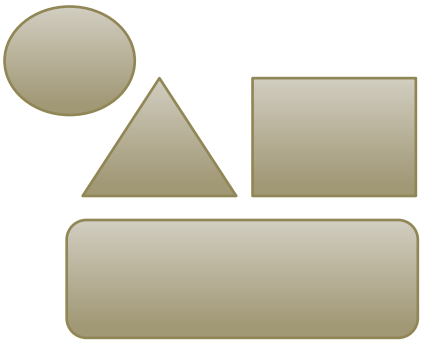
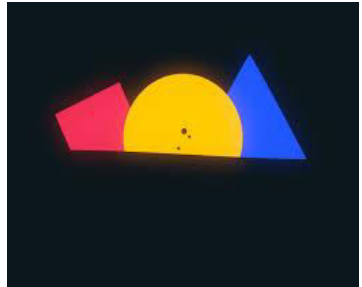
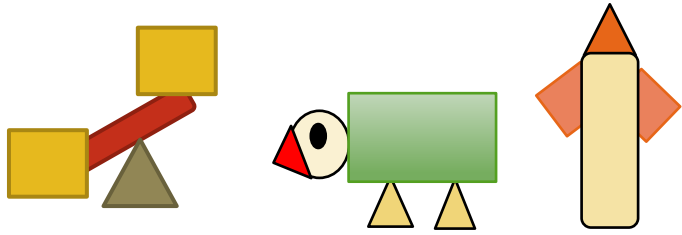
# BRAIN AND CREATIVITY

# 1. MENTAL PROCESS AND CREATIVITY

- ▶ **Preparation** - obtaining background knowledge relevant to the problem
- ▶ **Incubation** - unconscious processing of the problem - internalized
- ▶ **Intimation** - the creative person gets a "feeling" that a solution is on its way
- ▶ **Illumination** - sudden insight of doing the work in a particular way - subconscious to conscious awareness
- ▶ **Verification** - fine-tuning the work consciously - certain it works not just in theory but in practice

(Wallas, 1926)

# NEUROBIOLOGY OF CREATIVITY



**The executive attention network**

**The salience network**

Anterior insula (AI) and dorsal anterior cingulate cortex (dACC)

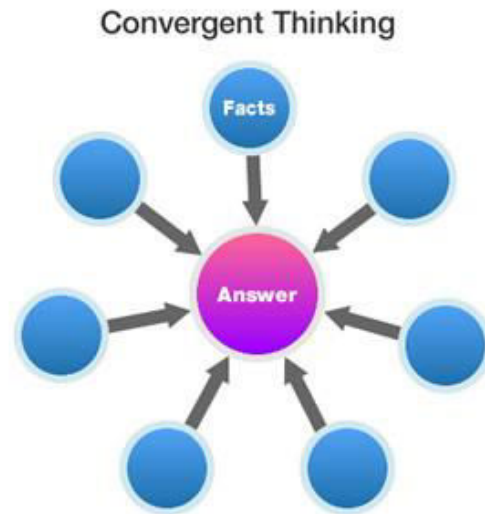
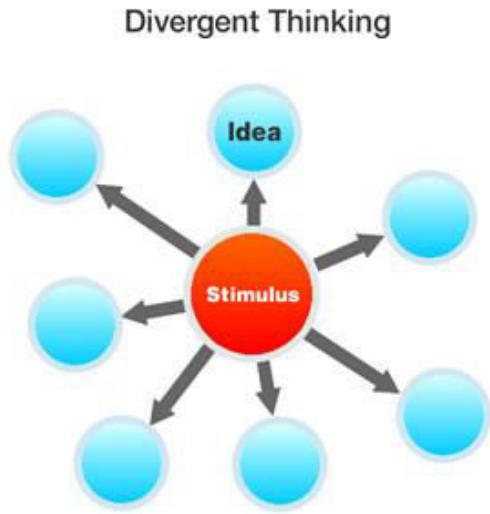
**The default network**

Amygdala, hippocampus, posterior cingulate cortex (PCC), and medial prefrontal cortex (mPFC)

**The executive attention network**

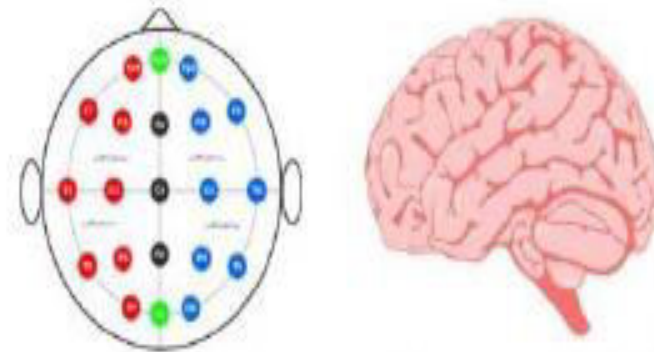
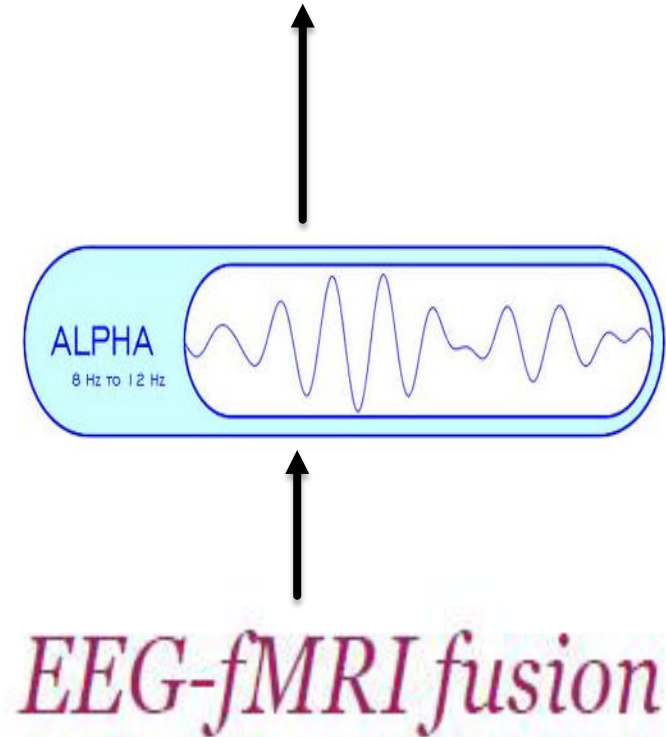
Dorsolateral prefrontal cortex (DLPFC) and the anterior cingulate cortex (ACC)

# CREATIVE IDEATION - COGNITIVE PROCESS - EEG - fMRI



Past memory + existing knowledge = Novel ideas

Divergent thinking is a reliable method via divergent tasks for assessing Creativity



# EEG ALPHA POWER AND CREATIVE IDEATION

- ▶ Highly creative individual + **think Inspirational story** > **writing** + task with instructions > no instruction to keep the ideas original - high  $\alpha$  power.
- ▶ Creative individual + **personality who are open to experience** - **STRONG  $\alpha$  SYNCHRONIZATION IN FRONTAL ACTIVITY.**
- ▶ Creative individual + **creativity related task** + creative intervention with stimulus (verbal activity > problem oriented) - **eyes closed** > **eyes open** - high  $\alpha$  power.
- ▶ Creative individual + **verbal creativity training** + exposure to people's idea with positive effect -  $\alpha$  **SYNCHRONIZATION IN PREFRONTAL CORTEX + RIGHT HEMISPHERE OF THE BRAIN.**
- ▶ Creative individual + **verbal ideation vs semantic task** - high  $\alpha$  power.
- ▶ Creative individual + **mental imagination task** + internally directed attention > externally directed - high  $\alpha$  power.



# ROLE OF FRONTAL AND PARIETAL ALPHA SYNCHRONIZATION

- ▶ Pre frontal alpha synchronization - internal processing was high w.r.t imagery and imagination - inhibition of task irrelevant activity (sensory processing or memory retrieval).
- ▶ Parietal alpha synchronization - creative ideation + creativity related task (imagining dancing + insight - mixture of outward and inward attention - **PREDOMINANT IN RIGHT POSTERIOR PARIETAL REGION.**
- ▶ Attention or orientation to external stimuli - Right hemisphere
- ▶ Shift of attention and stay focussed - Posterior parietal brain region

## 2. MEDITATION AND CREATIVITY

- ▶ Core of creativity is cognitive flexibility.
- ▶ Meditation helps to build new association to overcome fixed associated patterns.
- ▶ Meditation **might** increase creativity during preparation, incubation and illumination stage .
- ▶ Which type of meditation.....???

# MEDITATION AND CREATIVITY

- ▶ Creativity makes use of **divergent thinking** - solving problems with many possible solutions than **convergent thinking** - solving problems with a single, correct answer.
- ▶ Insight problem solving! (cognitive flexibility-approach/strategies to solve) - hindered by automated verbal-conceptual processes - reduced by increasing awareness through Mindfulness.

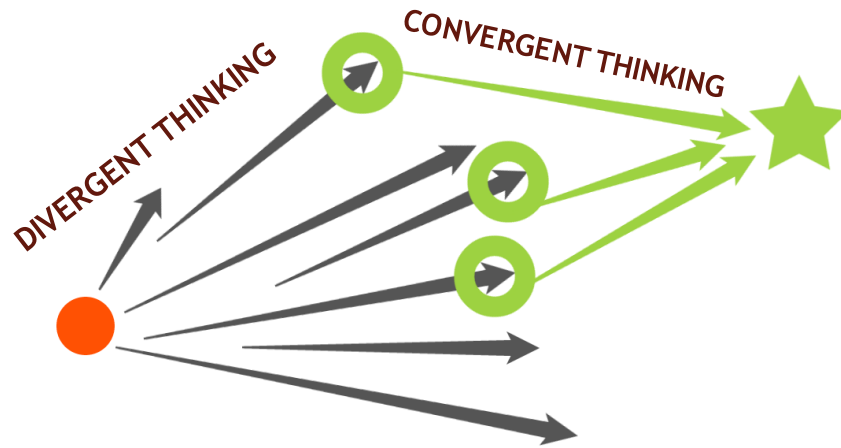
(Brian D,2012; Marci,2007)

# TYPES OF MEDITATION AND CREATIVITY

## Open-monitoring

Openness to perceive and observe anything

OM, Zen, Mindfulness Meditation



## Automatic self-transcending

Transcend the activity of thinking and experiencing the essence

Transcendental Meditation

## Focused-attention

Focusing on a particular item, thought, or object

Love, Kindness, Compassion, Meditation, Ananda Marga (mantra) and Kriya Yoga (mantra=breath).

# MEDITATION AND CREATIVITY

HIGHEST

COGNITIVE CONTROL

LOWEST

FOCUSSED ATTENTION  
(LOVE, KIND, COMPASSION)

ONE POINTED +  
STRONG EFFORT

LOGICAL THINKING, PROBLEM  
SOLVING

FAST GAMMA  
WAVES

MIND IS ACTIVE, THINKING AND DOING

OPEN MONITORING (ZEN, MM)

LEARNING ON - NOT  
CONTROLLED BY US +  
MEDIUM EFFORT

DREAM LIKE

SLOW THETA  
WAVES, ALPHA  
AND BETA

MIND IS ACTIVE, THINKING AND DOING

AUTOMATED SELF-  
TRANSCENDING  
(TM)

INCREASED RESTFUL  
AWARENESS + EFFORTLESS +  
CREATIVITY

RELAXED, HAPPY AND  
FOCUSSED

ALPHA WAVES

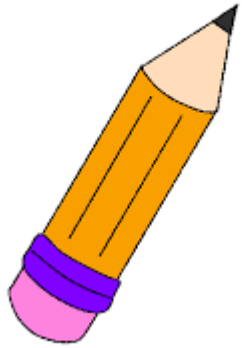
SILENCE, HAPPINESS, BLISS, EXPANDED  
AWARENESS



# METHODS TO IMPROVE CREATIVITY

# METHODS

- ▶ Exercise - aerobic workout, jogging/ running, bicycling, and treadmill - enhanced mood - improved creativity (activation of prefrontal cortex and hippocampus - future thinking, or imagination).
- ▶ Dance improvisation - new ideas appear through internal processes of a single creator; and interactions between the minds, bodies and the environment between a group dancers.



# METHODOLOGICAL ISSUES IN MEASURING CREATIVITY



Aspect	Limitations
Selecting Measurement Instruments	Divergence of instruments used as a result of researcher's dissimilar conceptions of creativity. Instruments may not measure multidimensional nature of creativity. Inconsistent results of creativity research due to different instruments used.
Sampling	Small number of studies conducted on children. Limited number of studies carried out in African and American countries. Small sample size in some studies. Inconsistent results
Testing Conditions	Different performance on creativity instruments due to varying testing conditions.
Psychometric Properties	Conflicting evidence of validity. Lack of updated and developmentally and culturally appropriate norms.
Domain-Generality/ Specificity of Creativity	Mixed results on whether creativity is domain-general or domain-specific.

Aspect	Limitations
<b>Basic creative task properties</b>	Instructions were related to fluency or creativity of ideas Task duration was from seconds to minutes Responses had to be told immediately or wait till the end of the task Features of task differed (verbal or figural task)
<b>Brain activation</b>	Raw power or event related power differ
<b>Alpha band power</b>	Some used alpha sub bands (high or low) or broad alpha range
<b>Cognitive process</b>	Beyond insight or non-insight solutions
<b>Individual difference</b>	Gender specific with respect to brain activity during creativity task.

# FUTURE DIRECTION

- ▶ Creative ideas may occur at different stages - Time course of creative ideation - High temporal resolution EEG techniques may be used.
- ▶ Studies may be required to see specific observed effects - internally/externally directed attention; memory process; top-down control or bottom-up stimulation.
- ▶ Gender differences during task related creativity.



# YOGA AND CREATIVITY

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