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Method of induction of basic and complex emotions

in video games and virtual environments

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- CG artist in early video game
- Art Director in video game and VR
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- Courses emotions induction University France Japan
- Best paper award ACM Siggraph San Diego 2007
- Consulting in emotion induction video game industry

Emotions, Presence, Methods of induction

- Emotions
 - Evolutionary theory
 - Classification
 - Physiological theory
 - Behavioral theory
 - Physiologist theory
 - Cognitive sciences
 - Neurosciences
 - Emotional Intelligence

- Presence
 - Presence in VR and video Game
 - Definitions
 - Presence and emotions
 - Measurement of the presence
 - Allocation voluntary and involuntary attention

- Method of induction of emotion in video game and VR
 - The surprise as a emotional vector
 - Fear induction
 - Anger induction
 - Disgust induction
 - Joyce induction
 - Sadness induction
 - Empathy and compassion
- Conclusion

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What's are Emotions? The Evolutionary theory

- A philosophical approach
 - Emotions must be avoid (Plato)
 - Emotions can be utile in Art (Aristotle)
 - Emotions must be directed by soul (Descartes)
- First definition
 - No consensus: “*Everybody know what is an emotion, before you ask him what it is?*” (Fehr & Russel, 1984)
 - The only way for the brain to evaluate environment inside and outside the body, to respond appropriately (Damasio, 2005)

What's are Emotions? The Evolutionary theory

- Darwin and the evolutionist theory
 - Emotions are innate and reflexive.
 - Emotions are phylogenetic and ontogenetic

- **Emotions**
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 - **Classification**
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What's are Emotions? Classification

- The categorical classification (P. Ekman)
 - Emotions are universals
 - 5 basics emotions:
 - Sadness, Anger, Disgust, Joy, Fear and Surprise
- Surprise is not always classify as a basic emotion (Johnson-Laird, 1992)

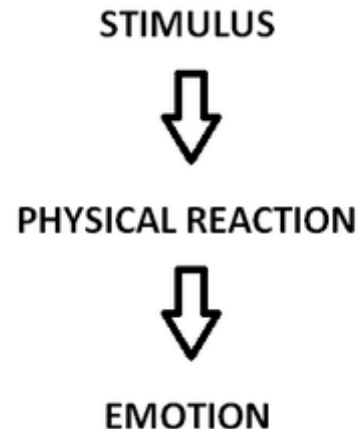
What's are Emotions? Classification

- The dimensional classification (Russel)
 - All emotions are derived from two neurologic systems:
 - First: The Valence
 - Second: The Arousal

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What's are Emotions? The Physiological theory

- The physiological peripheral & reflexive theory (W.James, 1884)



- Our incapacity to control our emotion prove, there are no links no links between emotion and cognition (James, Lange)

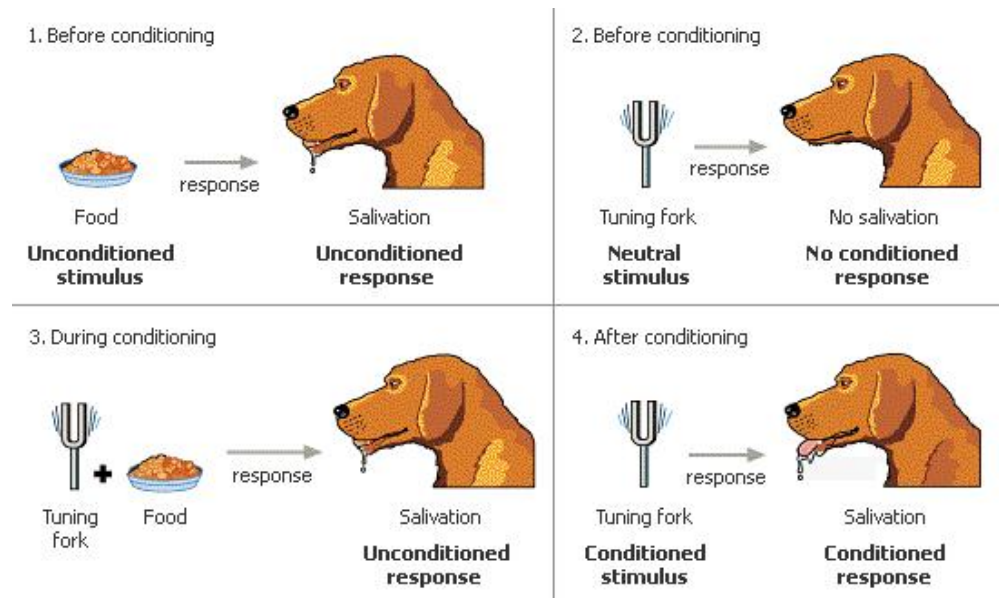
What's are Emotions? The Physiological theory

- The emotions are only reflexive (W.James, 1884)
- Emotions didn't use a NCS (Brain) path
 - A woman is sad when her baby die, not because her baby die, but because she cry.

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What's are Emotions? The Behavioral theory

- The brain is a black box (Watson 1913)
- All the emotions are reflexive and conditioned by stimuli (Pavlov)
- Pavlov's theory of correction. CR and SC



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What's are Emotions? The Physiologist theory

- A peripheral theory critic (W.Cannon & P. Bard)
- The emotional path is always the brain path
 - Thalamus and hypothalamus are use in the emotional path
- Many emotion product the same physiological reactions (W. Cannon)

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What's are Emotions? The cognitive science

- If Behaviorist could be compare to analogic science, cognitivist should be compare to a software theory
- For cognitivist: Emotions never use cognition (A. Fodor 1975)(Eckard, 1996)
- Human, one of the most emotional animal survive due to his emotional phylogenies

What's are Emotions? The cognitive science

- The contextualize cognitivist
 - Environment and cognition is the emotional heart
 - The arousal cognition theory: arousal + environment = emotion (Schater & Singer, 1962)

PHYSICAL REACTION

+

COGNITIONS



EMOTION

What's are Emotions? The cognitive science

- The appraisal cognitivist theory
 - The SEC's Stimulus Evaluation Checks (Scherer, 1984, 1988)
 - Evaluation of the stimulus novelty
 - Evaluation of the stimulus valence
 - Compare to the individual aims
- The coping potential (Lazarus & Launier, 1984)
- All these evaluation are not always conscious (Jazonc, 1980)

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What's are Emotions? Neurosciences

- Brain Map
 - Even without the Neo-cortex some emotions exists (Boring, 1950)
 - But without Neo-Cortex small stimulus create high emotions
 - Thalamus Neo-Cortex Hypothalamus



Temporal Lobes



Parietal Lobes



Frontal Lobes



Cerebellum



Occipital Lobes

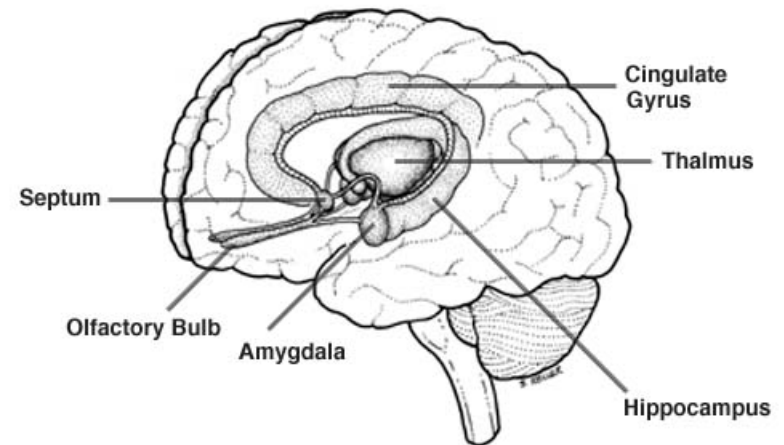


Brainstem

What's are Emotions? Neurosciences

- The limbic system, if he does exist?

- The phrenology idea of a localization of emotion in brain (J. Papez, 1937)
- The limbic system and the triune theory (P. Maclean, 1970)



- Animals and human have the same brain bio architecture (H.Karten & G. Northcutt, 1970)

What's are Emotions? Neurosciences

- The two cerebrals emotional system of the brain
- A audio Conditional Stimulus use many path in the brain (J. Ledoux, 1986)
- One path goes to auditory cortex, and other neo cortex part (The high path, conscious)
- The second one to the limbic Brain amygdala (The thalamic path, unconscious)

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What's are Emotions? Emotional intelligence

- The Qi and EI concept (Golleman)
- Five items
 - Aware of their own emotions
 - Management of emotions
 - Motivation
 - Empathy
 - Relationship management
- It's possible to educate to change his EI (Goleman & Hatch)

What's are Emotions? Emotional intelligence

- The EI degrades in cases of PTSD (Goleman)
- Emotions affect memory (A.R Damasio)
- In our society neuronal alarms are obsolete
- Our society create basic emotion and low EI
- Anger and Fear creates frustration in VG (Zillman, 1993)
- Emotions like empathy and compassion creates high EI level.
- Creating high quality EI is a new issues for VG and VR (D. Cage, P. Molyneux)

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Presence & Emotions? Presence in VR and VG

- $RV = I^2$
- Interaction in VR and in Video Game
- The Primitives Compartmental
 - Observe
 - Move
 - Act
 - Communicate
- The PCs must be invisible to induce emotions
- The PCs use too much cognition for interaction (A. Grumbach)

Presence & Emotions? Presence in VR and VG

- Immersion = imagination = presence (Bowman, 1999b)
- Immersion (Adams, 2009)
 - Spatial and sensorial and tactile immersion
 - Systemic and psychological and strategically immersion (Emotional)
 - Fictional or narrative immersion (Emotional)
- Presence the key for success in VR and Video Game

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Presence & Emotions? Presence Definitions

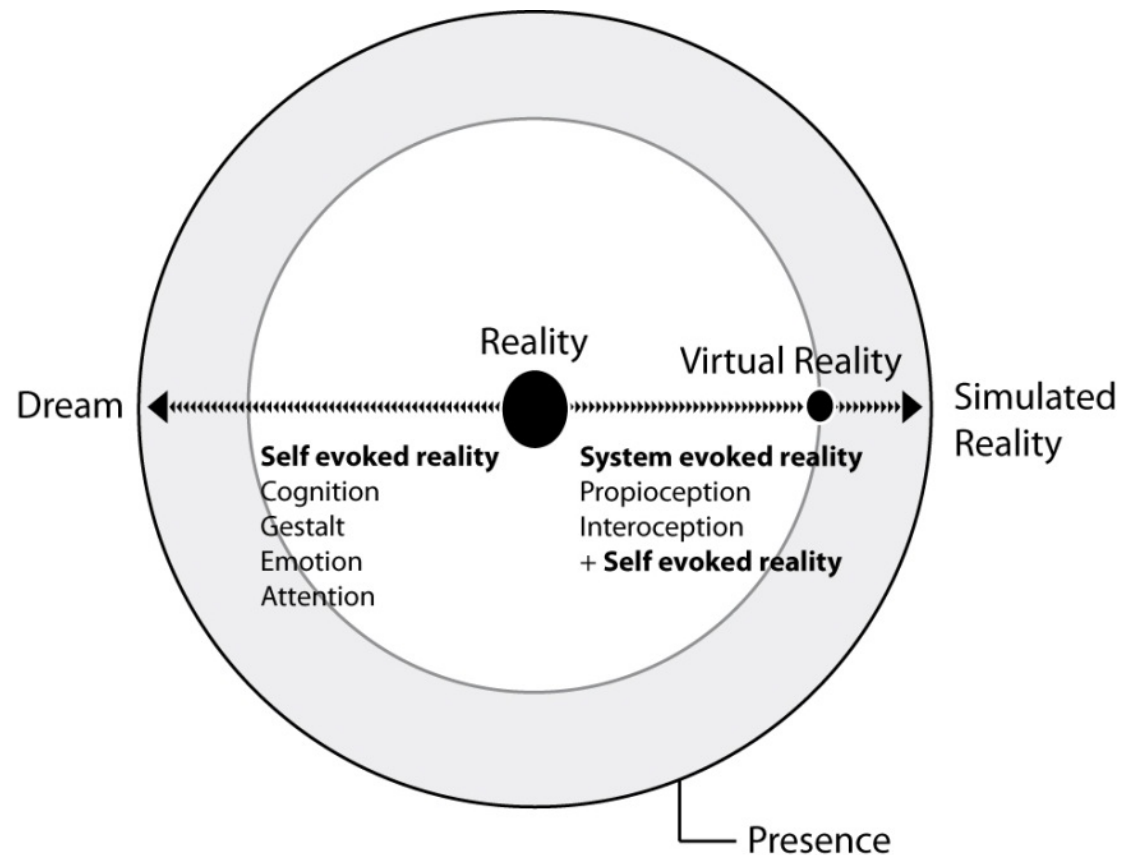
- Presence: “Being there” (Reeves, 1992 ; Slater, 1993)
- The user is somewhere other where he is physically (Slater)
- A perceptive illusion of a non mediation (Lombard & Ditton, 1997)
- A psychological state in which the virtuality of experience is not perceived

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Presence & Emotions? Presence & emotions

- Why presence lead to emotion?



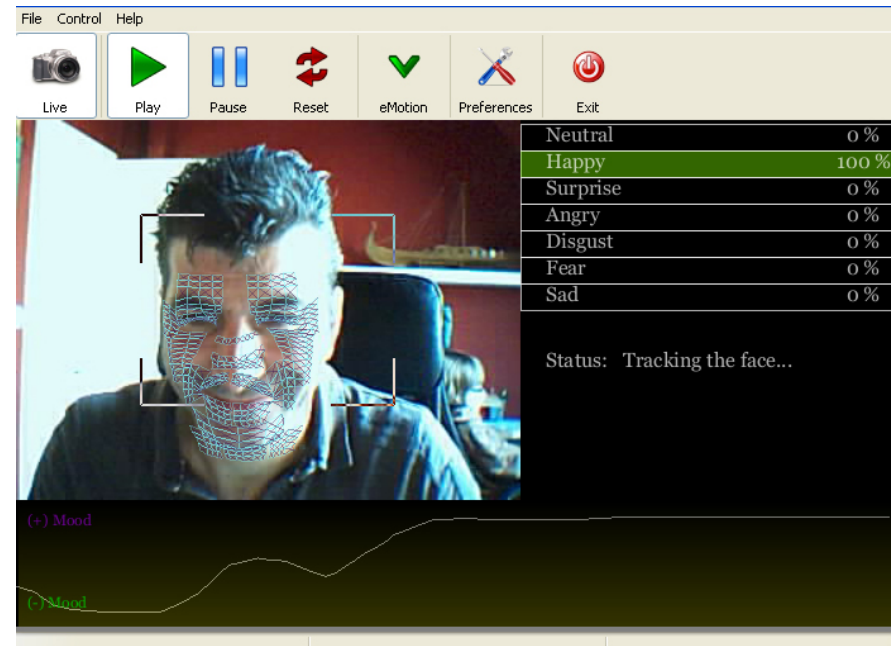
Presence & Emotions? Presence & emotions

- Presence increase with emotions induction
 - For Anxiety as for relaxation and neutral EVs
- Immersion without emotion = surprise effect (Bouvier, 2009)
- Emotions allow user to ignore real world and focus on VR and Video Game (Y. Wang, 2006)
- Emotion create presence and presence create emotion (Bouvier, 2009)

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Presence & Emotions? Measurements

- Five physiologic measurements methods
 - Cardiovascular measures (Dillon, 2000)
 - SCL Skin Conductance Level
 - EGG Electroencephalography
 - Eye measures (Laarni 2003)
 - EMG Facial Activity
- Presence measurements
= emotions measurements



Presence & Emotions? Measurements

- 28 Presence questionnaires (W.Joy & V. Baren, 2004)
 - Sensitivity
 - Robustness
 - Non-intrusive
 - Comfort
 - Internal consistency reliability

Presence & Emotions? Measurements

- BIP Break In Presence Measurements (Slater, 2000)
- The BAAM BIPs And Attention Measure (Geslin, 2011)



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Presence & Emotions? Attention

- Attention whether spontaneous or deliberate captive cognition and emotions (Laarni, 2003) (Ravaja, 2002)
- Gestalt theory of perception
- The meaning to connect to reality is attention (Perls, 2001)
- Two kinds of attention
 - Voluntary attention
 - Involuntary attention
- Attention is an essential component of presence and emotions (Bouvier, 2009)

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Emotions induction in VG & VR / Surprise

- Surprise a basic emotion? (Ekman) (Johnson-Laird, 1992)
- Surprise is an emotional vector
- The degree of novelty is crucial to the emotional level (Finkenauer & al, 1998)
- Technological surprise
- Dramatic surprise (Aristotle)

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Emotions induction in VG & VR / Fear

- Two kind of Fear:
- Basic Fear, Thalamus – Amygdala – Hippocampi (Smith, 1985)
 - Sensorial surprise
 - Sound as a SC Stimulus Conditional (A. Damasio, 1995) (Amnesia 2012) (Pavlov, 1963)

Emotions induction in VG & VR / Fear

- Cognitive Fear, Thalamus – Neo-cortex (Ledoux, 2005)
 - Induced by narrative
 - Hostile environmental conditions
 - Irrational situations
 - Uncontrollable and unavoidable situations (Öhman, 2000)
- This conscious fear is reduced by high levels of oxytocin hormone generate by empathy and sexual desire (Gale, 2009)

Emotions induction in VG & VR / Fear

- Fear is induced by:
 - Dimorphism (N.Girardon, 2011)
 - Nosophobia (Perret, 2000)
 - The Monster is a catalyst of fear (Perron, 2005)
 - Fear of the unknown, brain is constantly looking at appraisals to assess our environment (R. Lazarus, 1984) (Scherer, 1984, 1988)
 - The emotional mimicry (A.R. Damasio, 1995)

Emotions induction in VG & VR / Fear

- Fear is induced by: the Finitude and Death
 - The fear of death (Goleman, 1995)
 - Repetitive mode of death in the video game created anxiety no fear (Oury, 2008)
 - Higher cortical functions are inhibited by addictive routine (Jandrok, 2011)
 - These emotions are based of anxiety no fear
 - These emotions are little memory
 - We must reconnect with fear pleasure (Lacan, 1986)(Flahaut, 1993)
 - We need to reconnect with the finitude

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Emotions induction in VG & VR / Anger

- Anger is a basic and universal emotion (Ekman, 2003)
- A self supply characteristic “Anger feeds on anger” (Goleman, 1995)
- Anger is stronger when it follow an emotional overflow (Zilmann, 1993)
- Anger can be induced in furious battle for survival
- Anger increased by a desire for revenge (Aristotle)
- Anger is often the result of the mark of contempt (Spinoza)

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Emotions induction in VG & VR / Disgust

- Emotional avoidance mechanism
- Avoid spoiled food
- Avoid social and psychological degrading situations (Sherman, 2011)
- Mirror neuron system particularly active (Keysers, 2001)
- Emotional mimicry and survival of the group
- The insula activation: (Wicker, 2003)
 - Bad taste
 - Bad smell
 - Visual recognition of emotion

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Emotions induction in VG & VR / Joyce

- A basic emotion arousal (Ekman, 2007) (Russel, 1980)
- One of the three fundamentals affects (Spinoza)
- Joyce is defined as accomplishment
- Two type of Joyce:
 - Primitive survivor strategy, avoid disagreement
 - Joyce is a consequence of the creation act

Emotions induction in VG & VR / Joyce

- Joyce can be induced by:
- The realization of complexes objectives
- The opposition of other emotion
- The mimicry neuronal strategy
- Links with nostalgia

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Emotions induction in VG & VR / Sadness

- Sadness is one of the basic emotion (Ekman)
- Sadness is a coping mechanism
- It's a emotional pain associated by feeling disadvantage, loss, helplessness, despair and sorrow (Goleman, 1995)
- Sadness is a ontogeny emotion, need to be learn during childhood (R. Skynner & J. Cleese, 1993)
- Sadness can be induce by:
- Mimicry
- Pupil empathy (Harrison & al, 2006)(Harrison & al, 2007)
- Sadness induction by the loss

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Emotions induction in VG & VR / Empathy

- Empathy is a complex social emotion (Russel)
- It's a modern concept to describe emotional relation between people (R. Vischer)
- The way to understand and feel the emotion of others
 - Put themselves in the place of (W.Ditley)
- Two kind of empathy:
 - Emotional empathy
 - Cognitive empathy
- Empathy isn't emotional contagion
- In neuroscience, empathy is capacity to share distress

Emotions induction in VG & VR / Empathy

- Empathy can be induce by:
- Dramaturgy
- Observation by the role of mirror neuron in Broca area
- In video game and VR:
 - First Person view: observation of pain (Quake4)
 - Third view: The other isn't an avatar, but a familiar (Sims, League Of Legend)
- FPS and Simulation: The others isn't a robots, he feel and express pain and sadness as Joyce

To conclude...

Emotions induction / Conclusion

- Emotion are universal, they contribute to our survival
- Emotion are basic and complex
- Basic emotion are more reflexives and animal
- Complex emotions ate the essence of our human nature
- Emotional intelligence develop complex emotion comprehension
- The emotions enable better memory and awareness by presence
- Presence increases attention and emotional attachment to the VE and the game product

Emotions induction / Conclusion

- Emotions can be induced by:
- Dramaturgy
- Conditional Stimuli
- Novelty
- Technology
- Sound
- Environments

Emotions induction / Conclusion

- Monsters
- Finitude
- Objective
- Mimicry
- Nostalgia
- Loss
- Observation

Emotions induction / Conclusion

- Induction of basic and complex emotions is a challenge for the near future in video game as in VR
- To increase addiction.
- Not sensory and reflective addiction, but emotional and affective.
- To live more beautiful story, not just during a part time game.

Thank you!

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Thanks

And feel free to say hello or get in touch via email/twitter



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