Application to the medical field of voice emotion recognition ST

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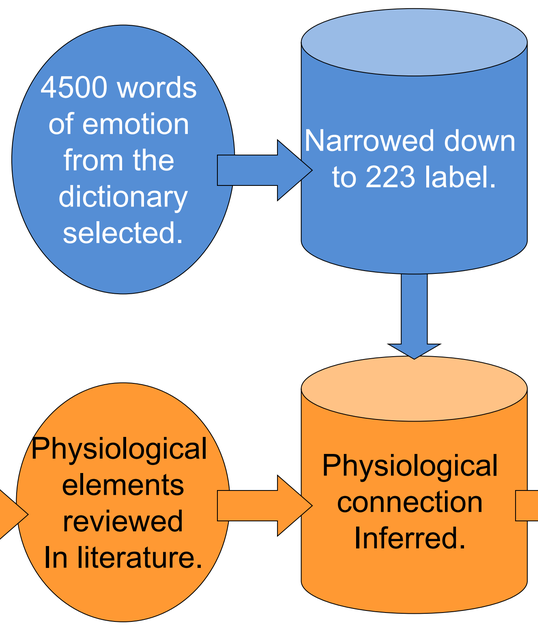
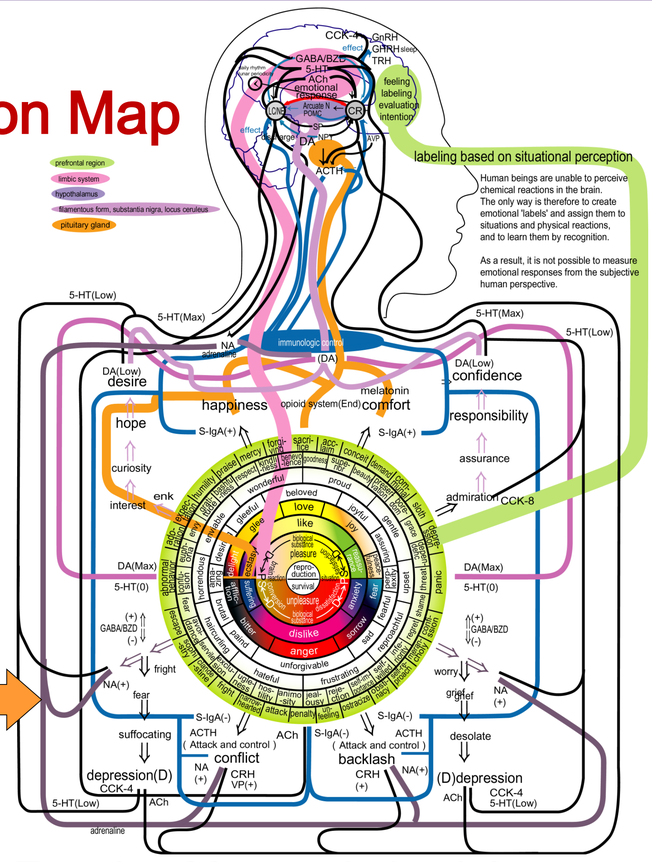
What is ST ? (ST = Sensibility Technology)

To detect the Emotion from the Voice!

matter	excitement	stress	anxiety	disgust	agonism	fear	depression	pleasure/unpleasure	stability	euphoria	expectation	heartrate	pupil	sympathetic	sweat	body temperature	blood pressure	cycle	immune
CRH	arousal	○ ACTH○	◎		◎		◎				○	◎					◎	biorhythms	
Neuropeptide Y(NPY)	calm	○ CRH ◎	○ ×	NA×															
Cortisol		○																	
Vasopressin(VP)		○ homeostatic			◎	◎								active immune functions			◎	biorhythms	
ACTH		○			◎ ×											×			
CCK-4	front◎		○ ◎ strong			○ ◎ strong	○								○				
CCK-8	all◎ front ×								○										
Melatonin		○ ×						happiness	○			×		forgetting				biorhythms	active immune
Opioid peptide	calm		NA×			NA×		pleasure		○				motion pleasure					inhibiting immune
β-endorphin		CRH×										◎					◎		
Acetylcholine		CRH◎					◎												
Noradrenalin	◎	CRH◎ △	◎	◎	◎	◎	◎					◎	expansion	tension memory					
Adrenaline		CRH◎ △	◎		◎	×◎						◎	expansion	tension					
Dopamine	◎	CRH◎			◎		low◎							memory					
Serotonin		CRH◎	◎ ×		low◎	◎	◎												
Angiotensin		CRH◎																	
Galanin		CRH◎	×																
Somatostatin		CRH×																	
α~ MSH		CRH×														×			
GABA		CRH×	NA×			NA×													
Benzodiazepine		×	◎																
Diazepam			NA×			NA×				○									
Ethanol			NA×			NA×													
Enkephalin																			
β-carboline			○ ◎																
Isoprenaline			◎																
Yohimbine			◎																
Fenfluramine			◎																
Sodium lactate			◎																
CO_2			◎ strong			◎ strong													
Caffeine	arousal		◎																
Galanin			× ↑																
Oxytocin	×	×	× ↑															maternal behavior	
FMRF Amide			×		◎ ↑														
Testosterone			×		◎ strong														
Androgen			×		◎														
Estrogen			×		×														
Progesterone					×														
Corticoid						○													

Assumption of Emotion Map



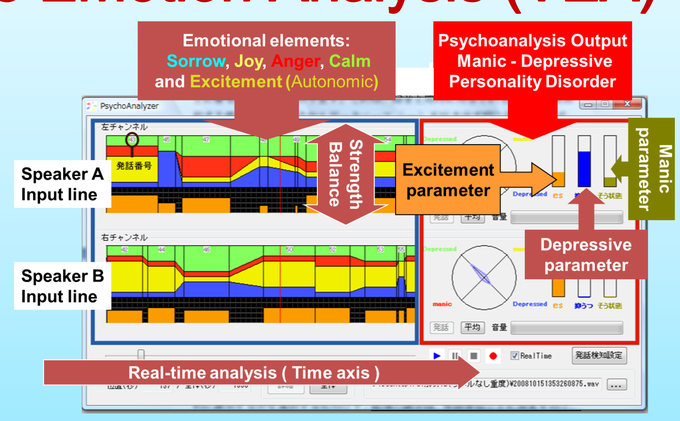


Emotion Map and physiology

Purpose

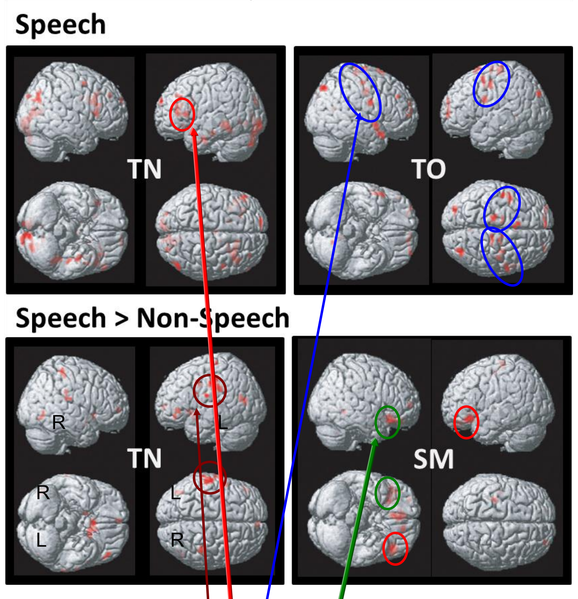
The research to detect the stress, PTSD and depression from the voice which analyzes an emotions activity in brain.

Voice Emotion Analysis (VEA) System



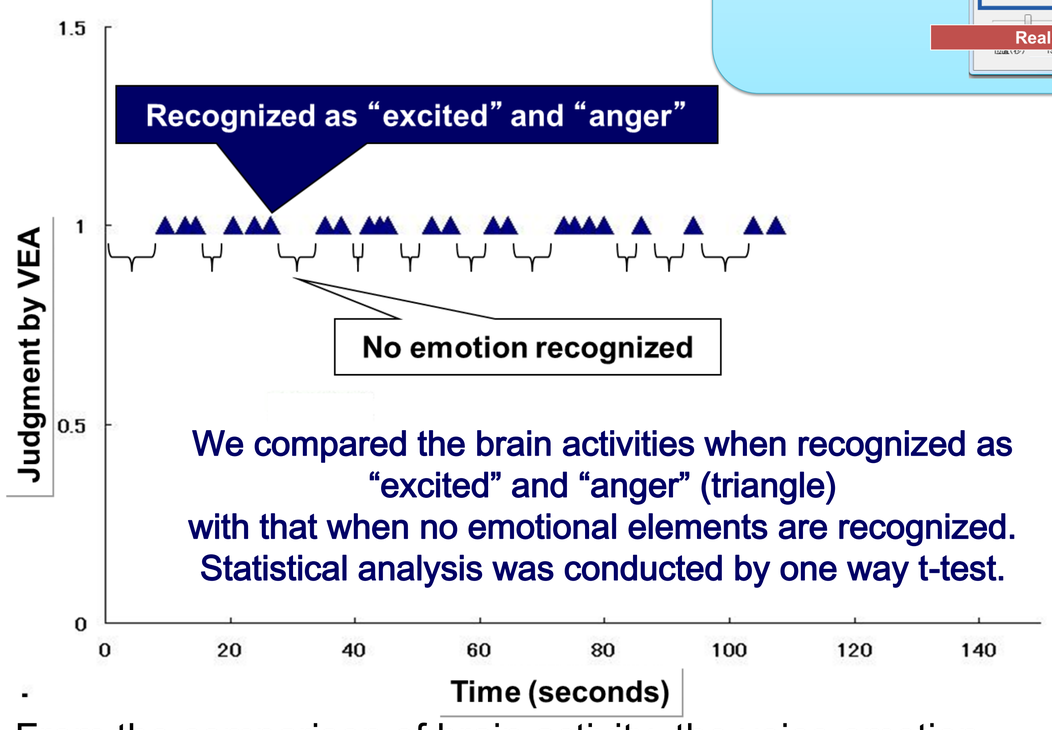
Experimental Results

By Using Voice emotion recognition which developed by AGI Inc., the emotion activity state of the brain was compared using fMRI(3T).



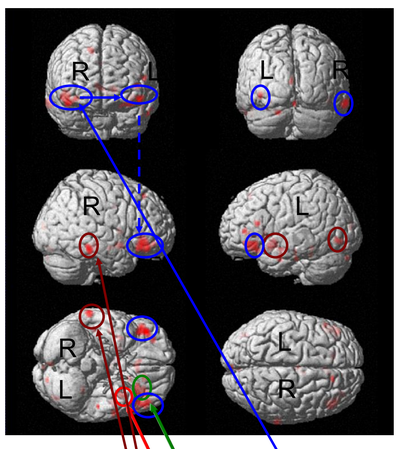
BOLD activation
- Motor cortex
  < Mouse movement
- Blocca area
  < Speech generation
- Welnicke area
  < Speech recognition >
- Right Blocca area
  < Sympathy, mirror neuron >

Emotion elicited in conversation?



We compared the brain activities when recognized as "excited" and "anger" (triangle) with that when no emotional elements are recognized. Statistical analysis was conducted by one way t-test.

From the comparison of brain activity, the voice emotion recognition ST had detected with the negative emotion activity in 99.9% of accuracy only when at the time of negative brain emotions activity. Moreover, correlation with a Self-Defense official's stress reaction was also able to be taken. "voice emotion recognition ST" could detect the change of emotion depend on the stress in field condition. The result suggested that the techniques of emotion recognition may be used for screening of mental status in military situation.

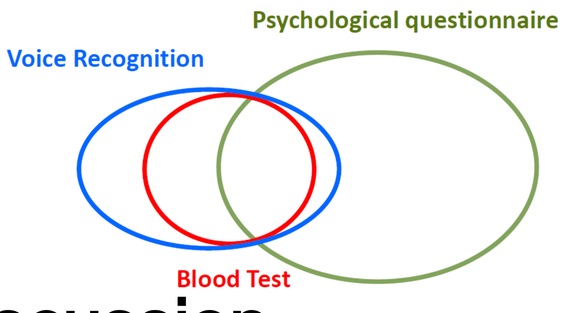


Activation area:
(t-test, p<0.001, = 99.9% uncorrected)

1 . Left and right frontal BA44,45
< L:speech generation, R: sympathy >
2 . Left dorsofrontal BA12
< hormonal control, suppressive emotion >
3 . Left amygdalate complex
< negative emotion >
4 . L/R inferotemporal
< visual imagery, body image >

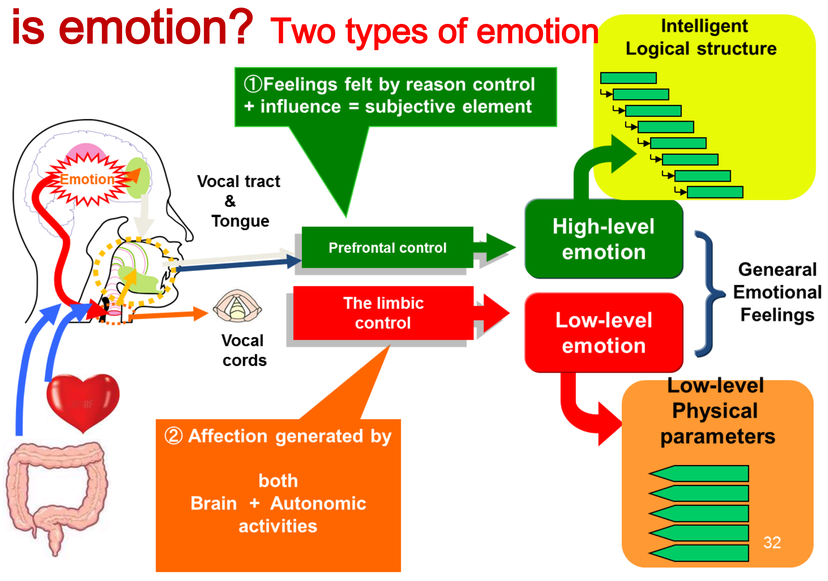
Why visual area? S's imagined experimenters face.

By NICT & AGI (2005-2008)

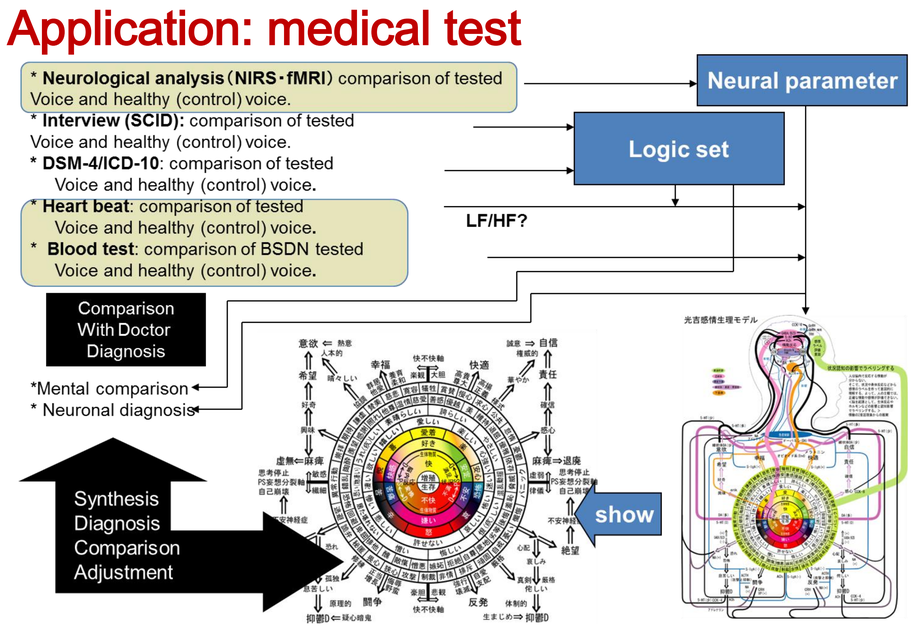


Discussion

Where is emotion? Two types of emotion



Application: medical test



Acknowledgement

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