

21st Century Trends and Issues in Human Learning and Performance

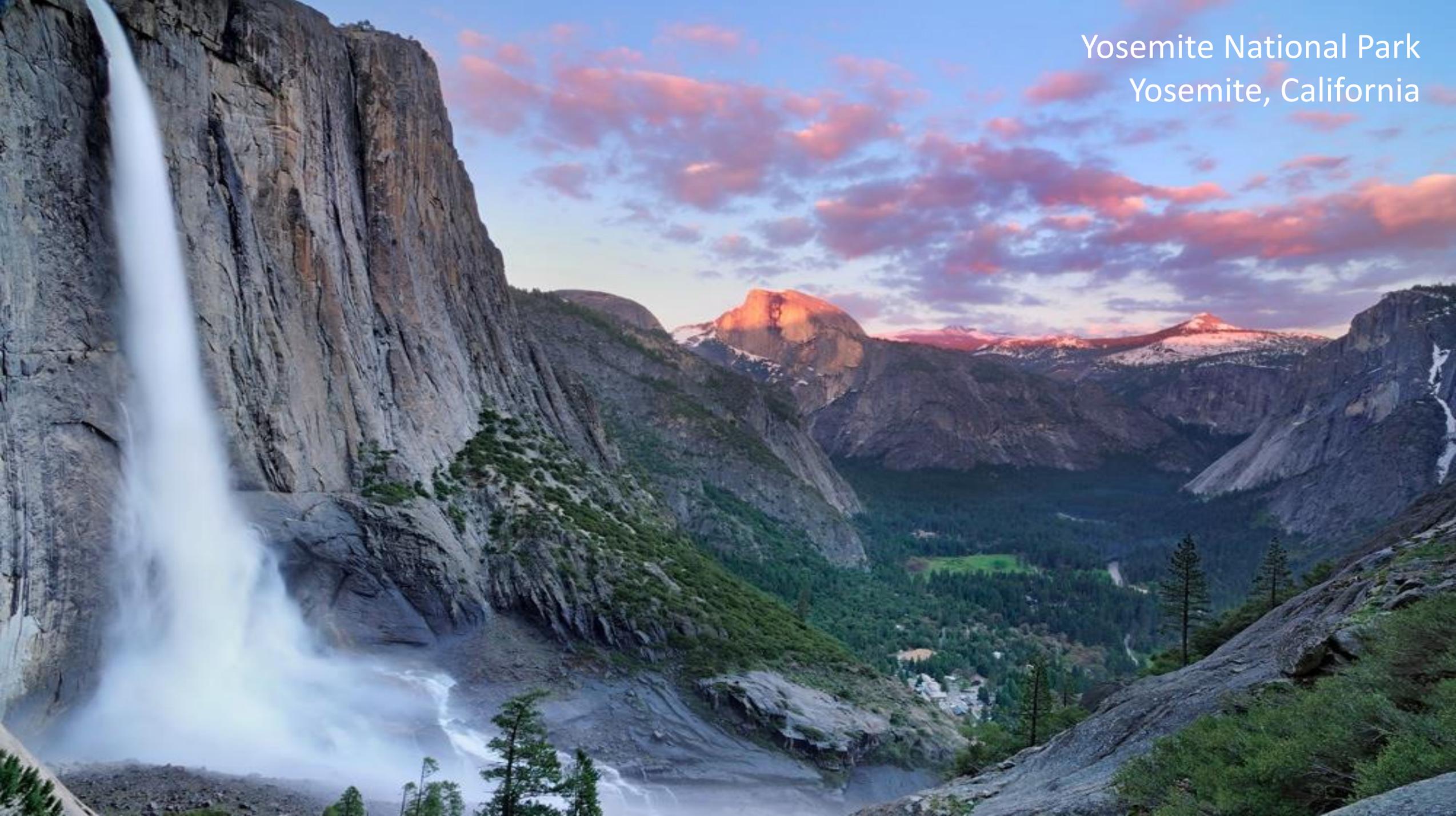
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University of Central Florida
Forging Our Future: The Next Century of L&D
NPS Annual L&D Community Gathering
August 23-25, 2016
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Grand Canyon National Park
Grand Canyon, Arizona



Yosemite National Park
Yosemite, California





Yellowstone National Park
ID, MT, WY



African Burial Mounds National Monument
New York City, NY

Jefferson National Expansion Memorial St Louis, Missouri





Tallgrass Prairie National Preserve
Strong City, Kansas



Post National Memorial
Gillett, AR

Inupiat Heritage Center
Barrow, Alaska





NPS Academy
Students 18-25







Public Land Corp







Cliff Spencer
Superintendent
Mesa Verde National Park
Colorado

Sue Consolo-Murphy
Chief of Science &
Resource Management
Grand Teton
National Park





**Amala Posey
Coordinator
Distance Learning
Resource Education Branch
Grand Canyon
National Park**

Bob Fuhrmann
Youth Program Manager &
Volunteer Coordinator
Yellowstone National Park





Doug Wilson
Archeologist
Fort Vancouver
National Historic Site



Enimini Ekong
Chief of Interpretation & Education
Brown vs. Board of Education
National Historic Site
Topeka, Kansas



Betty Reid Soskin
Park Ranger
Rosie the Riveter
World War II Home Front
National Historic Park
Richmond, California

Challenges & Uncertainties



1.2 Zettabytes

Estimated amount of Data in the Digital Universe for 2010.

75 Billion Fully Loaded iPads

The iStack would cover Wembley Stadium's field and reach approximately 339 miles into the sky.

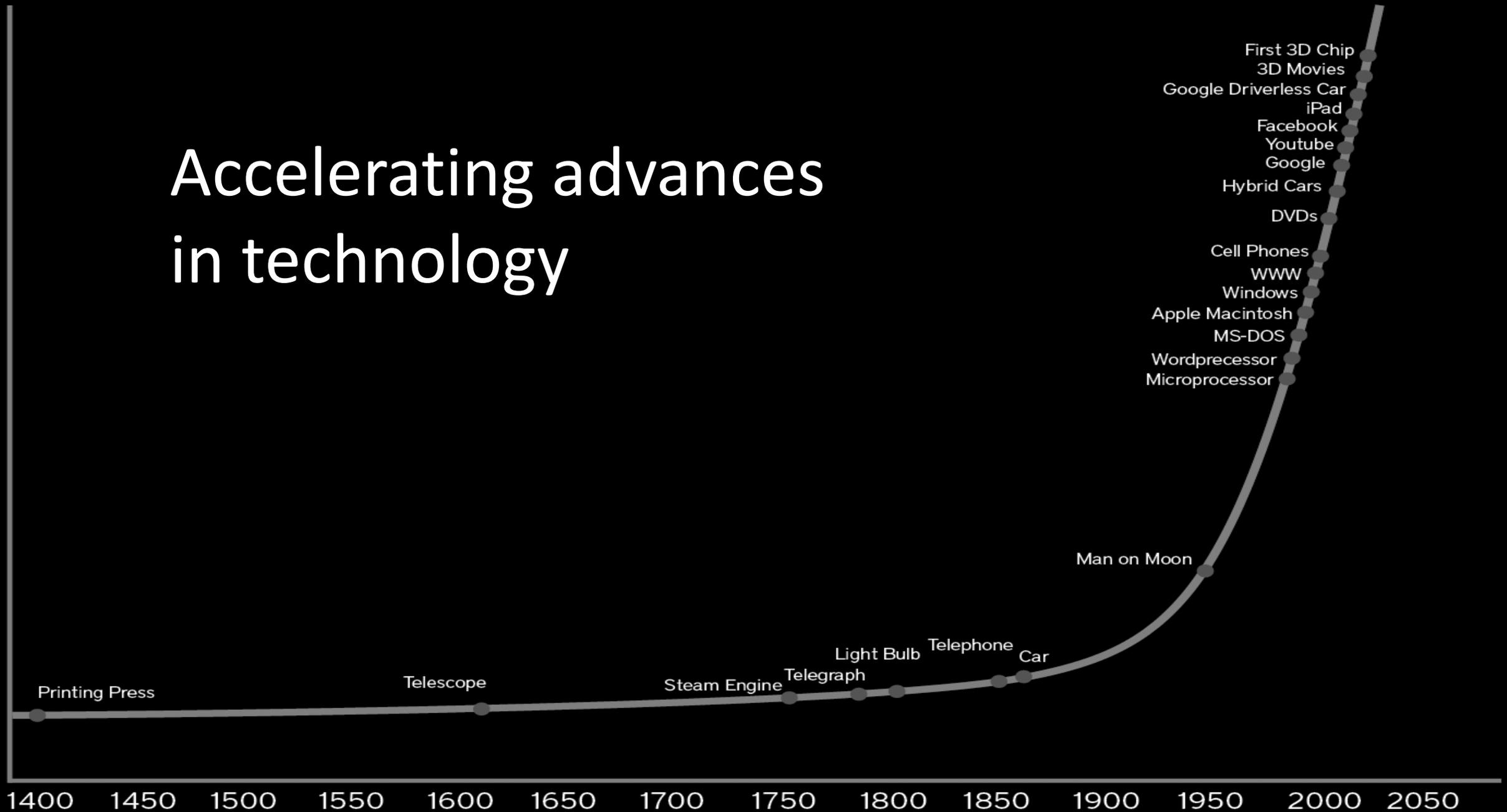
The stack would consist of more than 75 Billion iPads - with a retail value of \$37.4 Trillion

Which is equal to about 44% of the entire world's GDP \$84.7 Trillion. (according to 2009 data)

Exponential
growth in
information



Accelerating advances in technology





Geographic Isolation

A wide-angle photograph of a volcanic landscape. In the foreground, a dark, gravelly slope descends from the right towards the center. To the left, a more rugged, reddish-brown volcanic rock formation rises. The background shows a valley between these hills, with a bright sun setting or rising behind a range of hills, creating a golden glow in the sky. The sky is filled with wispy, white clouds. A single, dark evergreen tree stands on the right-hand ridge. A white thought bubble with a green outline is positioned in the upper left quadrant, containing the text "Can you hear me now?".

Can you hear
me now?

Limited Connectivity

Changing Roles



Park Ranger 025

Clerical
rangers
managers
Resource
Park
Archaeologists
Historians
Law
Maintenance
enforcement
Interpreters
Scientists
Ranger
assistants
workers



Retirements

Table 1. NPS Retirement Status (07/28/2016)

AGE	Eligible now	Eligible this year	Eligible next 5 Years	Eligible next 10 Years	TOTAL
29 & under					801
30-34				9	1,413
35-39			1	97	1,699
40-44		2	82	307	1,710
45-49	73	35	257	579	2,157
50-54	229	17	804	1,268	2,435
55-59	562	161	1,479	184	2,386
60-64	1,274	65	267		1,606
65 & over	667	4	12		683
Total	2,807	282	2,902	2,444	14,890*

*permanent employees, not including seasonals and terms



Recruitment and Retention

Table 2. Workforce Diversity

	White	Hispanic	Black	Other	TOTAL
NPS Count (2015)	11,956	853	1,189	901	14,899
NPS Percentage (2015)	80.2%	5.7%	8.0%	6.1%	100%
US Percentage (2012)	64%	16%	12%	8%	100%
US Percentage (2050)	47%	29%	9%	15%	100%



Cultural Boundaries

Regardless of race, religion, national origin, disabilities, age, gender, or sexual orientation, people must:

Cultural Boundaries

- Respect individual differences;
- Empower team members;
- Maintain inclusive policies, and practices;
- Treat others equitably; and
- Encourage alternative views and suggestions for achieving program goals and objectives.

Identify, discuss, gather
input, and work together
to overcome challenges



Trends and issues
in human learning
and performance





10. Learning Styles

10. Learning Styles



10. Learning Styles

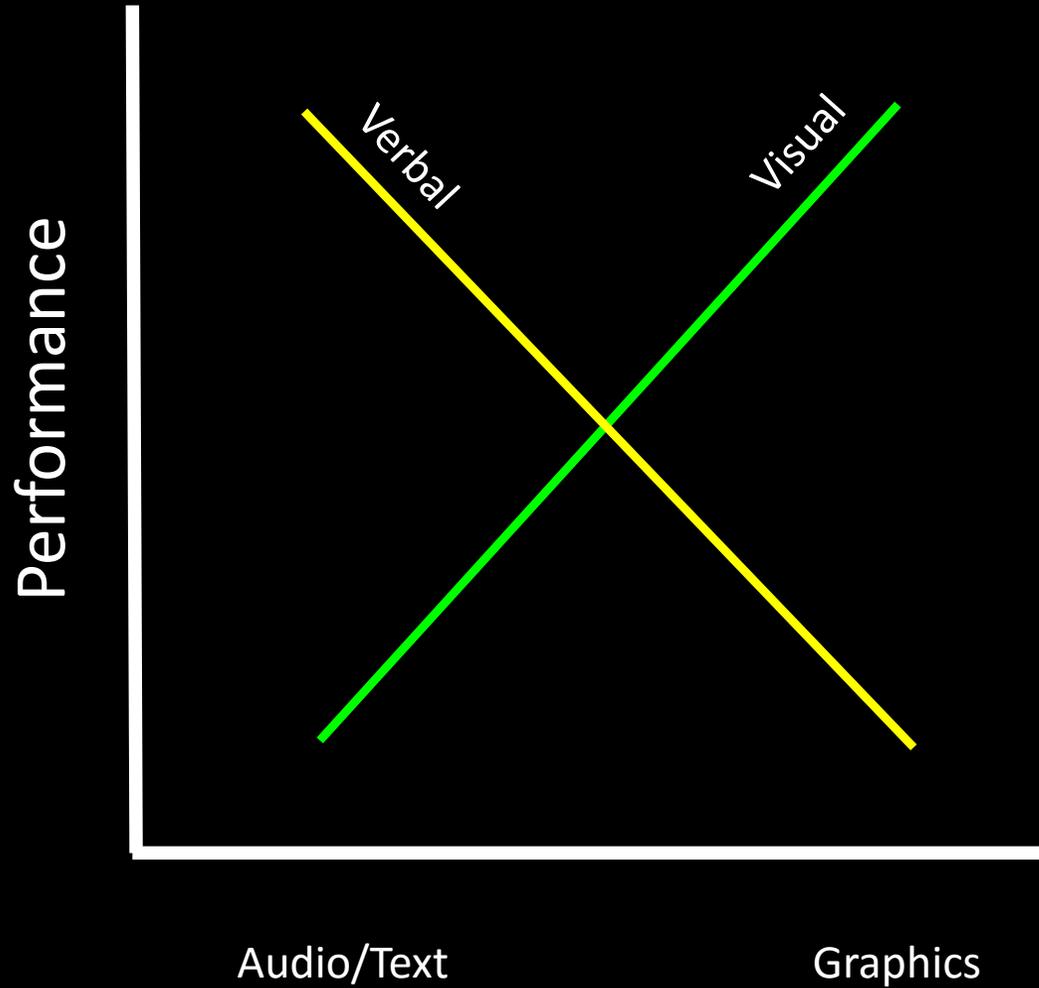


Figure 1a. Expected results with styles

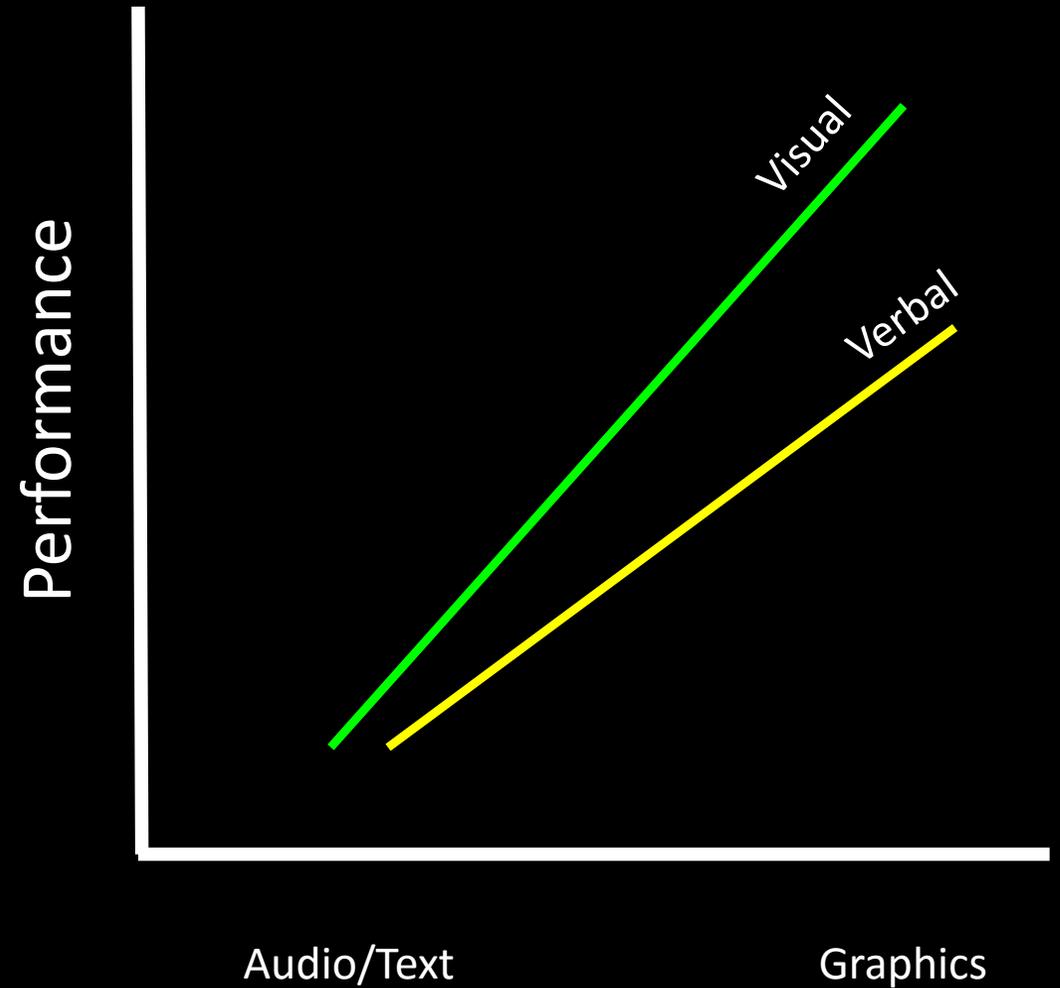
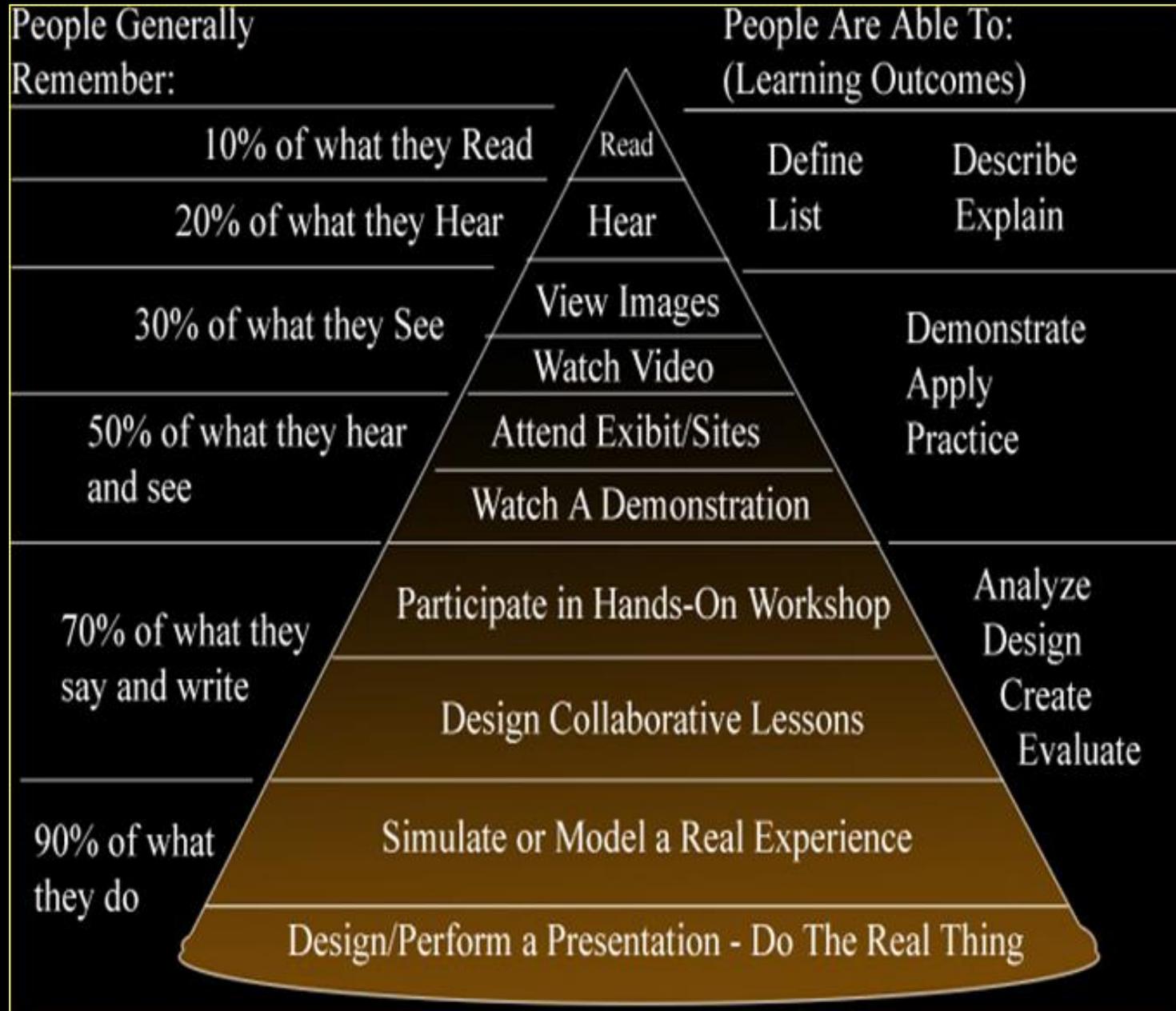


Figure 1b. Actual results with preferences



Dale's
Cone of
Experience



- 9. Web 1.0, 2.0, & 3.0
- 10. Learning Styles



Web 1.0

- Information web
- 100,000 sites
- Read only
- Static
- Company generated
- Content dissemination
- Email, Html, Websites, Portals



Web 2.0

- Social web
- 100,000,000 sites
- Read/write
- Interactive
- User generated
- Content creation
- Blogs, Wikis, XML, Facebook, YouTube, Social Networks, SIRI



Web 3.0

- Semantic web
- 1,000,000,000 sites
- Read/write/reinvent
- Intelligent
- Contextually generated
- Content customization
- Smart Apps and Agents, widgets, iGoogle, NetVibes, Watson, ???



- 8. Communities of Practice & Social Media
- 9. Web 1.0, 2.0, & 3.0
- 10. Learning Styles



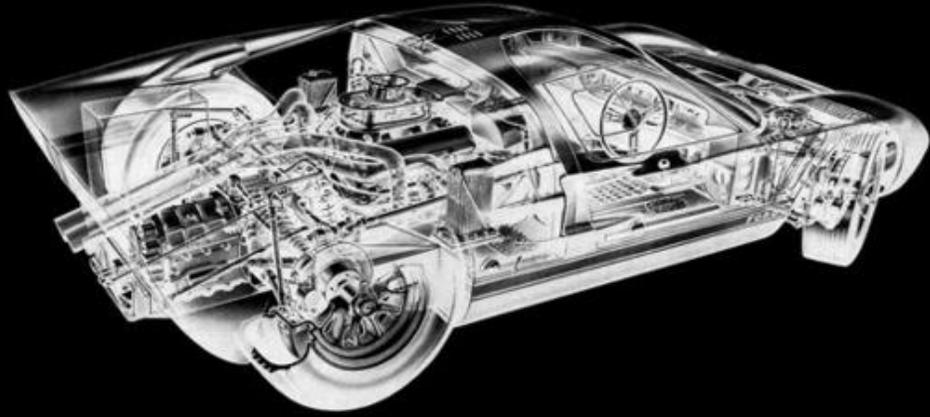
Communities of Practice (CoP)

Social Media....

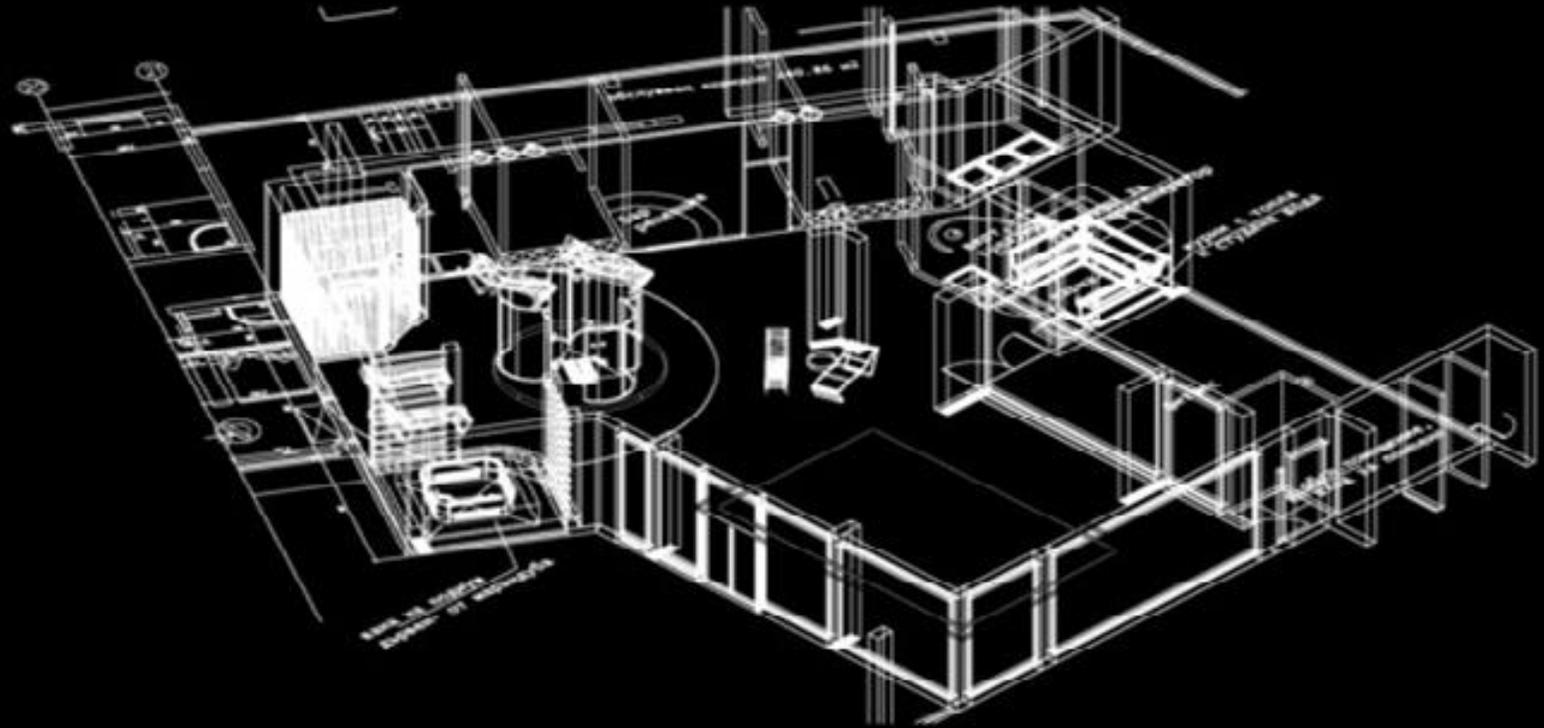
- Computer-mediated tools that enable...
- To share and exchange content, and
- Establish and facilitate CoP in
- Dialogic (rather than monologic) manner.
- **Examples:** Facebook, WhatsApp, WeChat, Qzone, Tumblr, Instagram, Twitter, Baidu, Tieba, YouTube, Snapchat;
- **Cautions & Criticisms:** Trustworthiness of info, disparity in access, ownership, exposure to bad images/ behavior, impersonal, information overload, cultural boundaries.



7. Neuro-Imaging, Psycho-Physiological Measures, & Neurobiological Theories
8. Communities of Practice & Social Media
9. Web 1.0, 2.0, & 3.0
10. Learning Styles



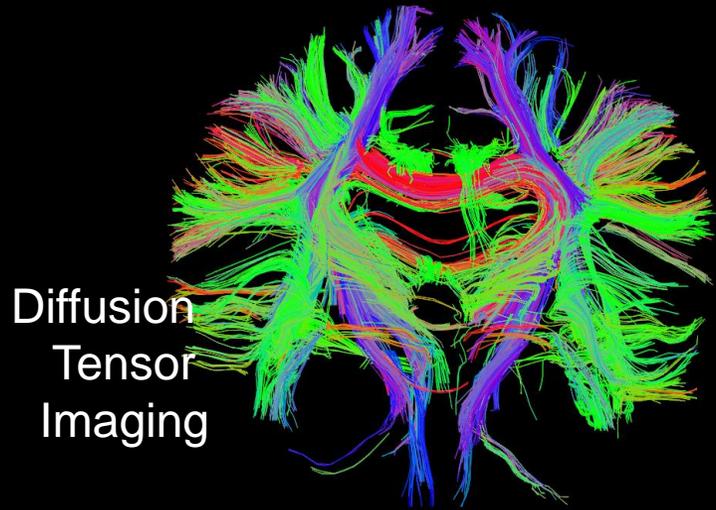
Engineers & architects
correlate changes in structure
to changes in function to
design & predict



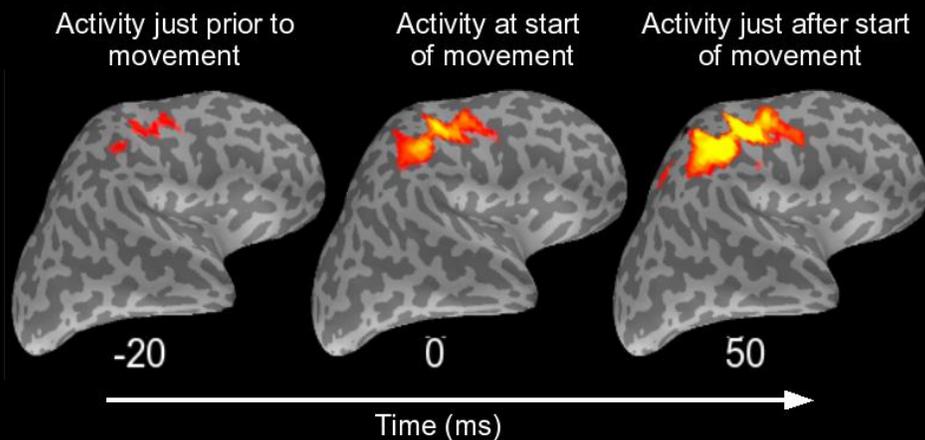
*How do behavioral
and cognitive
scientists measure
changes in
structure and
function?*



Neuro Imaging Technology



Magnetic
Resonance
Imaging

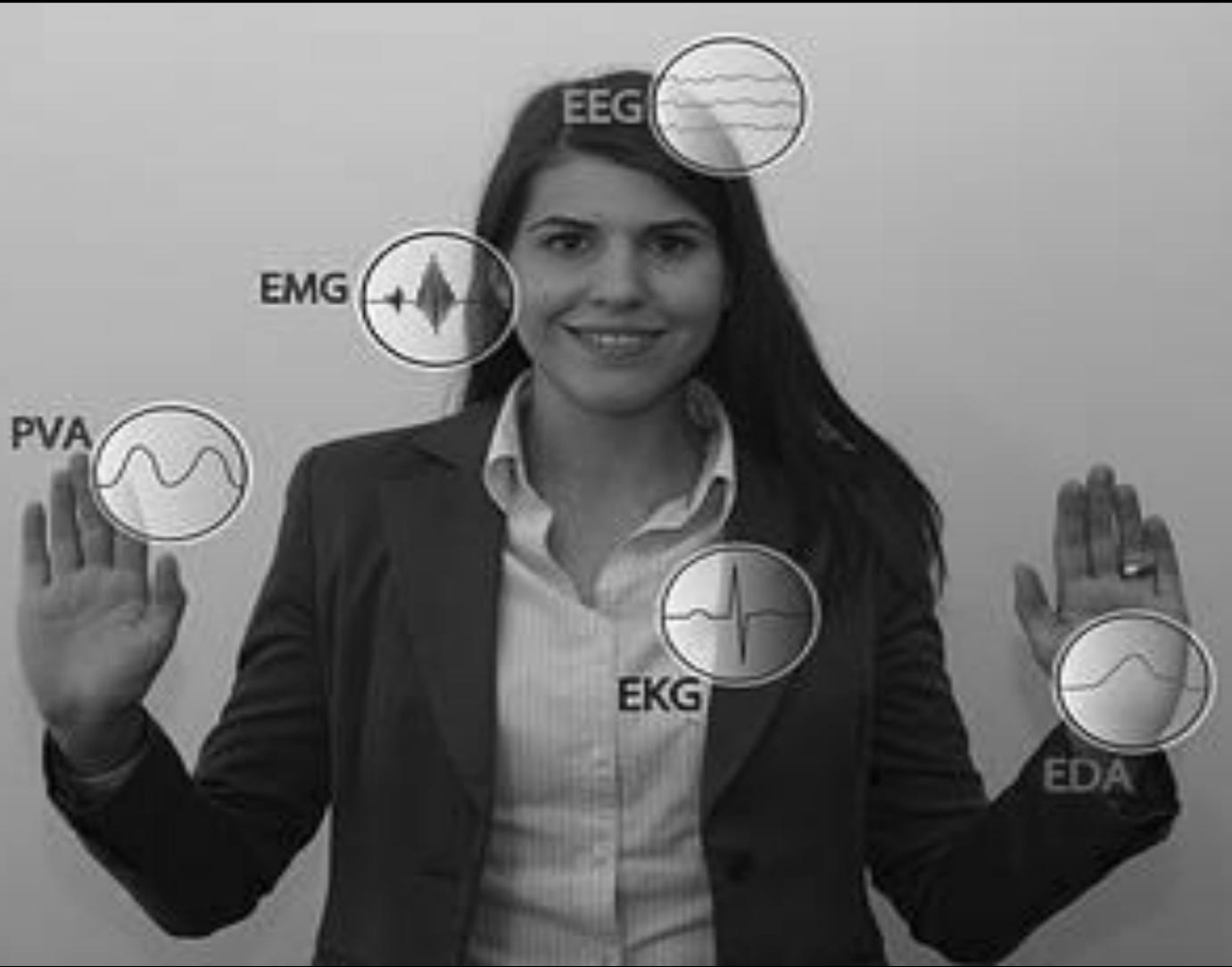


Magneto encephalography

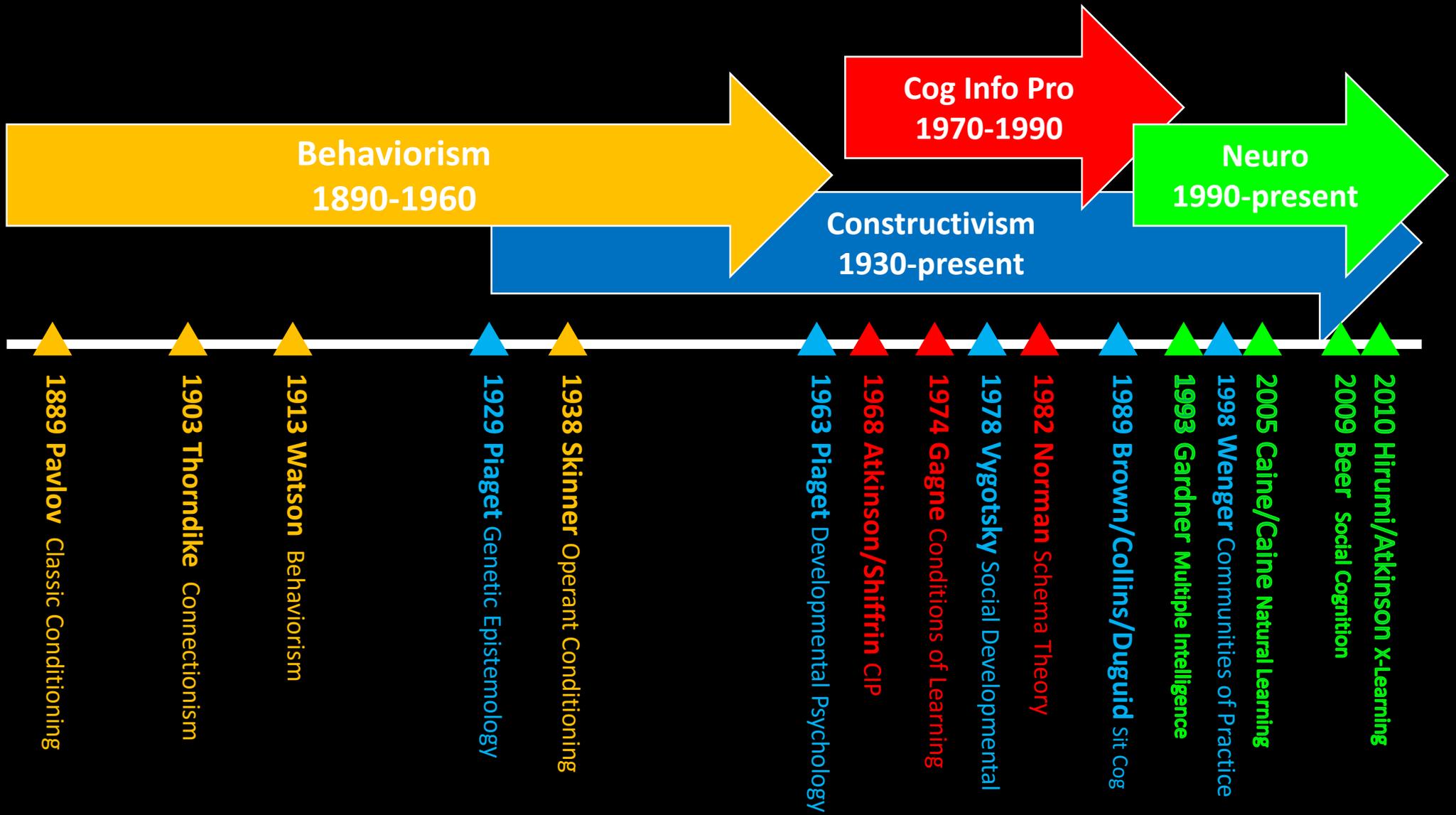


Near Infrared
Imaging (fNIR)

Physiological Measures



- Facial recognition
- Eye movement
- Skin conductance
- Heart rate
- Blood pressure
- Brain waves
- Muscle activity
- Hormones (e.g. Cortisol)



Major Classes of Learning Theories

Brain Rules (Medina, 2014)

1. **Survival:** Brain designed to solve problems related to survival
2. **Exercise:** Boosts brain power
3. **Sleep:** Enhances attention, memory, mood, logic, dexterity...
4. **Stress:** Your brain is built to deal with 30 seconds of stress
5. **Wiring:** Every brain is wired differently
6. **Attention:** We don't pay attention to boring things
7. **Memory:** Repeat to remember anything past 30 seconds
8. **Sensory Integration:** Multisensory environments always do better
9. **Vision:** Vision trumps all other senses
10. **Music:** Study or listen to boost cognition
11. **Gender:** Male and female brains are different
12. **Exploration:** We learn by active testing



6. Experiential and Simulation-based Training
7. Neuro-Imaging, Psycho-Physiological Measures, & Neurobiological Theories
8. Communities of Practice & Social Media
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10. Learning Styles

Experiential Learning

- **Continuity:** People learn from their experiences
- **Interaction:** Experiences derived from interactions with environment and others

(Dewey, 1938)



Experiential Learning

- Interesting and authentic goals and challenges
- Skill development and learning of facts, concepts, procedures, rules, problem solving, etc. occur in context



Experiential Learning

Published Experiential Instructional Strategies

<p>Pfeiffer & Jones (1975)</p> <ol style="list-style-type: none">1. Experience2. Publish3. Process4. Internalize5. Generalize6. Apply	<p>Kolb (1984)</p> <ol style="list-style-type: none">1. Concrete Experience2. Reflective Experience3. Abstract Experience4. Active Experience	<p>Barrows (1985)</p> <ol style="list-style-type: none">1. Start New Class2. Start a New Problem3. Problem Follow-Up4. Presentation(s)5. After Conclusion of Problem
<p>Shank, Berman & Macpherson (1999)</p> <ol style="list-style-type: none">1. Define Goals2. Set Mission3. Present Cover Story4. Establish Roles5. Operate Scenarios6. Provide Resources7. Provide Feedback	<p>BSCS (2005)</p> <ol style="list-style-type: none">1. Engage2. Explore3. Explain4. Elaborate5. Evaluate	<p>Clark (2004)</p> <ol style="list-style-type: none">1. Goals2. Reasons and Activation3. Demonstration4. Application5. Integration6. Assessment



Simulation-Based Training

- Live, virtual or constructive.
- Accelerates development of expertise by:
 - Providing unlimited opportunities to practice in safe environment;
 - Standardizing experience;
 - Presenting variations; and
 - Facilitating pattern recognition, visualization, and decision making.



5. Emotions, Imagination, Gamification, Story, Play and Game
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Experiential Learning

- Neither explicitly nor adequately address human emotions or imagination
- Fail to realize potential of technologies to facilitate learning



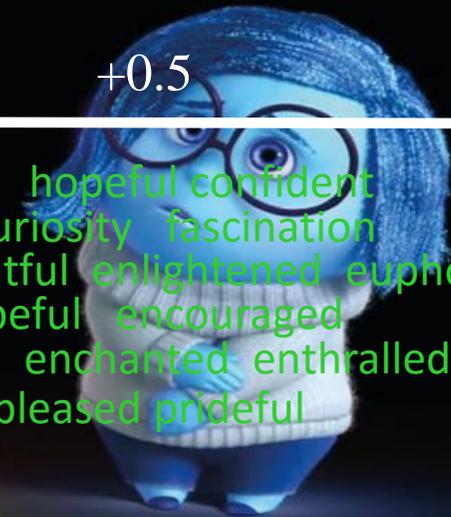
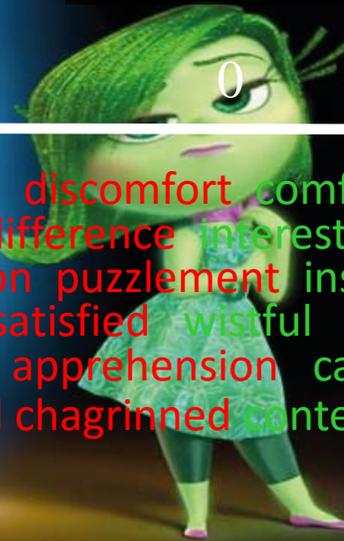
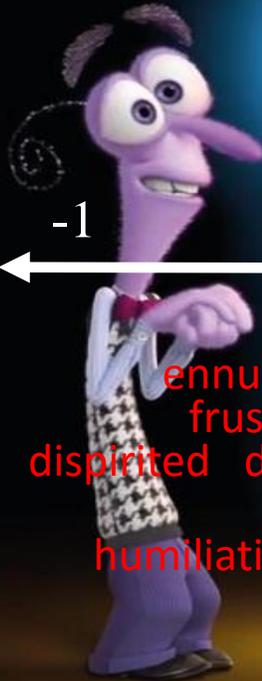
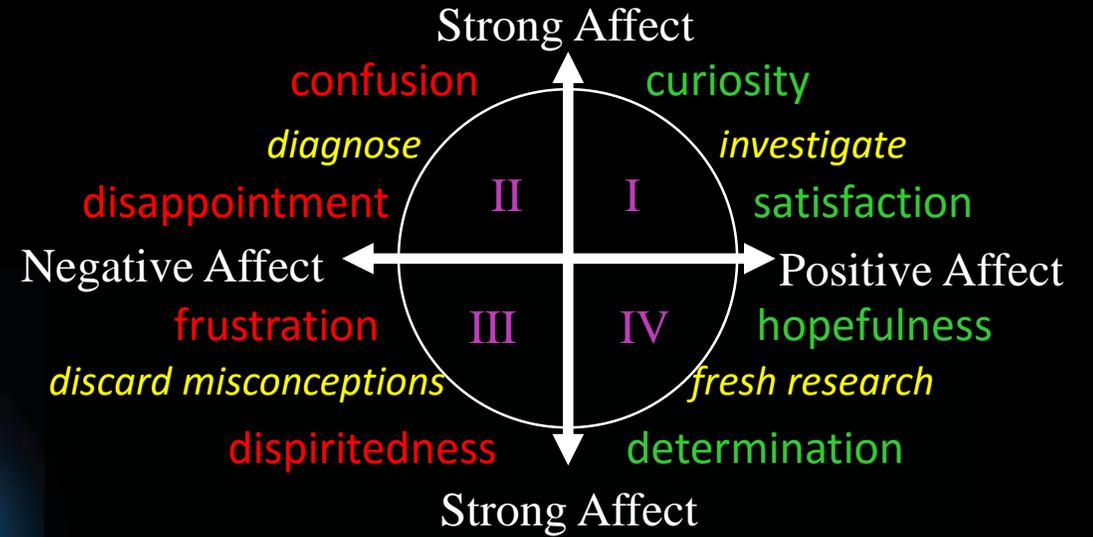
**What do we know about
human emotions and
imagination?**



Emotions

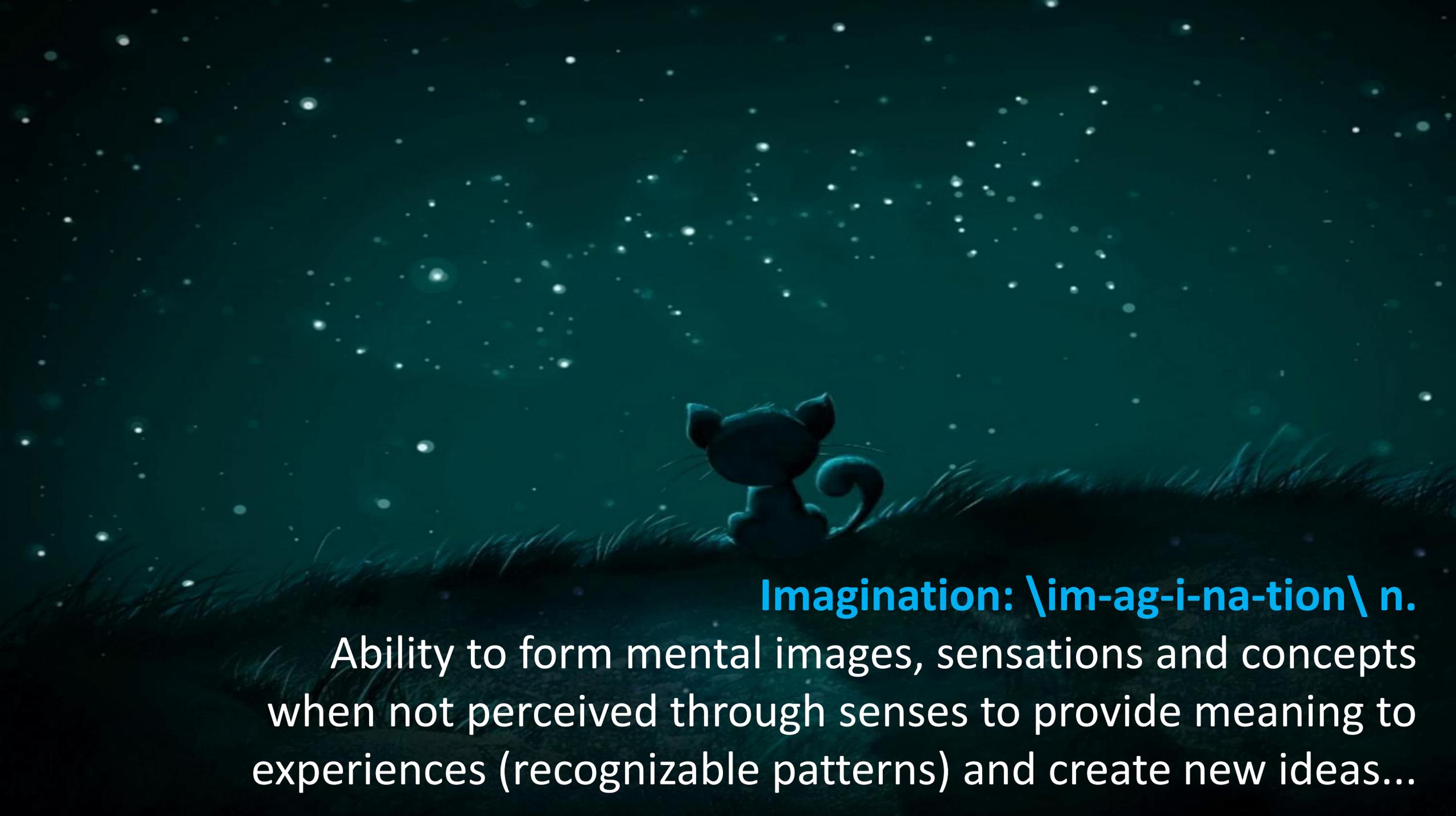
Basic Emotions

- Fear
- Anger
- Sadness
- Happiness
- Contempt
- Disgust



Emotions

- Strength affects release of neurotransmitters
- Neurotransmitters strengthen synaptic connections (encoding and recall)
- Valence affects continuing motivation
- Changes engage humans over time

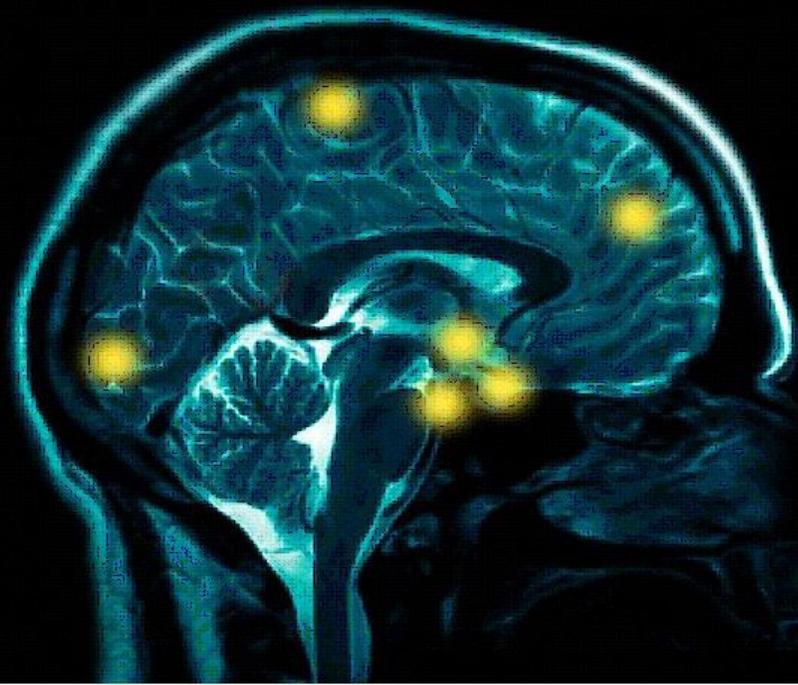


Imagination: \im-ag-i-na-tion\ n.

Ability to form mental images, sensations and concepts when not perceived through senses to provide meaning to experiences (recognizable patterns) and create new ideas...

Imagination

- Two lines of research (a) Creative Imagination, and (b) Perceptual Imagination
 - Neo-cortex “imagines” what it’s like to do, say, feel, hear, taste & think. “Mind’s Eye” forms mental images, sensations and concepts
 - Experiencing, remembering and imagining fires similar neurons



Imagination

Images of past & future cause and effect relationships:

- Affect decision making & performance
- Source of real pleasure and pain
- Allows us to escape current time, place and perspective



Who evokes
emotions & sparks
imagination?

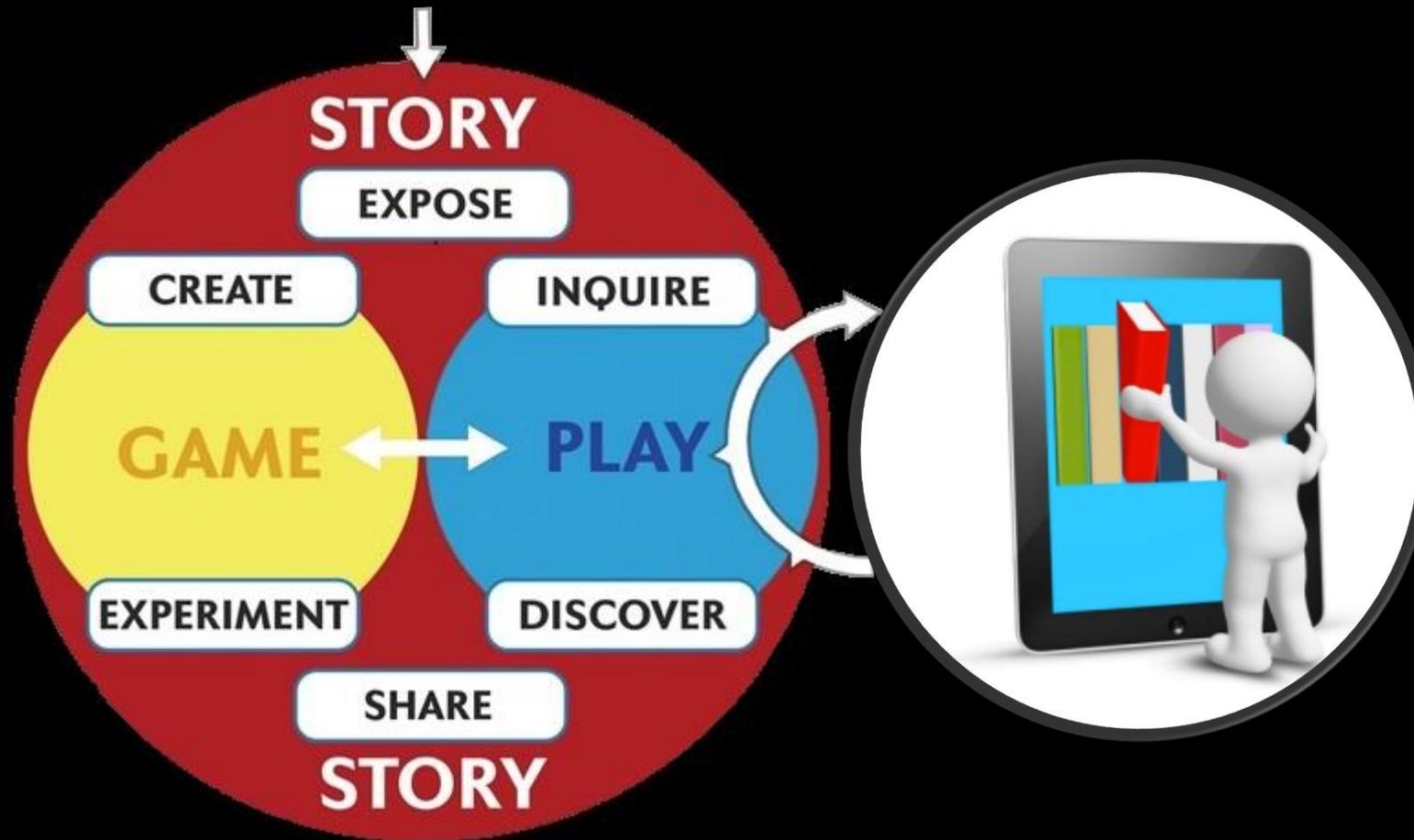


InterPLAY Instructional Theory



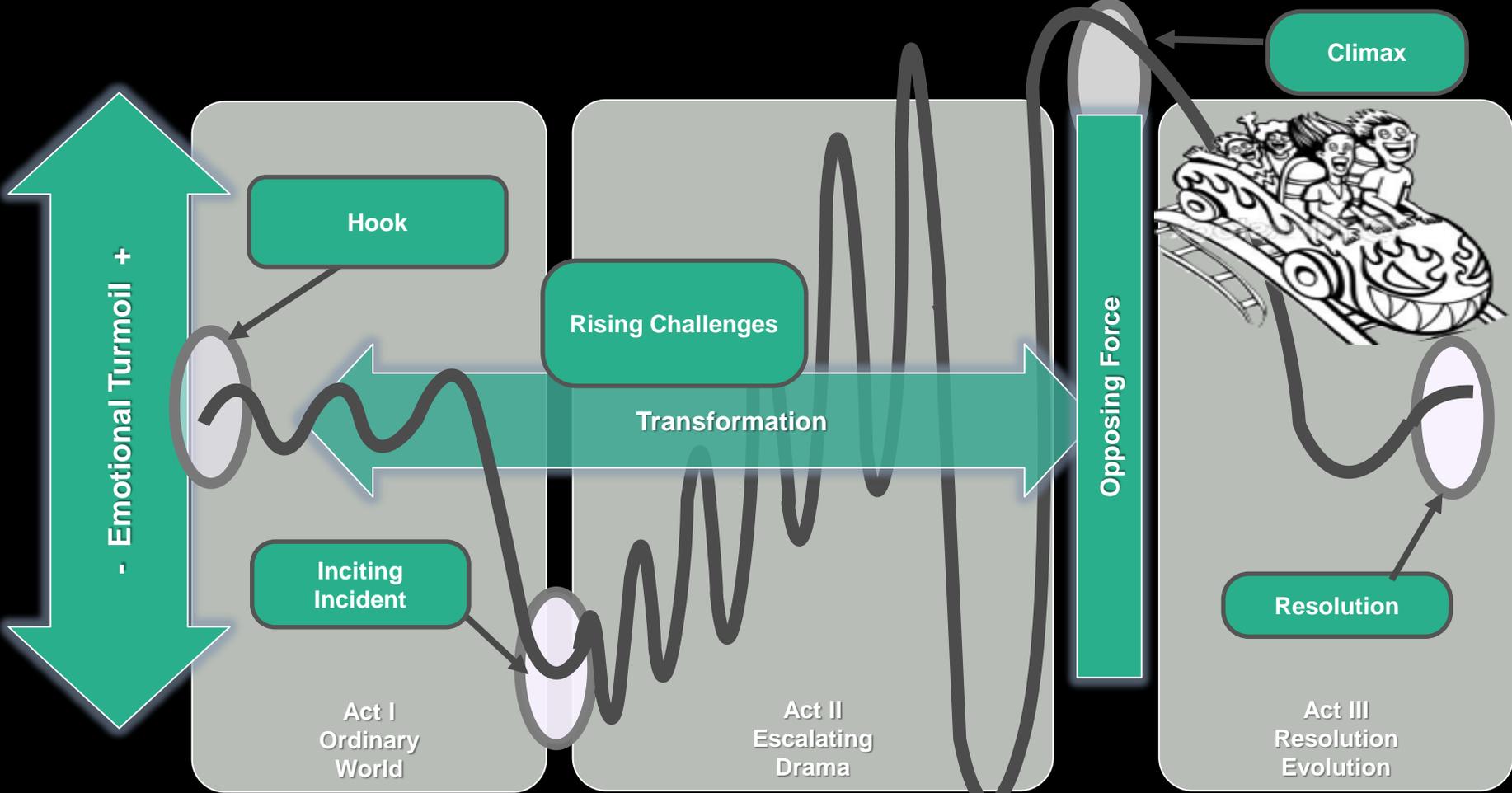
Conceptual diagram for InterPLAY (Hirumi, 2016)

InterPLAY Instructional Strategy



InterPLAY Instructional Events (Hirumi, 2016)

InterPLAY Instructional Strategy

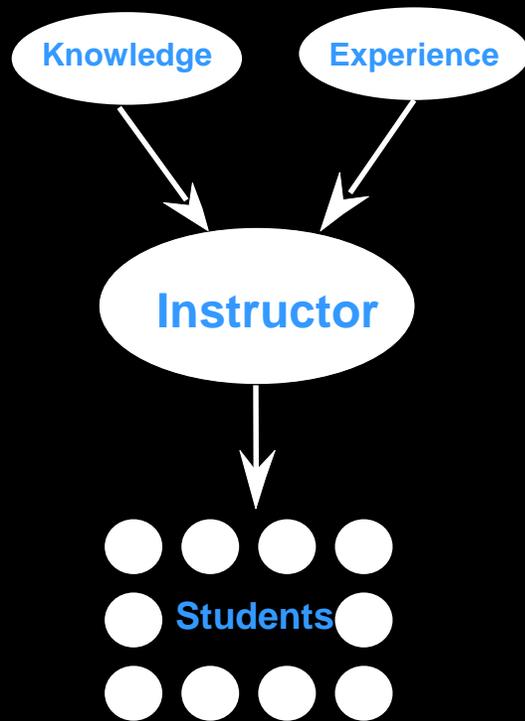


Interplay Experience Arc

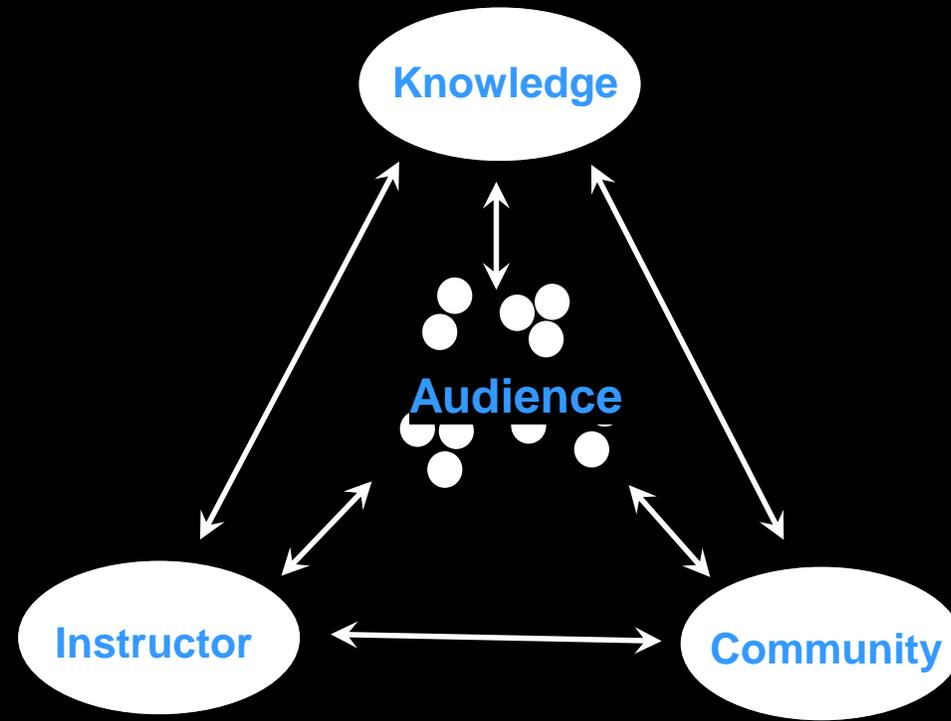


4. Teacher vs. Audience-Centered
5. Emotions, Imagination, Gamification, Story, Play and Game
6. Experiential and Simulation-based Training
7. Neuro-Imaging, Psycho-Physiological Measures, & Neurobiological Theories
8. Communities of Practice & Social Media
9. Web 1.0, 2.0, & 3.0
10. Learning Styles

4. Teacher vs. Audience-Centered Training, Flipped Classroom and Hybrid Environments



Instructor-Led

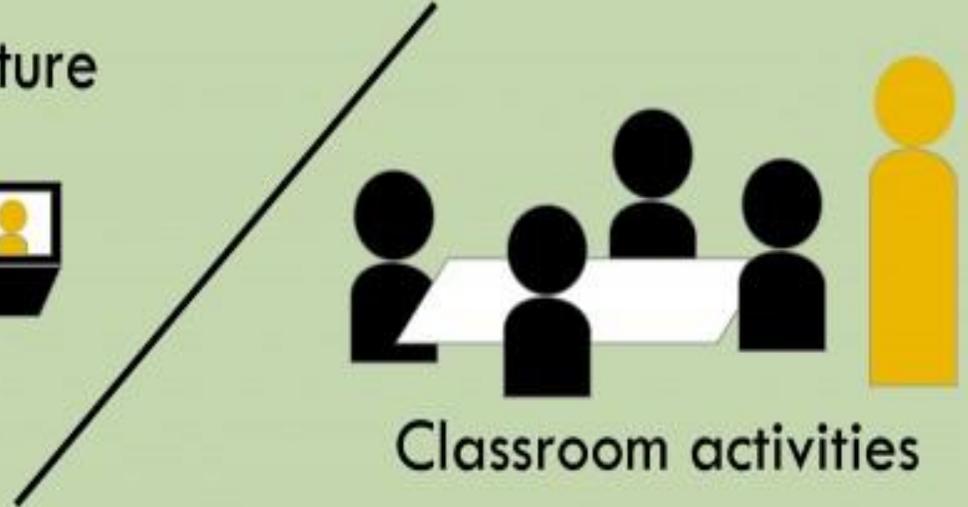
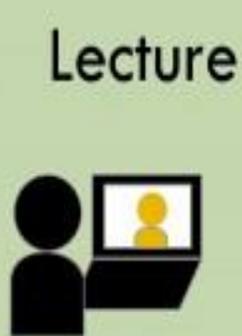
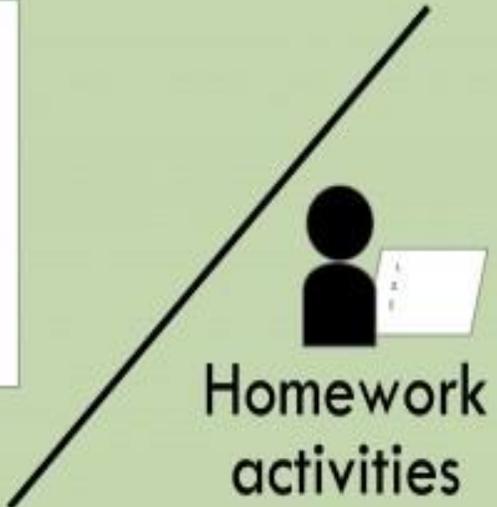
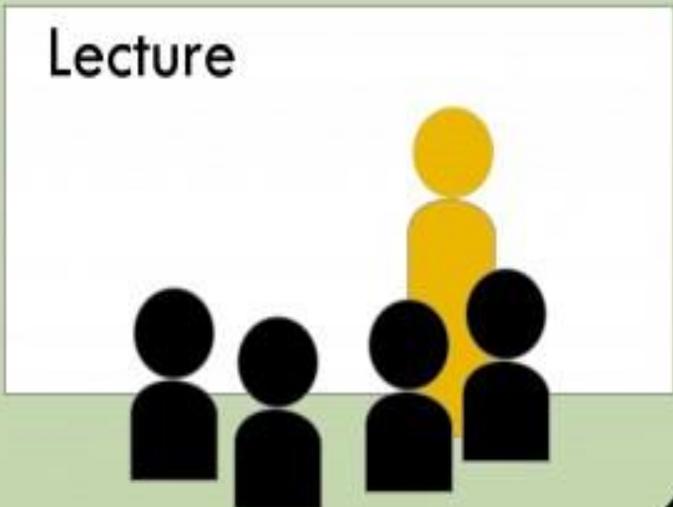


Audience-Centered



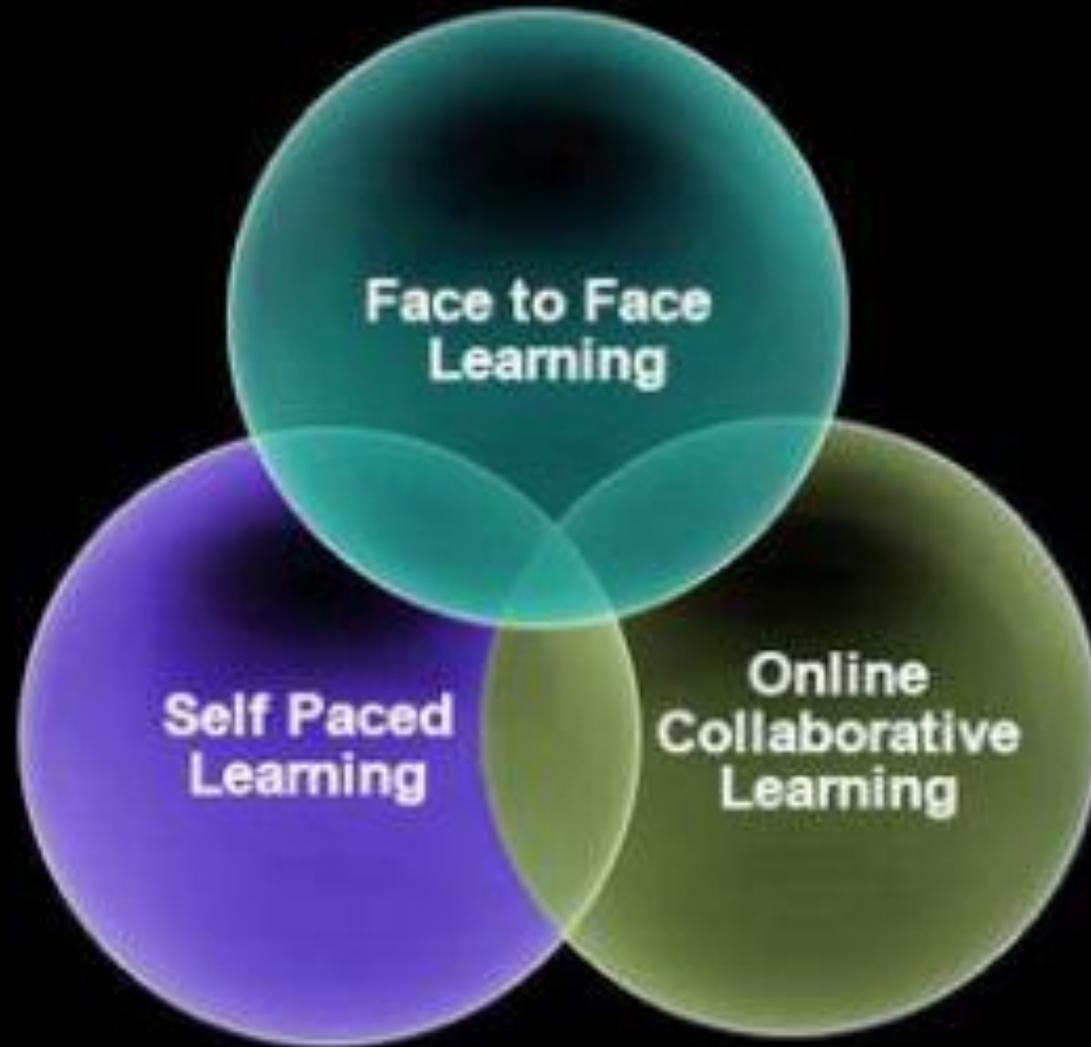
TRADITIONAL

FLIPPED



FLIPPED

Hybrid Learning Environments





3. Grounded vs. Craft-based Design
4. Teacher vs. Audience-Centered
5. Emotions, Imagination, Gamification, Story, Play and Game
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3. Craft-Based (SME) vs Grounded Design



Information vs. Training



Information

Expository text and other (e.g., audio, video, graphic) media designed to transmit a message from sender to receiver

Training

Series of events & activities designed intentionally to facilitate learning

Craft-Based (SME) vs Grounded Design



Craft-Based Design (SME approach)

Series of events & activities based on past practices, opinions, fads, politics, etc.

Grounded Design Instruction

Series of events & activities based on practical experience, research & theory

Grounded Design

“The systematic implementation of processes and procedures that are rooted in established theory and research in human learning.”

(Hannafin, Hannafin, Land, & Oliver, 1997, p.102)

Grounded Design

Conditions

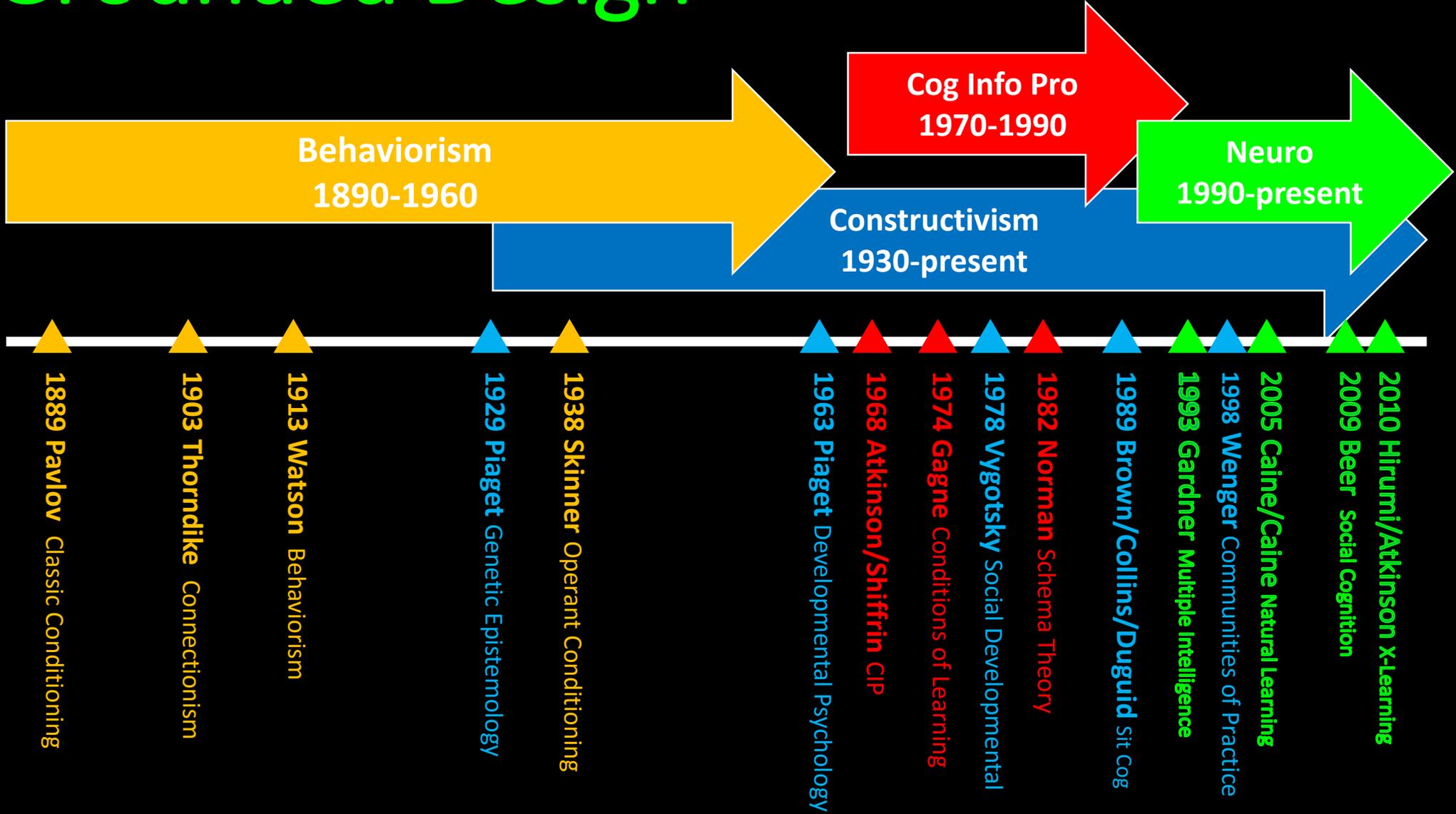
- Rooted in defensible theoretical framework
- Consistent with research findings
- Traceable design decisions
- Validated with successive implementations
- Based on desired outcomes

Grounded Design

Significance

- Aligns research, theory, and practice
- Explains and predicts results
- Allows systematic study, continuous improvement
- Generalizable beyond unique conditions
- Provides pedagogical foundations for interactions and technology

Grounded Design





2. Time vs. Competency Training
3. Grounded vs. Craft-based Design
4. Teacher vs. Audience-Centered
5. Emotions, Imagination, Gamification, Story, Play and Game
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2. Time vs Competency Based

Age:	Agrarian	Industrial	Information
Transportation:	Horse	Trains and Cars	Airplanes
Communications:	Mail	Telephone	Computer Networks
Family:	Extended Family	Nuclear Family	Single-Parent Family
Business:	Family	Bureaucracy	Team
Education:	One-room School-house	Conventional System	?

Industrial-Age	Information-Age
Time-based	Competency-based
Time constant/Achievement varies	Achievement constant/Time varies
Grade levels	Continuous progress
Group-based content delivery	Personal learning plans
Content and memorization of facts	Performance and Problem-solving
Conventional CRT (tests)	Performance-based CRT (portfolios)
Competitive and adversarial learning	Collaborate and cooperative learning
Classrooms	Hybrid (f2f, online)
Teacher as dispenser of knowledge	Teacher as coach or facilitator of learning
Isolated reading and writing skills	Communications skills
Technology as objects of training	Technology as tools for learning



1. Learning vs. Performance
2. Time vs. Competency Training
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1. Learning vs. Performance



Performance Ecosystems





Organizational Culture



Organizational Culture

1. Management leadership and sponsorship
2. Technology Advocacy
3. Ownership and control
4. Attitudes toward learning and performance
5. Charter of the L&D function
6. Budget, Resources, Time
7. Standards



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Creativity: \cre-a-tiv-i-ty\ n.

Ability to use **imagination** to transcend traditional ideas, rules, **patterns**, relationships, or the like, to form **meaningful new** ideas, forms, and methods.

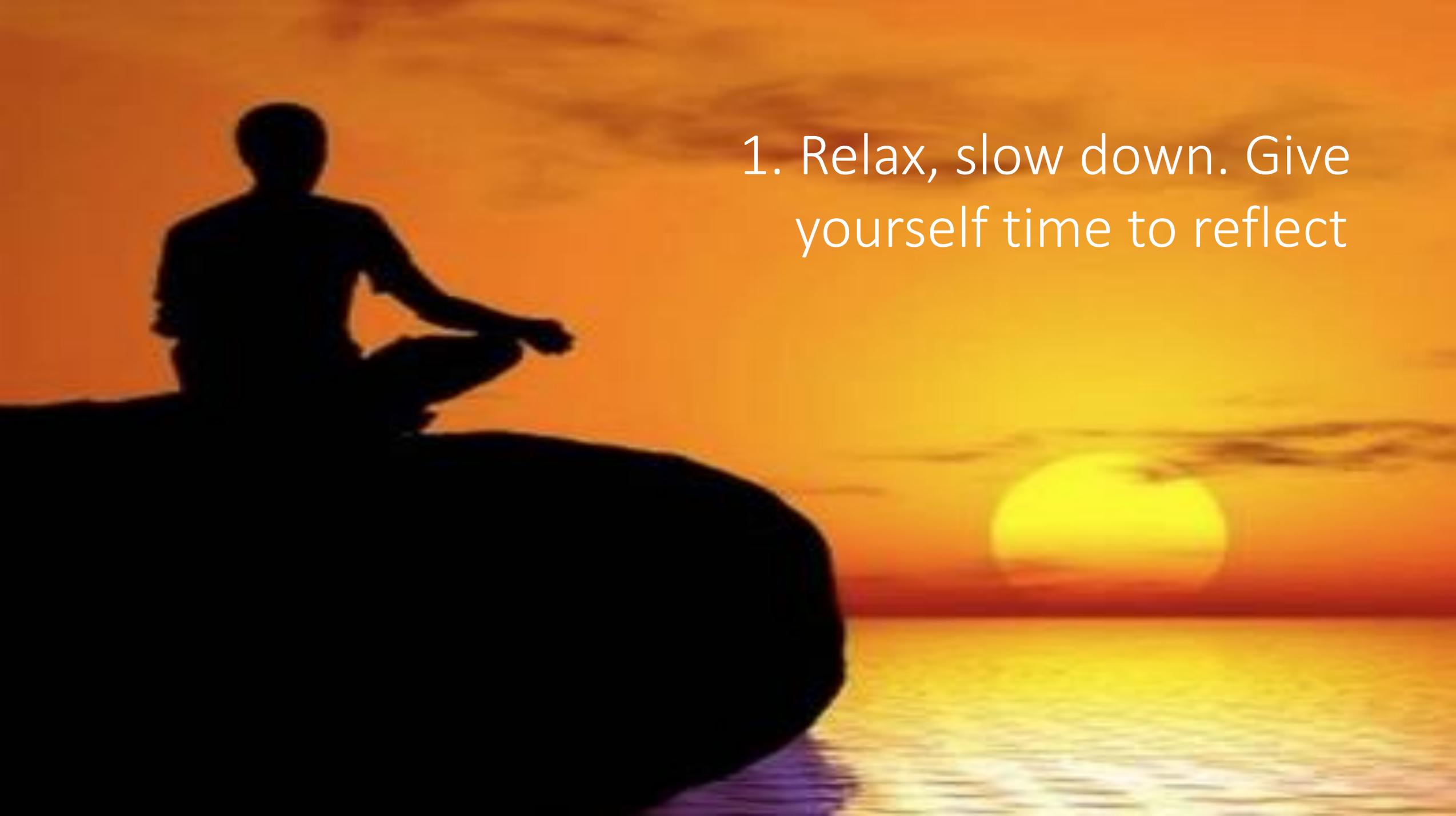
Conditions

Table 8. Comparison of factors found to inhibit and foster creativity

	Inhibitors	Catalysts
Physical	Structured/Closed Spaces	Flexible/Open Spaces
	Stark/Dark Colors	Warm/Vibrant Colors
	Loud/Distracting Sounds	Soft/Soothing Sounds
	Stale Air	Fresh Air
	Hot/Cold Temperature	Warm/Cool Temperature
Psychological	Focused Attention/Concentration	Unfocused Attention
	Purposeful/Serious	Playful/Reflective
	Decisive/Certain	Contemplative/Flexible
	Forceful/Stressful	Eager/Calm
	Demanding/Pressured	Unpressured/Relaxed
	Negative Mood	Positive Mood
	Fearful/Critical	Confidence/Supportive
	Efficient/Productive	Exploratory/Experimental
	Compliant/Error Free	Open/Constructive Failure

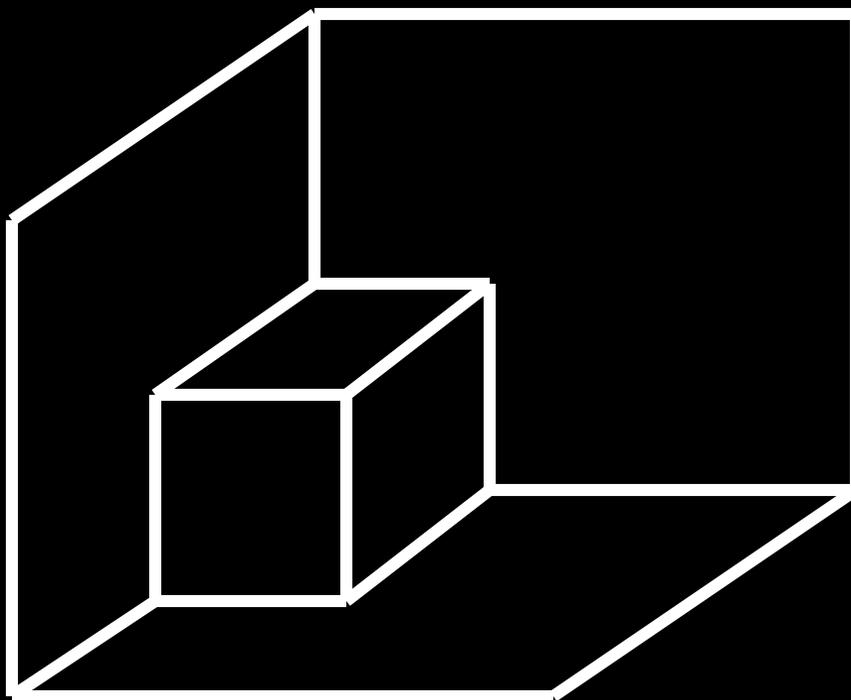
7 ways to
spark imagination
& foster creativity



A silhouette of a person sitting in a meditative pose on a large rock. The background is a vibrant sunset over a body of water, with the sun low on the horizon and its light reflecting on the water's surface. The sky is a mix of orange and yellow tones.

1. Relax, slow down. Give yourself time to reflect

2. Change your Perspective





2a. Look through different lens

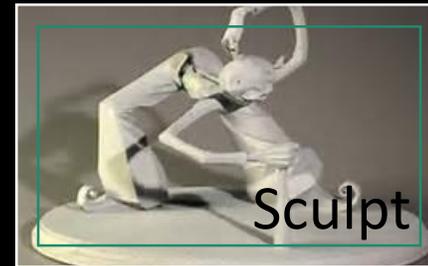
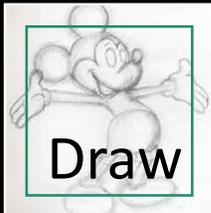
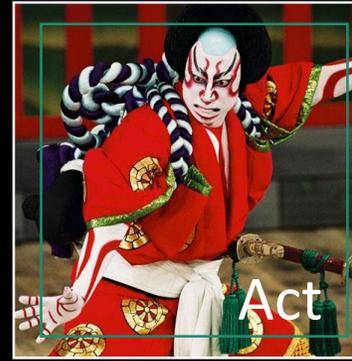


2b. Walk
backward
Use other hand
Write upside
down

2c. Use
different
senses



3. Use different ways to communicate



4. Be Knowledgeable



5. Be mindful &
curious



5a. Use Innovation Skills



Observe Question

Experiment Network Associate

6. Be Courageous Take risks



7. Be Playful



1. Amazing Places, Programs & People

2. Challenges & Uncertainties

- A. Information, Technology, Isolation & Connectivity
- B. Job Roles & Responsibilities
- C. Retirement, Recruitment, Cultural Boundaries

3. Key Trends and Issues

- A. Learning Styles
- B. Web 1.0, 2.0, 3.0
- C. CoP & Social Media
- D. Neuro-Imaging, Physiological Measures, Neuro-Biology
- E. Experiential Learning & Simulation-Based Training
- F. Emotions, Imagination, Gamification, Story, Play, & Game
- G. Teacher vs. Audience-Centered Design
- H. Grounded vs. Craft-Based Design
- I. Time vs. Competency-Based Training
- J. Learning vs. Human Performance

4. Creativity & Innovation

