



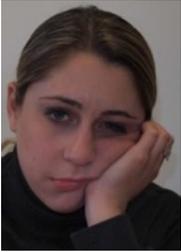
**Ekman**  
 (6/7 emozioni di base)



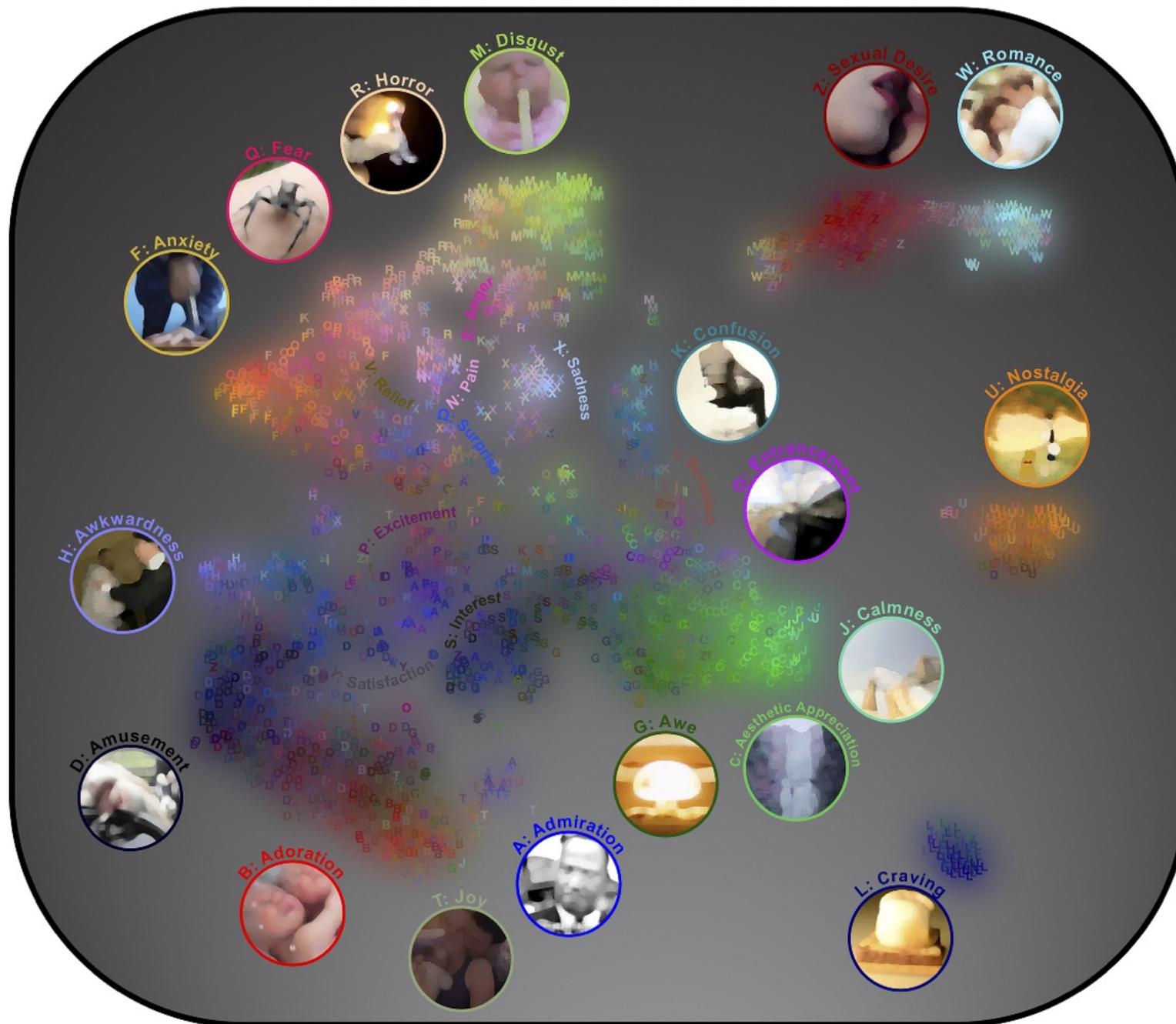
**Plutchik**  
 (8 emozioni di base e  
 “ruota delle emozioni”)

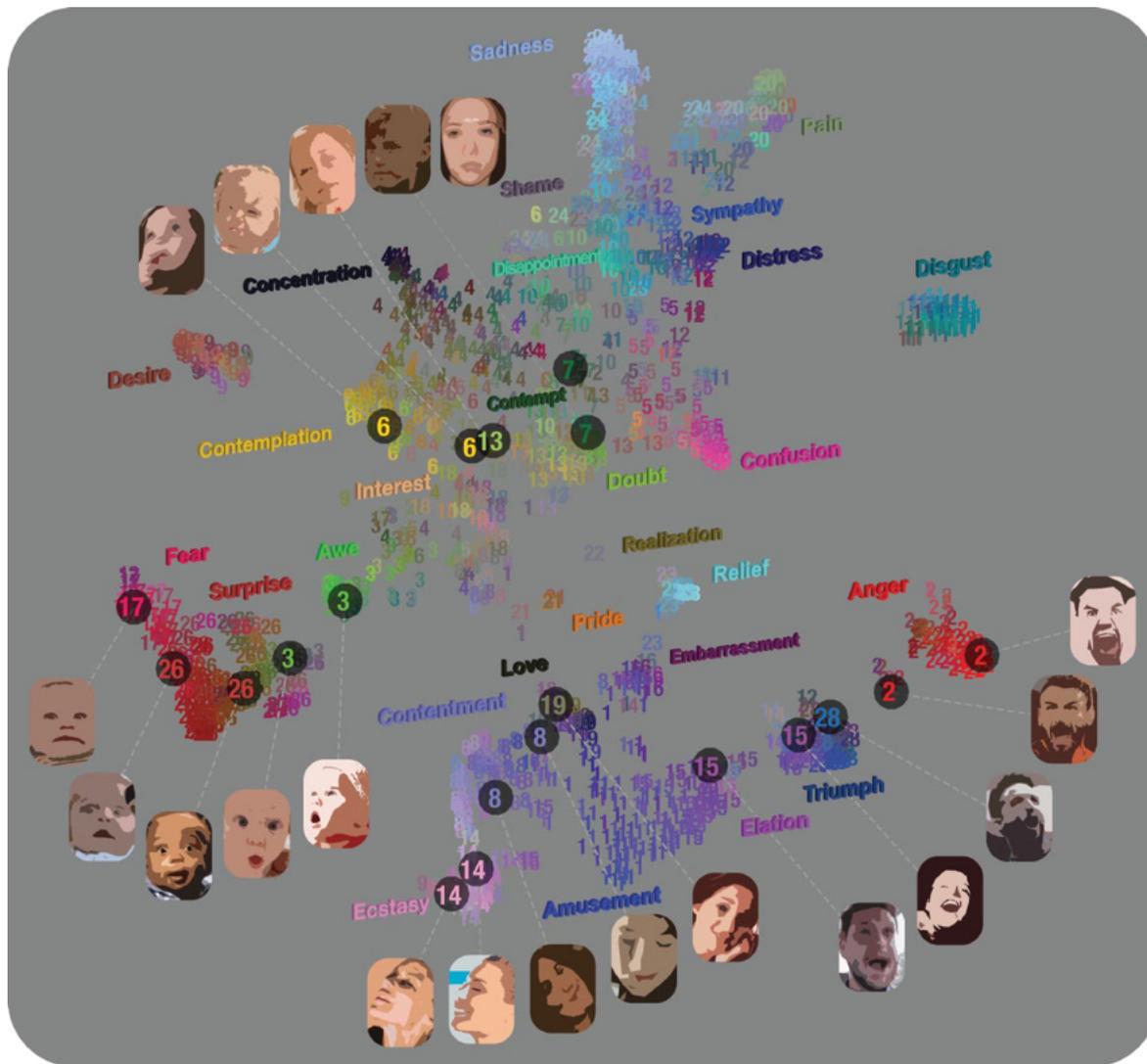
## Sviluppi recenti della BET: 1. espansione della lista delle emozioni di base (da 6 a 25-30 candidate)

Emotion	Signal (shade indicates evidence for universality)			Physiology (shade indicates evidence for cross-cultural reliability)	Neural Correlate (shade indicates evidence of subcortical involvement)	Nonhuman Primates (shade indicates homologues in multiple monkey/ape species)	Evidence
	Facial	Vocal	Tactile				
Amusement	√1,3,6,7,16,20,22	√36,37,39	--	√46,48,49,50,56,96	√94,95,128	√125,127	Strong
Anger	√1,2,3,4,5,22,25	√36,37,38,39,40	√5,42,43	√18,45,46,56	√92,93,100	√125,127	Strong
Desire	√1,20,21,22	√38,39	--	√46,56,59	√94,102,103	√125,127	Strong
Fear	√1,2,3,4,5,22,25	√36,37,38,39,40	X <sup>42</sup>	√5,44,46,56	√92,100	√125,127	Strong
Happiness	√1,2,3,5,16,20,22,25	√40	√43	√5,44,45,46,56,96	√92,93,100	√125,127	Strong
Pain	√1,20,22,30,31,32,43,79	√39	--	√46,76,77,78,80,91	√92,118,119	--	Strong
Pride	√1,6,16,20,22,25,33,35	X <sup>36,38,39</sup>	X <sup>42</sup>	√56,67,82,83,96	√93,117	√125,126	Strong
Shame	√1,3,22,24,25,35	X <sup>36,38</sup>	--	√84,85,86	√104,117	√125,126	Strong
Disgust	√1,2,3,4,5,22,25	√36,37,38,39,40	--	√5,44,46,56	√92,94,100	--	Moderate
Sadness	√1,2,3,4,5,22,25	√36,37,38,39	√43	√5,44,45,46,47,56	√92,94,95,100	--	Moderate
Surprise	√1,2,3,5,22,25	√36,37,38,39	X <sup>42</sup>	√5,44,46,56	√100,121	--	Moderate
Awe	√3,6,8,16	√36,39	--	√51,52,53,96	√92,93,97,98,99	--	Emerging
Contempt	√2,4,15	√36,38,39,40	--	--	√101	--	Emerging
Embarrassment	√1,3,12,20,22,23,24,25	√36,39	√42,43	√56,60,61,62,63	√104,105,106,107	--	Emerging
Envy	X <sup>26</sup>	√36	X <sup>42</sup>	√51,64	√107,108,109	--	Emerging
Gratitude	√16	X <sup>36</sup>	√42,43	√65,66,96	√110,111,112	--	Emerging
Guilt	√24	--	√42,43	√67,68,69,70	√93,104	--	Emerging
Love	√3,16,20,29	X <sup>36,38</sup>	√42,43	√56,59,73,74,75,96	√113,114,115,116	--	Emerging
Sympathy	√1,20,22	X <sup>36,39</sup>	√42,43	√87,88,89,90	√122,123,124	--	Emerging
Boredom	√1,9,10,11,22	√40	--	√10,11,54,55	--	--	Nascent
Contentment	√1,3,16,22	√38,39,41	--	√46,56,96	--	--	Nascent
Coyness	√1,17,18,22	--	--	√57,58	--	--	Nascent
Interest	√1,16,20,22,27,28	√36,38,39	--	√71,72,96	--	--	Nascent
Relief	--	√36,31,40	--	√56	√120	--	Nascent
Confusion	√1,12,13,14,22	--	--	--	--	--	Weak
Triumph	--	√36,39	--	--	--	--	Weak

Boredom		43 + 55	Eyelids drooping, head tilted, (not scored with FACS: slouched posture, head resting on hand)
Contentment		12 + 43	Smile, eyelids drooping
Embarrassment		7 + 12 + 15 + 52 + 54 + 64	Eyelids narrowed, controlled smile, head turned and down, (not scored with FACS: hand touches face)
Interest		1 + 2 + 12	Eyebrows raised, slight smile
Pain		4 + 6 + 7 + 9 + 17 + 18 + 23 + 24	Eyes tightly closed, nose wrinkled, brows furrowed, lips tight, pressed together, and slightly puckered

## 2. Mappe multidimensionali delle emozioni basate su grandi campioni, con migliaia di stimoli

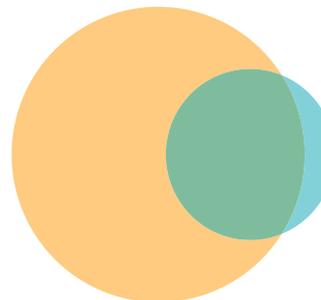




1. **Amusement** happiness, laughter, extreme happiness, **amusement**
2. **Anger** **anger**, boiling with anger, angry contempt, feeling mad
3. **Awe** **awe**, surprise, awestruck surprise, wonder
4. **Concentration** **concentration**, deep focus, determination, focus
5. **Confusion** **confusion**, feeling perplexed, bewilderment, dumbfoundedness
6. **Contemplation** **contemplation**, thoughtfulness, pondering, concentration
7. **Contempt** **contempt**, annoyance, disapproval, distrust
8. **Contentment** **contentment**, relaxation, peacefulness, calmness
9. **Desire** **desire**, lust, feeling flirtatious, feeling sexy
10. **Disappointment** **disappointment**, sadness, regret, frustration
11. **Disgust** **disgust**, feeling grossed out, extreme disgust, disgusted contempt
12. **Distress** **worry**, anxiety, **distress**, nervousness
13. **Doubt** **doubt**, distrust, suspicion, contemptuous doubt
14. **Ecstasy** **ecstasy**, sensory pleasure, bliss, extreme pleasure
15. **Elation** extreme happiness, happiness, excitement, laughter
16. **Embarrassment** **embarrassment**, shyness, amused embarrassment, embarrassed relief
17. **Fear** **fear**, feeling scared, extreme fear, bone-chilling terror
18. **Interest** **interest**, childlike curiosity, curiosity, wonder
19. **Love** **love**, happiness, feeling loved, romantic love
20. **Pain** **pain**, severe pain, angry pain, feeling hurt
21. **Pride** pride in country, **pride**, honor, patriotism
22. **Realization** inspiration, **realization**, feeling dumb, deep relief
23. **Relief** **relief**, deep relief, feeling worn out, heart sinking
24. **Sadness** **sadness**, extreme sadness, crying, feeling upset
25. **Shame** **shame**, disappointment, sadness, self-dissatisfaction
26. **Surprise** **surprise**, shock, awestruck surprise, extreme surprise
27. **Sympathy** concern, compassion, pity, caring
28. **Triumph** **triumph**, excitement, great triumph, pride

Cowen et al. (2019)

Variance in  
28 Emotion  
Categories



Variance in  
Basic Six  
Emotions

# Il dibattito sull'universalità

*Stem and Leaf Plot of Mean Proportion Cross-Cultural Accuracy of Emotion Recognition (N = 162)*

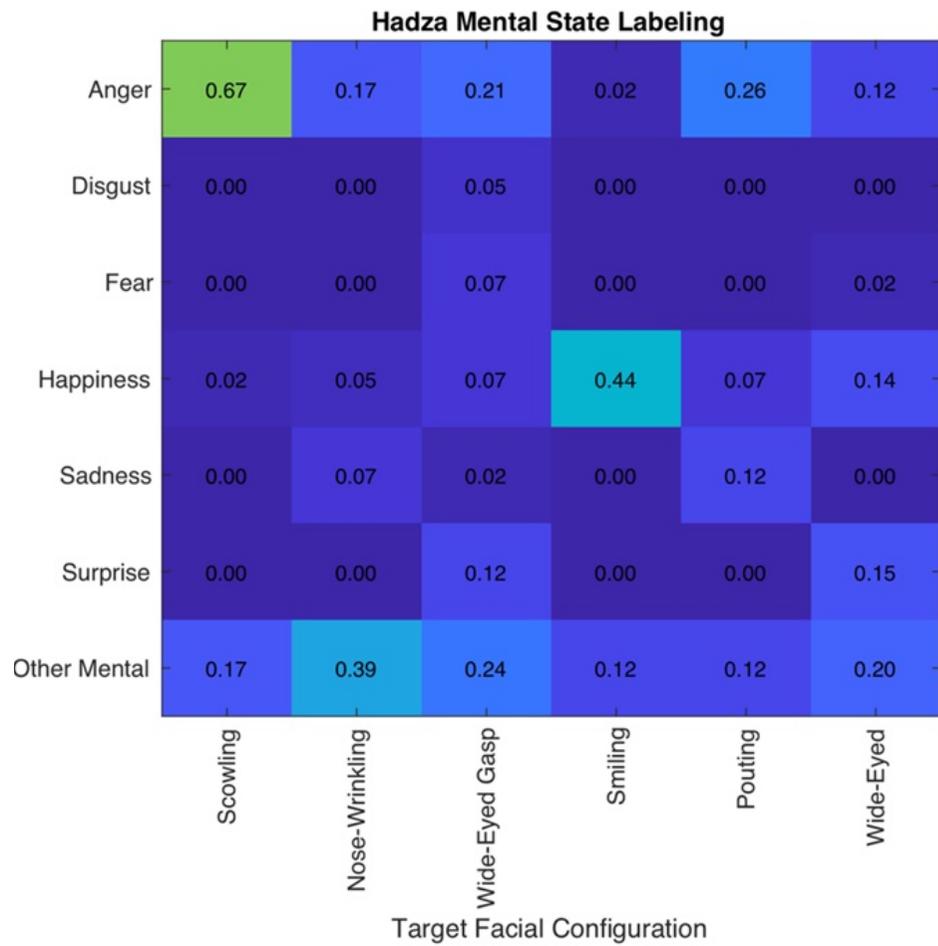
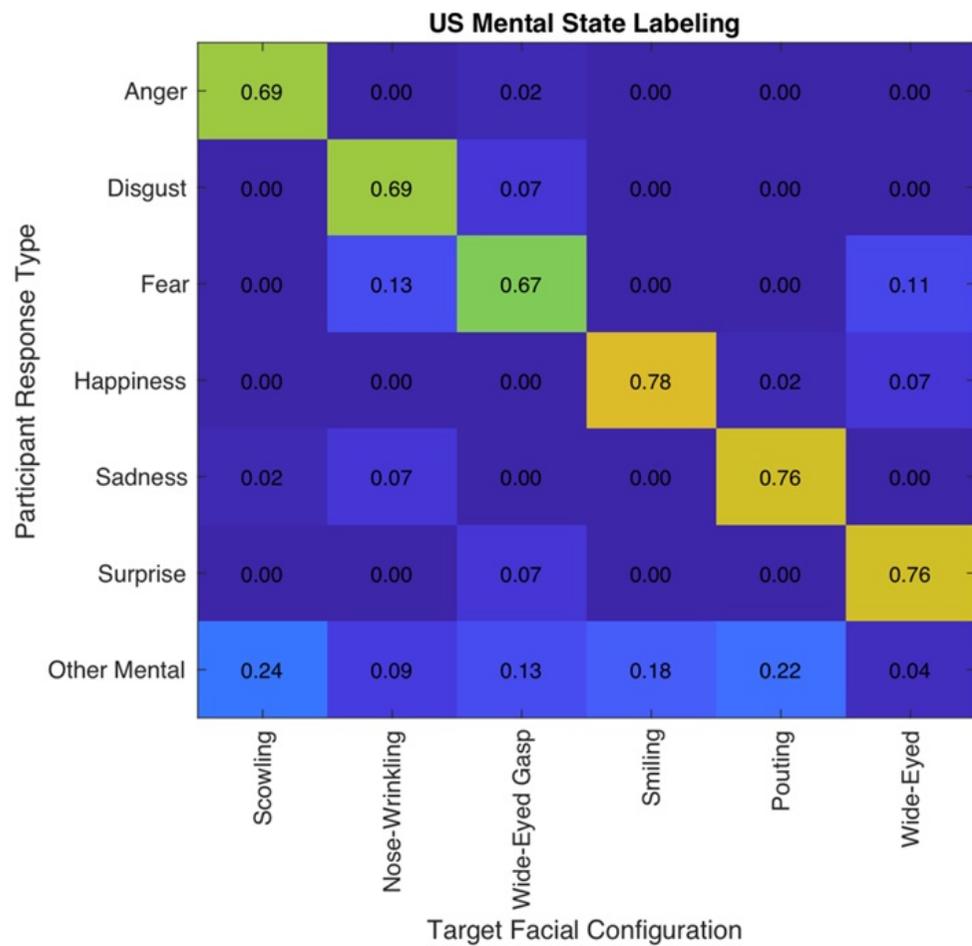
Stem	Leaf
.9	1, 2, 3
.8	5, 6, 6, 7, 7, 9, 9
.8	0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 3, 3, 4, 4, 4,
.7	6, 6, 7, 7, 7, 7, 8, 9, 9, 9, 9
.7	0, 1, 1, 1, 2, 2, 2, 2, 2, 3, 3, 4, 4, 4, 4
.6	5, 5, 5, 5, 5, 7, 8, 8, 9, 9
.6	0, 0, 0, 0, 1, 1, 2, 2, 2, 2, 3, 3
.5	6, 6, 6, 6, 7, 7, 7, 8, 8, 8, 8, 9, 9, 9, 9, 9, 9, 9
.5	0, 0, 0, 0, 0, 1, 2, 2, 3, 3, 3, 4, 4, 4
.4	6, 6, 6, 7, 7, 7, 7, 7, 7, 7, 8, 8, 9, 9, 9, 9
.4	0, 0, 1, 2, 2, 2, 2, 2, 3, 3, 3, 4, 4
.3	5, 6, 7, 8, 8, 9, 9
.3	0, 1, 2, 4,
.2	6, 6, 6, 6, 7, 7, 8
.2	1, 3, 4, 4
.1	8
.1	1, 2
.0	
.0	0, 3

## Meta-analisi di Elfenbein e Ambady (2002)

**Universalità di fondo** (accuratezza media = 58%)  
 ma anche **“dialetti”** locali nell'espressione emotiva

*Stem and Leaf Plot of Proportion In-Group Advantage in Cross-Cultural Emotion Recognition (N = 168)*

Stem	Leaf
.7	7
.5	3
.5	1
.4	
.4	6
.4	5
.4	
.4	1
.3	8, 9
.3	6
.3	5
.3	3
.3	0, 0, 1
.2	8, 9
.2	7, 7, 7
.2	
.2	2, 2, 3
.2	0, 1
.1	8, 8, 8, 9, 9, 9, 9
.1	6, 6, 6, 6, 7, 7
.1	4, 4, 4, 5, 5, 5, 5, 5, 5
.1	2, 2, 2, 2, 2, 3, 3
.1	0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 1
.0	8, 8, 8, 8, 8, 8, 8, 8, 8, 9, 9, 9, 9, 9, 9, 9, 9
.0	6, 6, 6, 6, 6, 6, 6, 6, 6, 7, 7, 7, 7
.0	4, 4, 4, 4, 4, 4, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5
.0	2, 2, 2, 2, 2, 2, 3, 3, 3, 3, 3, 3, 3
.0	0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1
-0	0, 0, 1, 1, 1, 1
-0	3, 3, 3
-0	4, 4, 5, 5, 5
-0	6, 6
-0	8
-1	0
-1	2, 2, 3, 3
-1	5
-1	
-1	
-2	0
-2	2
-2	5
-2	
-2	
-2	
-3	0



Matsumoto et al. (2008, 2009): espressioni di orgoglio nella **cecità congenita**

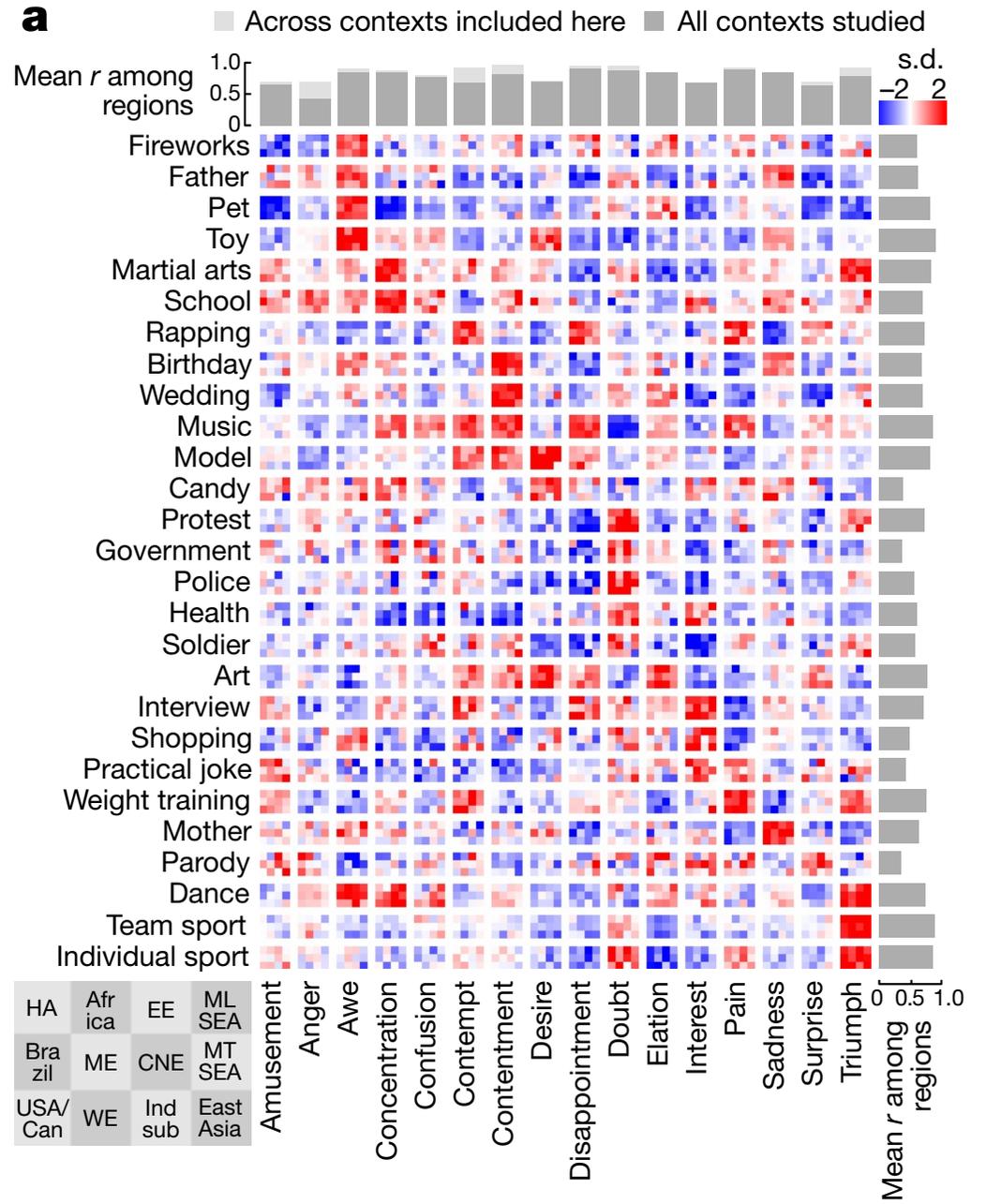
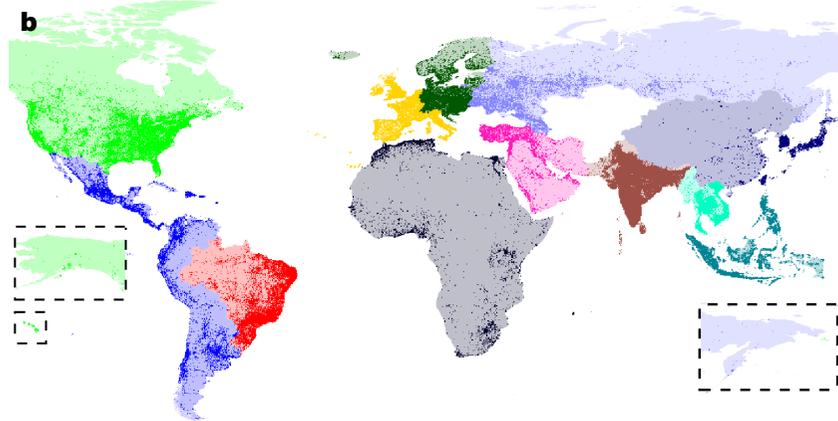
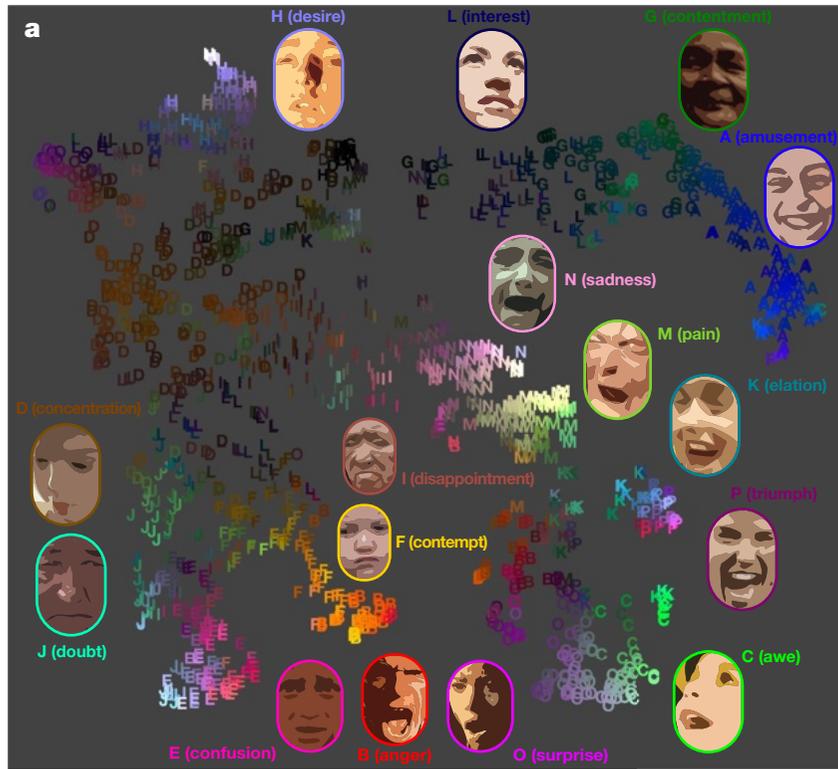


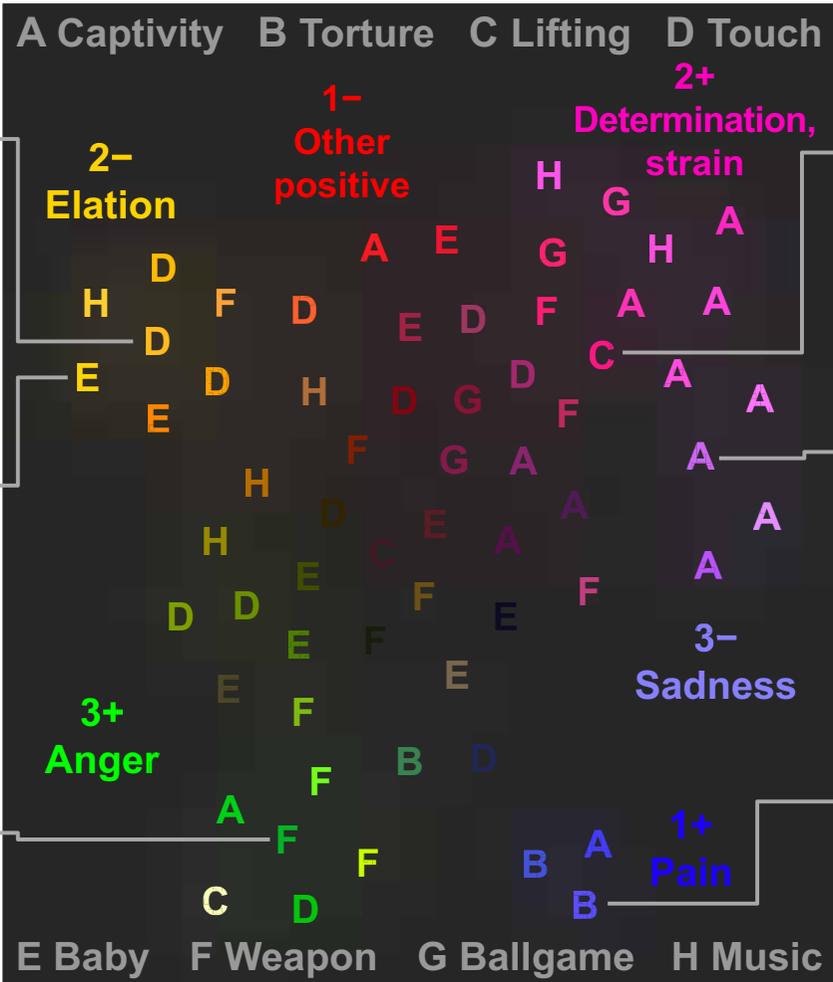
**Fig. 3.** Pride expression in response to victory shown by a sighted (*left*) and congenitally blind (*right*) athlete.

*Pearson and Spearman (in Parentheses) Correlations Between Congenitally Blind, Noncongenitally Blind, and Sighted Athletes on Relative Proportions of Individual FACS AUs (Top Right) and EMFACS Categories (Bottom Left)*

Blind status	Congenitally blind	Noncongenitally blind	Sighted
Match completion			
Congenitally blind	—	.88** (.74**)	.85** (.77**)
Noncongenitally blind	.63* (.56*)	—	.96** (.83**)
Sighted	.29 (.26)	.82* (.44 <sup>†</sup> )	—
Receiving medal			
Congenitally blind	—	.97** (.71**)	.96** (.51**)
Noncongenitally blind	.99** (.47 <sup>†</sup> )	—	.98** (.38*)
Sighted	.99** (.48 <sup>†</sup> )	.99** (.48 <sup>†</sup> )	—
On podium			
Congenitally blind	—	.90** (.37*)	.92** (.51**)
Noncongenitally blind	.94** (.69*)	—	.95** (.71**)
Sighted	.98** (.71*)	.95** (.68*)	—



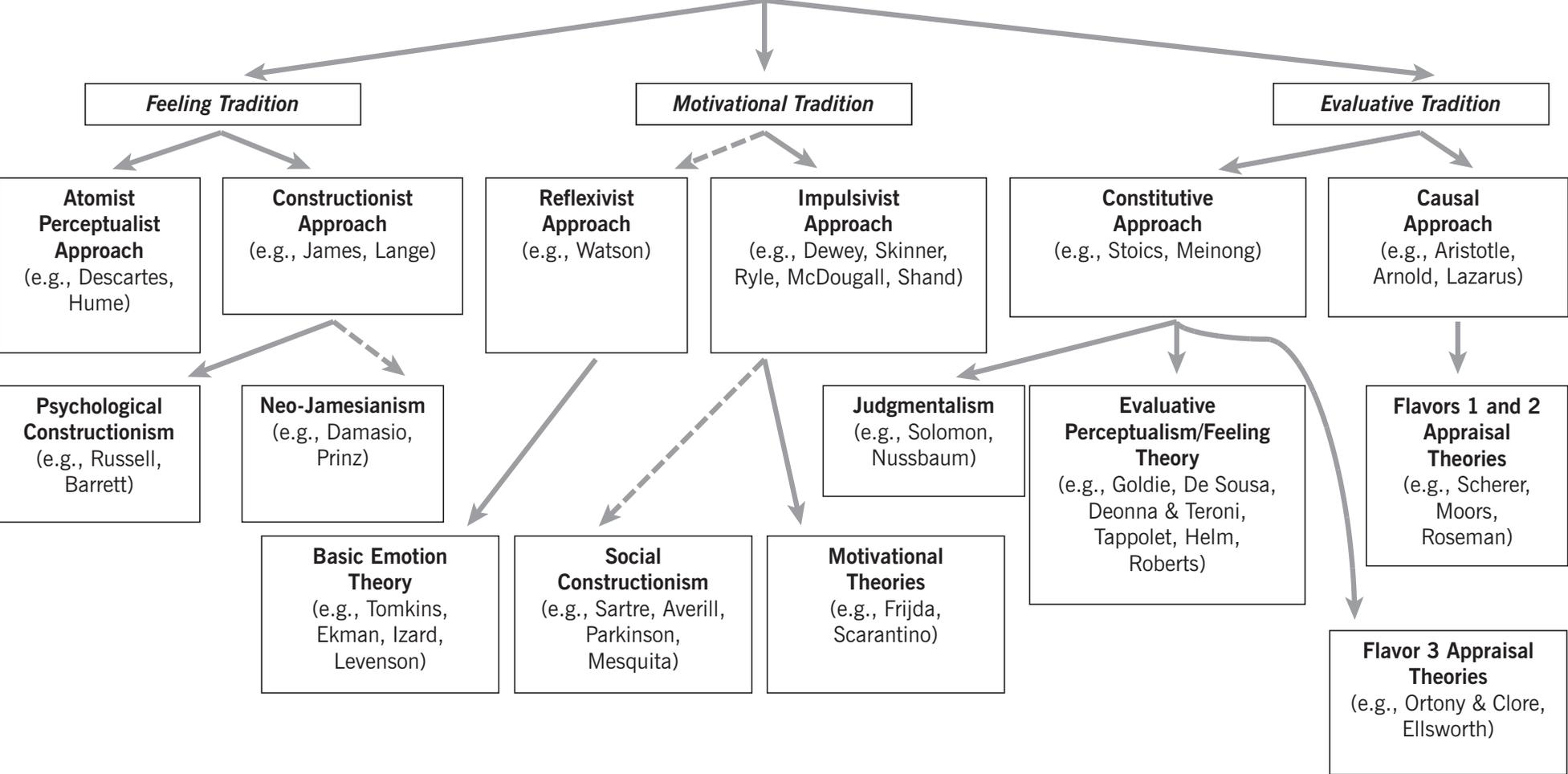




Cowen & Keltner (2020)



**Emotion Theories: A Family Tree**



# L'approccio costruttivista

**Meccanismi specializzati** (“programmi” ecc.) che generano specifiche emozioni



Critiche principali:

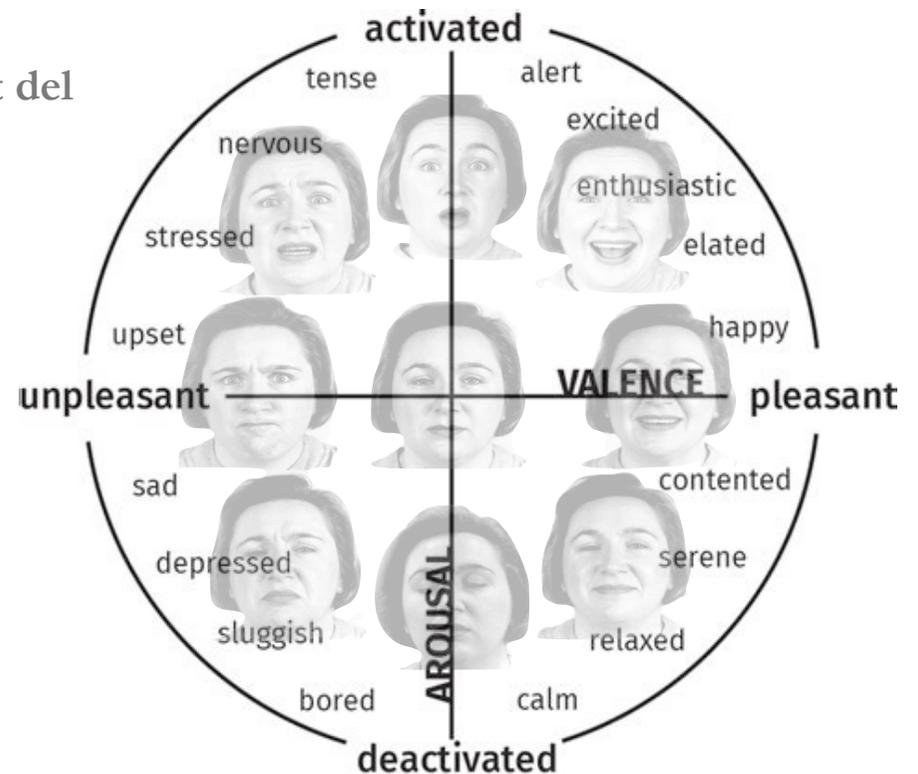
- **universalità** supportata solo in parte, con eccezioni e risultati negativi
- scarsa **coerenza** tra esperienza, espressioni, fisiologia, comportamenti...
- **dipendenza dal contesto** di espressioni e percezione

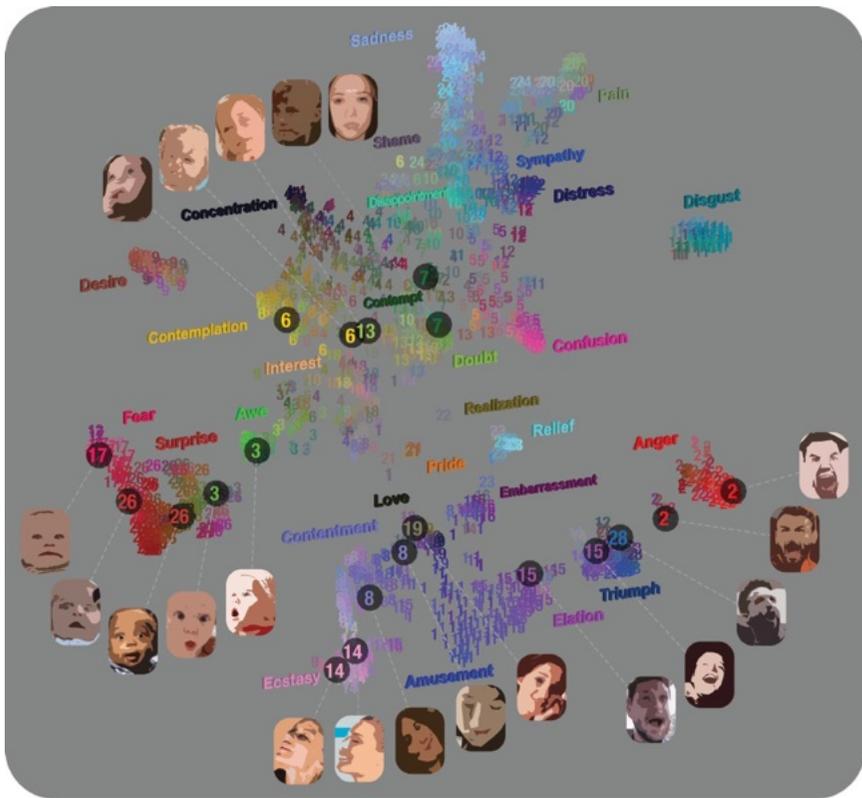


**Meccanismi generali** i cui output vengono interpretati come specifiche “emozioni”

Russell: il **core affect** (stato affettivo di base) come input del processo costruttivo

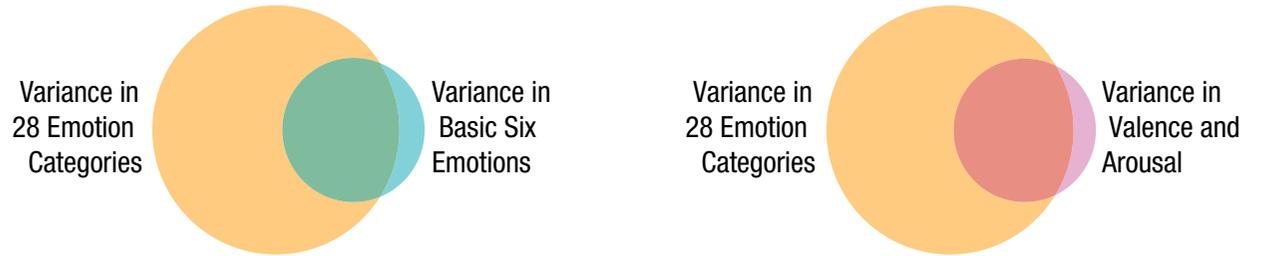
- Due dimensioni: **arousal** (attivazione) e **valenza**
- Le espressioni facciali esprimono **arousal + valenza**
- Base per la tesi dell’**“universalità minima”**



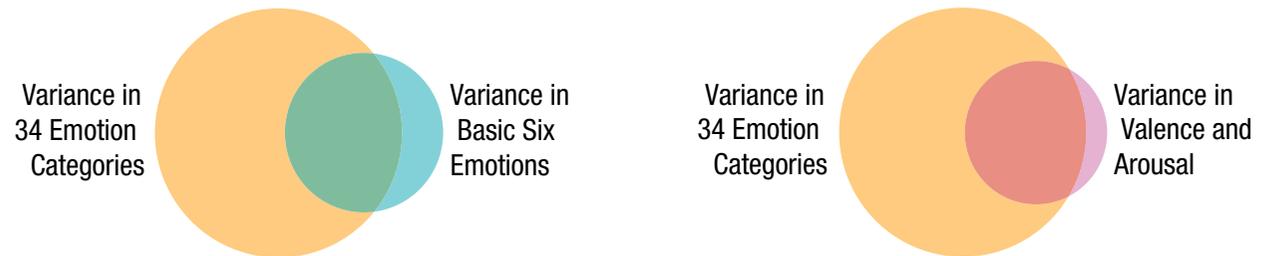


Cowen et al. (2019)

Facial/Bodily Expressions



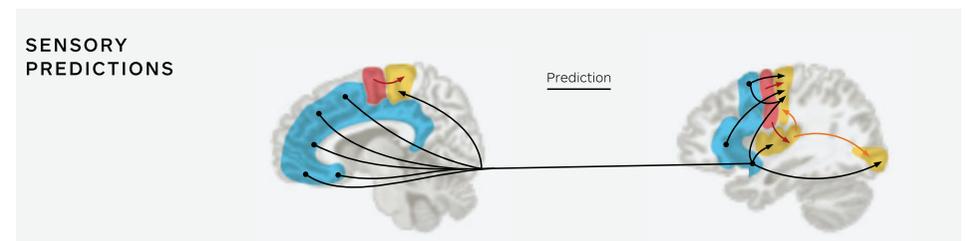
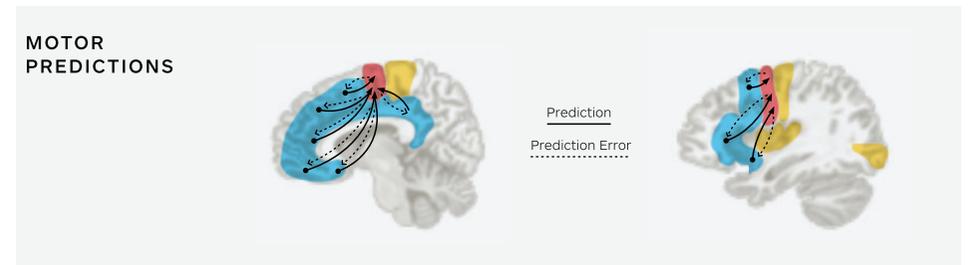
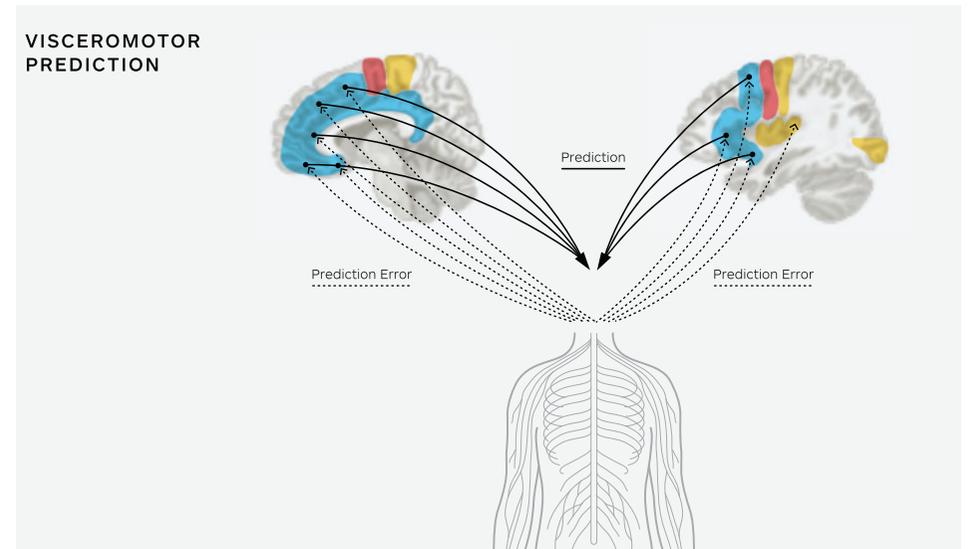
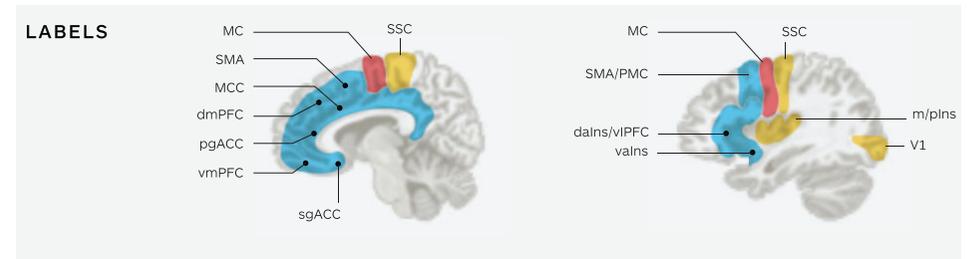
Reported Emotional Experiences





## Lisa Feldman Barrett: teoria dell'emozione costruita (TCE)

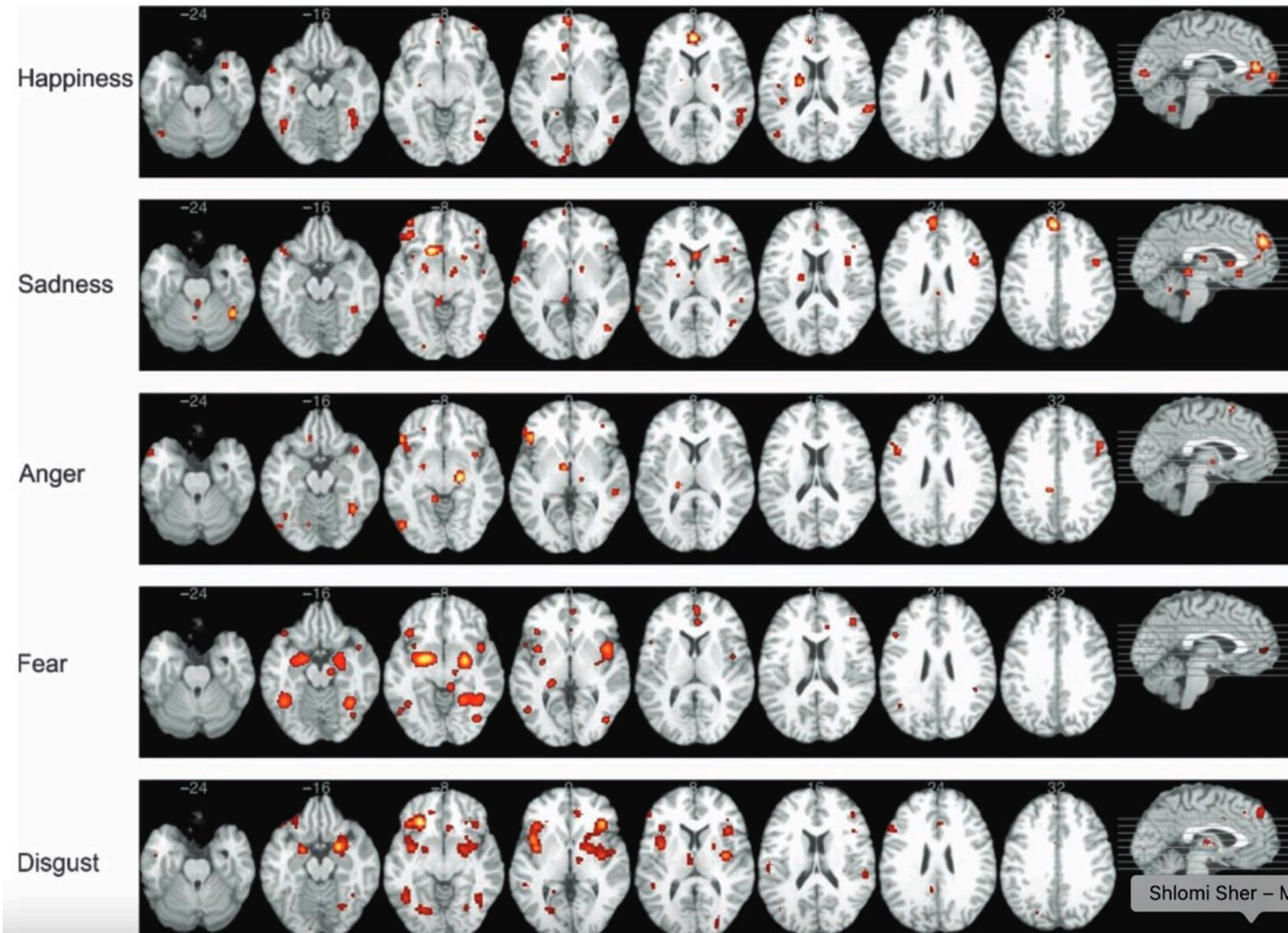
- Basata sulla teoria del **“predictive brain”**
- Il cervello **costruisce continuamente concetti e categorie** per identificare, spiegare e predire gli input (sia sensoriali che enterocettivi)
- Le emozioni vengono costruite **allo stesso modo delle altre percezioni, dagli stessi meccanismi**
- Si ha un'episodio emozionale quando una certa configurazione di input viene **categorizzata come un'emozione** (ad es. “rabbia”)
- “Emozioni di base” e altri meccanismi specializzati riflettono una fallacia **essenzialista**



**Table 2.** Selected neuroscience evidence supporting the theory of constructed emotion

Observation	Method	Example Citations
Degeneracy: mapping many neurons, regions, networks or patterns to one emotion category	Human neuroimaging: task-related data	(Vytal and Hamann, 2010; Lindquist et al., 2012; Wilson-Mendenhall et al., 2011, 2015; Oosterwijk et al, 2015)
Degeneracy: mapping many neurons, regions, networks or patterns to one emotion category	Human neuroimaging: multi-voxel pattern analysis	(Clark-Polner, Johnson and barrett, 2016); compare the different patterns for a given emotion category across (Kragel and LaBar, 2015; Wager et al., 2015; Saarimaki et al., 2016)
Degeneracy: mapping many neurons, regions, networks, or patterns to one emotion category	Intracranial stimulation in humans	(Guillory and Bujarski, 2014)
Degeneracy: mapping many neurons, regions, networks, or patterns to one emotion category	Behavioral observations in humans with amygdala lesions	(Becker et al., 2012; Mihov et al., 2013)
Degeneracy: mapping many neurons, regions, networks, or patterns to one emotion category	Optogenetic research showing many to one mappings for behaviors in rodents	(Herry and Johansen, 2014)
Neural reuse: Mapping one neural assembly to many emotion categories	Human neuroimaging: task-related data	(Vytal and Hamann, 2010; Wilson-Mendenhall et al., 2011; Lindquist et al., 2012)
Neural reuse: Mapping one neural assembly to many emotion categories	Human neuroimaging: intrinsic connectivity data	(Wilson-Mendenhall et al., 2011; Barrett and Satpute, 2013; Touroutoglou et al., 2015)
Neural reuse: Mapping one neural assembly to many emotion categories	Optogenetic research and some lesion research in rodents	(Tovote et al., 2015)
Predictive coding explains aversive ('fear') learning	Optogenetic research and some lesion research in rodents	(Furlong et al., 2010; McNally et al., 2011; Li and McNally, 2014)
Emotion concepts are embodied	Human neuroimaging: task-related data	(Oosterwijk et al., 2012, 2015)
Multimodal summaries of emotion concepts are represented in the default mode network	Human neuroimaging: task-related data	(Peelen et al., 2010; Skerry and Saxe, 2015)
Default mode and salience network interconnectivity is associated with the intensity of emotional experiences (as distinct from arousal)	Human neuroimaging: task-related data	(Raz et al., 2016)
Embodied simulations are associated with increased activity in primary interoceptive cortex	Human neuroimaging: task-related data	(Wilson-Mendenhall et al., under review)

## Emozioni di base nel cervello?





## B CLASSIFICATION ACCURACY

True class	Anger	Disgust	Fear	Happy	Sad
Anger	0.43	0.07	0.28	0.15	0.08
Disgust	0.03	0.76	0.08	0.08	0.06
Fear	0.02	0.04	0.86	0.06	0.03
Happy	0.00	0.07	0.23	0.58	0.11
Sad	0.00	0.07	0.20	0.09	0.65

Anger Disgust Fear Happy Sad  
Classification based on brain

## C ESTIMATED INTENSITY MAPS FOR FIVE EMOTION CATEGORIES

