The application of emotion and mind recognition in voice
Quantitative measurement technology of emotion

The University of Tokyo
The Department of Technology
The Department of Medicine

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16.3.2012

www.agi-web.co.jp

Sentience System Computer

- Just simple
- Beyond your gender, age or nationality
- To be analyzed your emotions and mind
- Scientific real-time measurement

Anger | Anxiety | Excitement
Joy | Relief | Calmness
Sadness | Pain | Dis/pleasure

Visualized emotions and its strength in colors

SENSIBILITY ST TECHNOLOGY

ST/PST Review

ST = Sensibility Technology

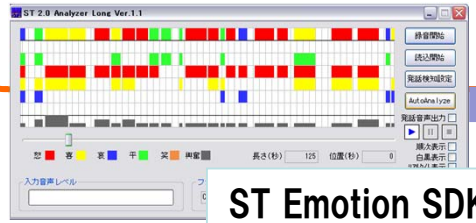
VEA = Voice Emotion Analysis

PST = Psychoanalysis System Technology

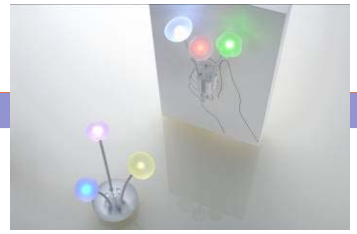
Visualized emotions （ST/VEA）

Recognized emotions from voice (VEA) soon after utterance（for **9** emotions）
Shows even complex emotions easy
displayed in colors and degrees (volume/strength)

To know feelings ：Analyzed emotions in colors and shows its quantities

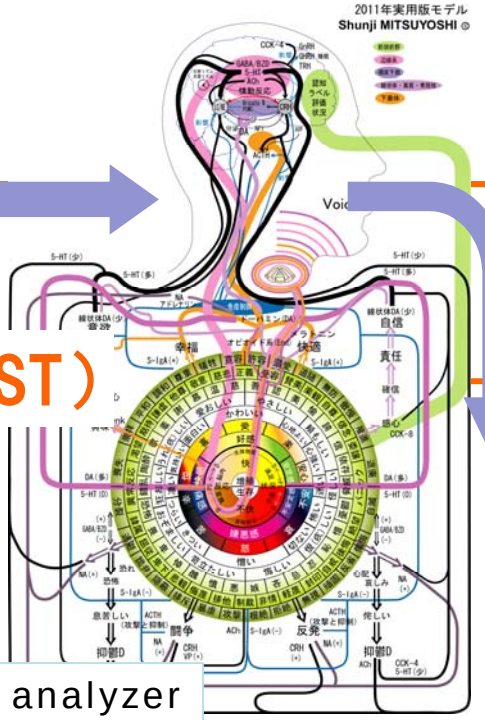


ST Emotion SDK



Recognized human's mind （PST）

To know a condition ：Stresses, Fatigue
To know physiology ：Brain, Nerve, Homeostasis of hormone
The aspect of a cranial nerve transfer substance is analyzed from voice.
To know mind ：Determined manic-depressive psychosis
Supports ：The complement of a cognitive function to a disabled person
Improves ：Application to cognitive behavior therapy



STCRM Mind analyzer

Made in Japan is…
Japanese people search for perfection from the beginning.

- In these national traits, we produced highly efficient technology in Japan.
- We tried hard for 15 years.
- GAME, CRM, mental health, Smart Phone etc…
- USA, China, etc…

About our technology

Our technology has been recognized as formal adoption by the world first army in advanced nations, doctor's degree acquisition, the international patent, **the National Research Institute** test result and the test result in the Ministry of Defense (**Japan Army**).

The effect in **the East Japan great earthquake** was inspected.

Thereby, it has proved that technology of our company is the highest performance.

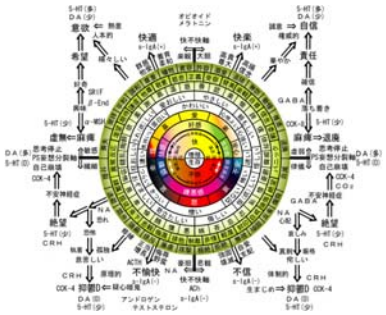
The performance was checked using (the huge subjectivity assessment data + brain measurement + blood test + doctor).

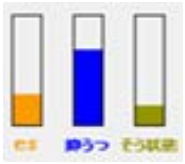
agi Sensibility Technology

ST(VEA) Archive

株式会社 AGI

2001 ez virtual talk / KDDI
2003 Android SAYA / Tokyo University of Science
2005 感性生命体んとと君 / NTT Institute
2007 Nintendo DS Kokoro scan / SEGA
2009 Sensibility Call Center / NTT soruko
2010 意識空間 / Mitsui Sumitomo construction Inc.
2011 The Defense Agency, National Defense Academy, National defense medical school / A supporting team for the great Japan earthquake





IEEE Stanford NiCT 独立行政法人 情報通信研究機構 東京大学 THE UNIVERSITY OF TOKYO 防衛医科大学校

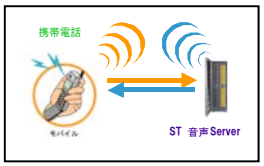
Started to observe emotions → Released the theory of ST that measures emotions → Inspected correlation between brain and emotions → Completed the test for forecasting behavior at major call centers → Verified detection of the depression

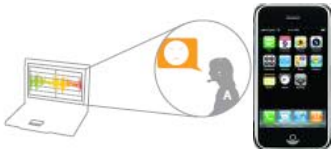
2001 ST engine | 2004 ST engine Ver.2 | 2008 ST engine Ver.3

AGI Holdings | A subsidiary company of SGI Japan Inc.（AGI） | AGI Incorporation

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

Designing The Future KDDI NTT NEC SEGA EPSON EXCEED YOUR VISION 防衛省・自衛隊 MINISTRY OF DEFENSE





ST Call centre

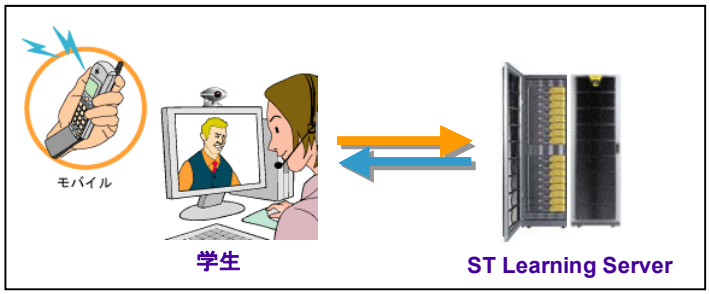
★Applied ST as a stress detector to use for the great Japan earthquake support in the self-defense forces
*No.1 official advanced technology in military

agi Sensibility Technology

株式会社 AGI

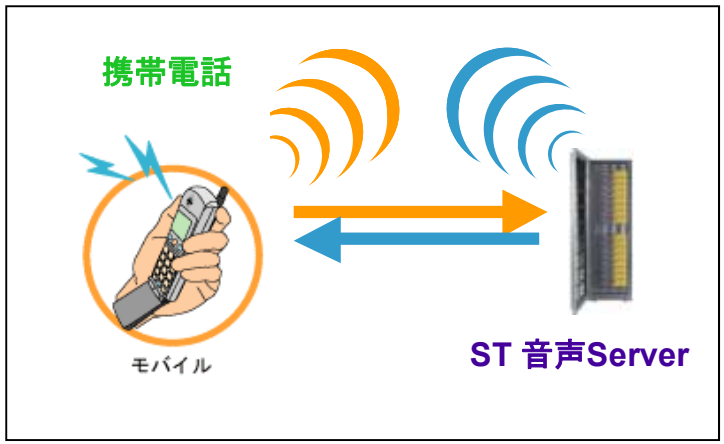
Achievements in 2000 to 2004
Verbal communication system, communicator

Virtual robot「**んとと**」
By NTT Cyber solution laboratory Institute
Trial with “Untoto-kun” for seeking a new interface to have emotion



ST Learning（ver.1.0）
日本大学
Innovation for language materials

ST artificial intelligence system「Setsugu(Service)」（ ver.1.0, 2.0 ）
The virtual agent in voice recognition and emotion analysis



「EZ Virtual Talk」KDDI Virtual character
「Star Private Talk」Virtual talk with public figure
（ ver.1.0 ）

Sensibility Technology

SiliconGraphics

株式会社 AGI

CeBIT Join the vision

Achievement in 2005:Communication Support Terminal

Designed by NEC

The feeling communicator

Express your feelings with lighting

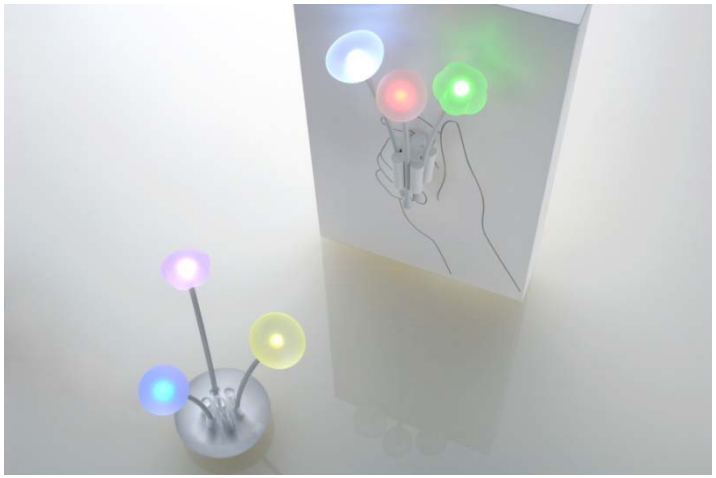
「言花（KOTOHANA）by **NEC**」

Exhibited「CeBIT2006」

■Date/Place

- March 9th – March 15th, 2006 (7 days)
- International Exhibition Center in Hannover, Germany
- 6,270 companies were participated
- Visitors: 48 millions（statistics by 2005）

SENSIBILITY ST TECHNOLOGY

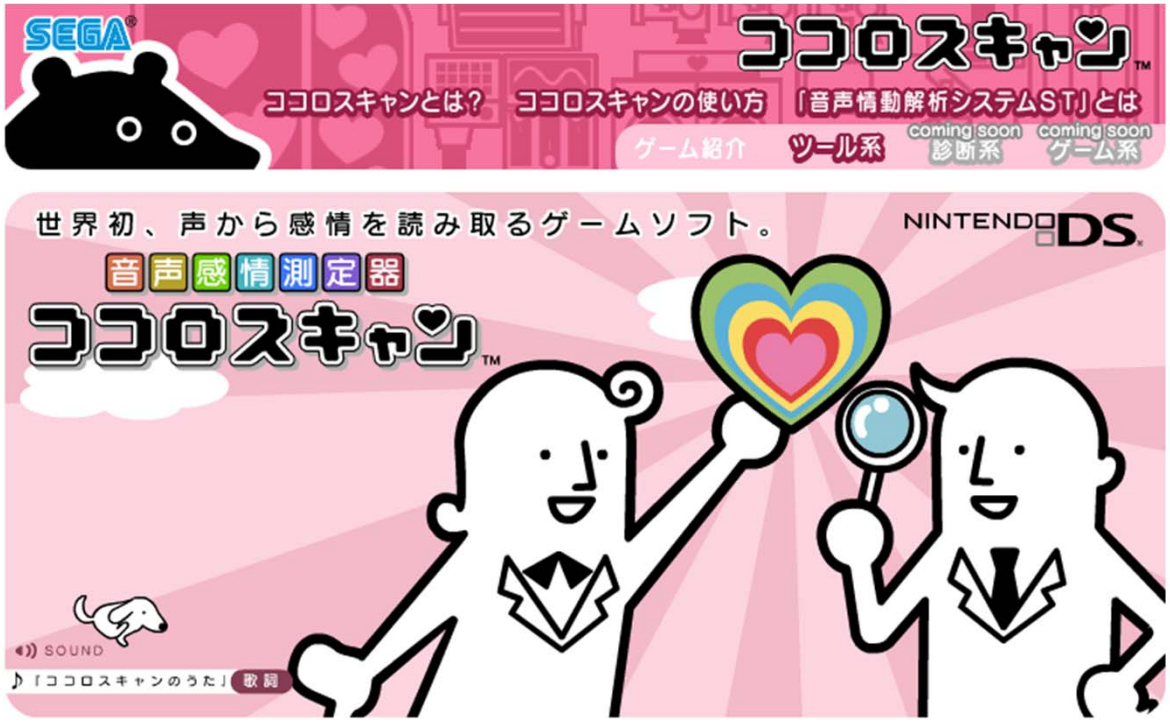


Practical example

Video conference system plus **言花** KOTOHANA

Cebit 2006 KOTOHANA NEC

Achievement in 2007:NINTENDO DS



Released by SEGA
Total product sales reached 70,000 sets

The children of deafness said to me.
“ For us, mother’s emotion came to be in sight by a color the first time with your ST ”

SENSIBILITY ST TECHNOLOGY

Analyzed emotion in voice and displays as a color
Applied ST into NINTENDO DS

What is emotion?

Could we touch emotion?
It is subjective. It is sensibility.

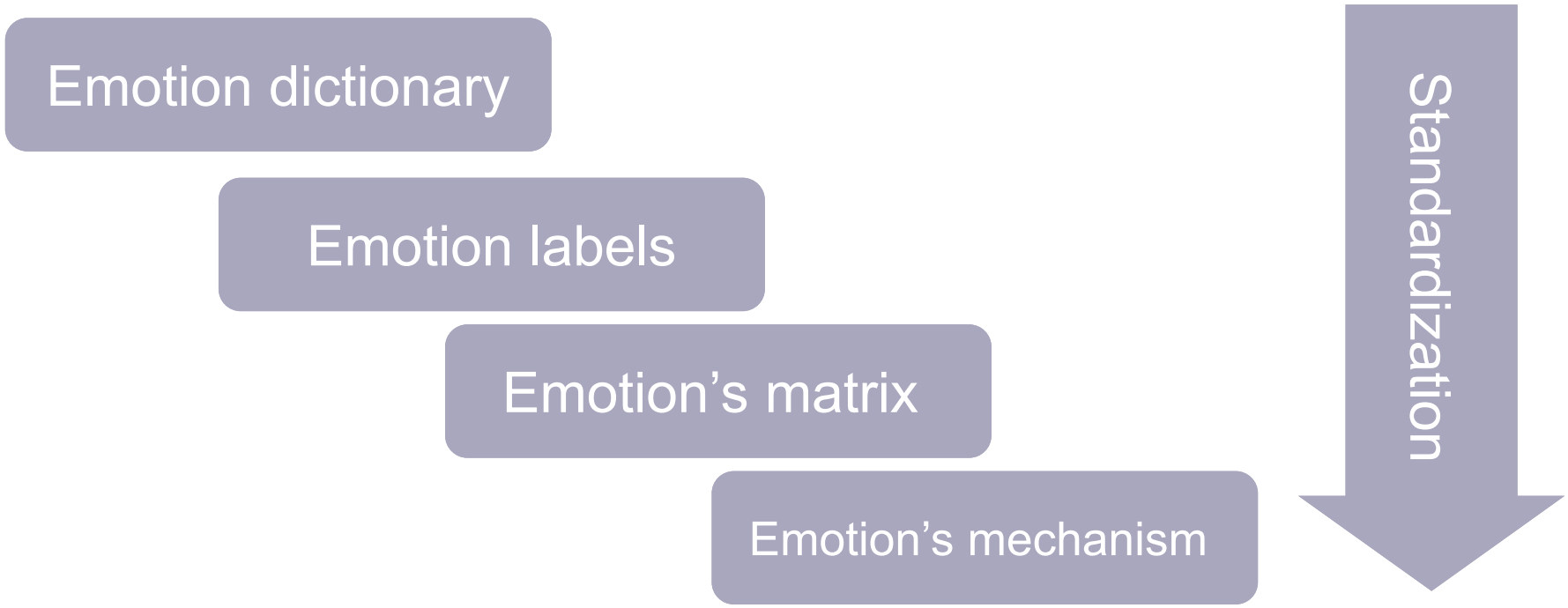
How does it measure as subjective feeling and emotion?

Perhaps, is it similar to color recognition ?
If so, how does it explain about on the field of color research ?

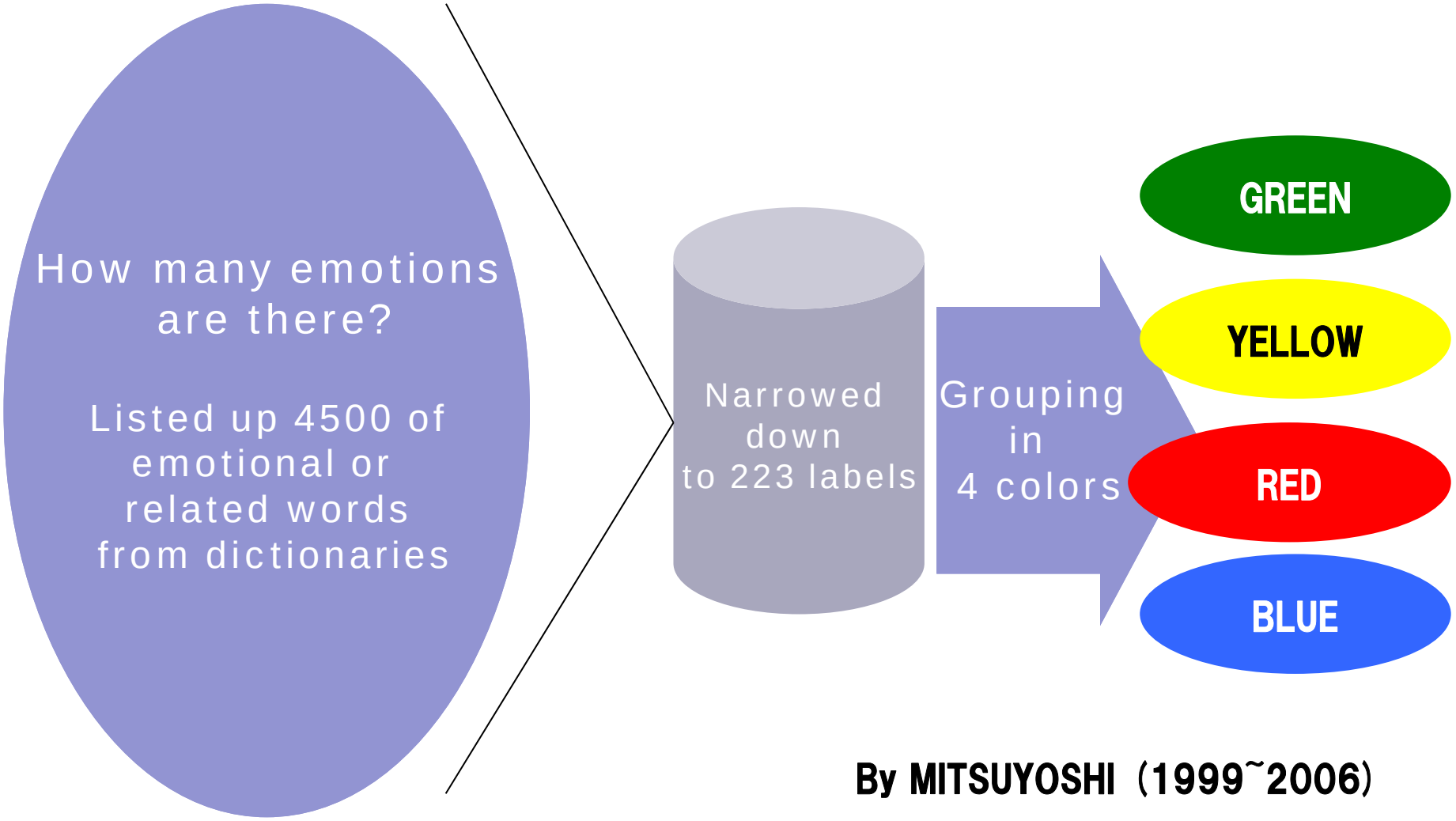
We are going to explain emotion which is observed from subjection and physical function.

Outline of standardization for emotion and psychology

1. Updated result of research on emotional expressions
2. Determined items of emotion – included synonyms
3. Updated physiological reaction and its matrix with emotion items（Matrix of correlation between physical action and biological materials)
4. Built mechanism for a correlation of each items
5. Standardized emotion items



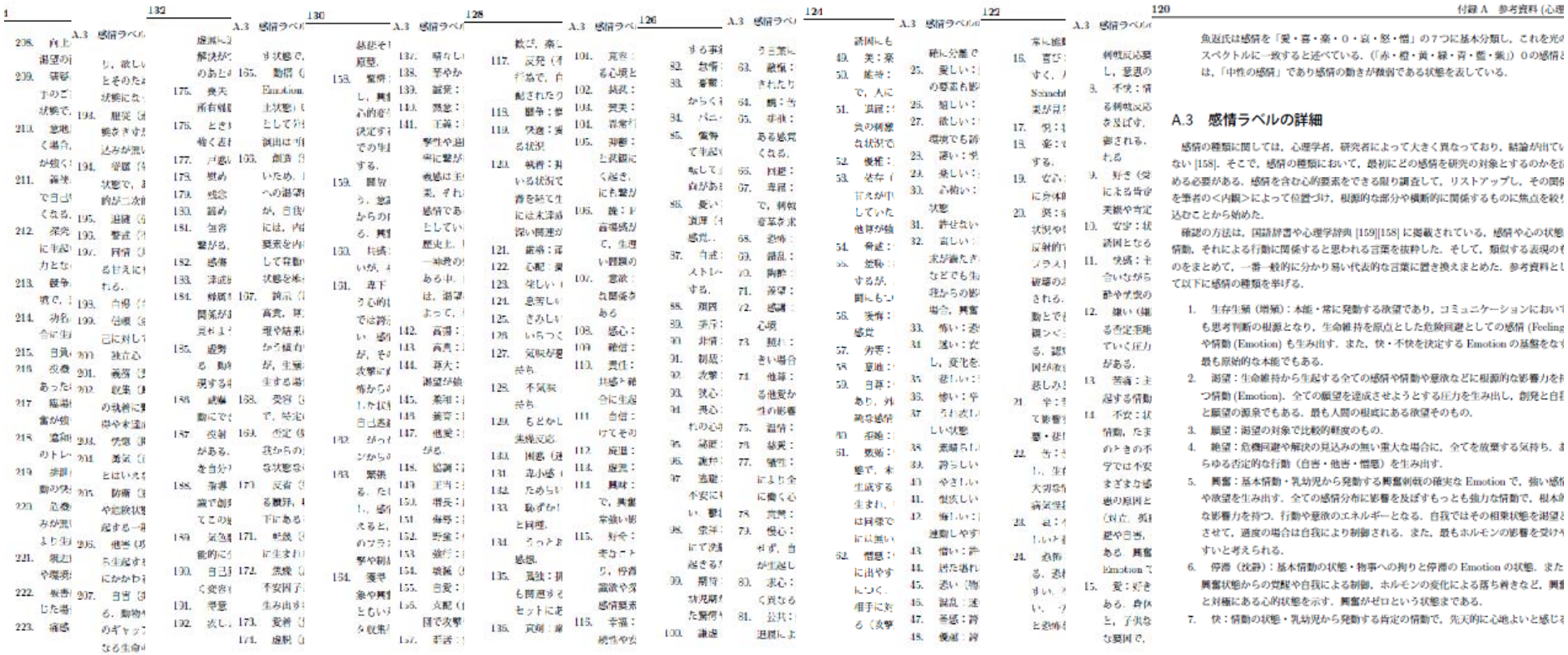
Emotional RGBY



By MITSUYOSHI (1999~2006)

223 words of emotion labels

This is a chart which is classified 4500 emotional related words into 223 groups



A.3 感情ラベルの詳細

感情の種類に関しては，心理学者，研究者によって大きく異なっており，結論が出ていない [158]．そこで，感情の種類において，最初にどの感情を研究の対象とするのかを決める必要がある．感情を含む心的要素をできる限り調査して，リストアップし，その関係を筆者の<>内観>によって位置づけ，根源的な部分や横断的に関係するものに焦点を絞り込むことから始めた．

確認の方法は，国語辞書や心理学辞典 [159][158] に掲載されている，感情や心の状態，情動，それによる行動に関係すると思われる言葉を抜粋した．そして，類似する表現のものをまとめて，一番一般的に分かり易い代表的な言葉に置き換えまとめた．参考資料として以下に感情の種類を挙げる．

1. 生存生殖（増殖）：本能・常に発動する欲望であり，コミュニケーションにおいても思考判断の根源となり，生命維持を原点とした危険回避としての感情 (Feeling や情動 (Emotion) も生み出す．また，快・不快を決定する Emotion の基盤をなす最も原始的な本能でもある．
2. 渇望：生命維持から生起する全ての感情や情動や意欲などに根源的な影響力を持つ情動 (Emotion)．全ての願望を達成させようとする圧力を生み出し，創発と自己と願望の源泉でもある．最も人間の根底にある欲望そのもの．
3. 願望：渇望の対象で比較的軽度のもの．
4. 絶望：危機回避や解決の見込みの無い重大な場合に，全てを放棄する気持ち，あらゆる否定的な行動（自害・他害・憎悪）を生み出す．
5. 興奮：基本情動・乳幼児から発動する興奮刺戟の確実な Emotion で，強い感情や欲望を生み出す．全ての感情分布に影響を及ぼすもっとも強力な情動で，根本的な影響力を持つ．行動や意欲のエネルギーとなる．自我ではその相乗状態を渇望とさせて，過度の場合は自我により制御される．また，最もホルモンの影響を受けやすいと考えられる．
6. 停滞（沈静）：基本情動の状態・物事への拘りと停滞の Emotion の状態．また興奮状態からの覚醒や自我による制御，ホルモンの変化による落ち着きなど，興奮と対極にある心的状態を示す．興奮がゼロという状態まである．
7. 快：情動の状態・乳幼児から発動する肯定の情動で，先天的に心地よいと感じる

References：The psychology dictionary, The encyclopedia of **広辞苑** ・The great Japanese dictionary , Oxford English dictionary, The medical psychoanalysis dictionary and others

By Mitsuyoshi (1999~2006)

The research of relation between Emotional response / Physical reaction and materials

物質	興奮	ストレス	不安	嫌悪	闘争	恐怖	うつ	快不快	安定	陶酔	期待	心拍	瞳孔	交感神経	発汗	体温	血圧	周期	免疫
CRH	覚醒	○ACTH ○	◎		◎		◎				○	◎					◎	日周	
神経ペプチド	沈静	○CRH ◎	○×	NA×															
コルチゾール		○																	
バゾプレシン		○恒常性			◎	◎								活性			◎	日周	
ACTH		○			◎×											×			
CCK-4	前◎		○ ◎強			○ ◎強	○								○				
CCK-8	全◎ 前×								○										
メラトニン		○×						幸福	○			×		忘却機能				日周季節	活性
オピオイドペプチド	沈静		NA×			NA×		快感		○				運動快感					NK活性
βエンドルフィン		CRH×										◎					◎		
アセコルリン		CRH◎					◎												
ノルアドレナリン	◎	CRH◎ △	◎	◎	◎	◎	◎					◎	拡大	緊張記憶					
アドレナリン		CRH◎ △	◎		◎	J◎						◎	拡大	緊張					
ドーパミン	◎	CRH◎			◎		低◎							記憶					
セロトニン		CRH◎	◎×		低◎	◎	◎												
アンジオテシン		CRH◎																	
ガラニン		CRH◎	×																
ソトマスタチン		CRH×																	
α−MSH		CRH×																	
GABA		CRH×	NA×			NA×													
ベンゾジアゼピン		×	◎																
ジアゼパム			NA×			NA×													
エタノール			NA×			NA×													
エンケファミン																			
βカルボリン			○◎																
イソプレナリン			◎																
ヨヒンビン			◎																
フェンフラミン			◎																
乳酸ナトリウム			◎																
CO2			◎強			◎強													
カフェイン	覚醒		◎																
ガラニン			×？																
オキトシン	×	×	×？															母性行動	

表1：心的身体的作用と生体物質の関係マトリックス

感情や精神状態（横軸）、および身体反応（縦軸）に影響するという確認が学会誌や論文などの治験にある、生体物質やホルモンなどを調べ、対批表マトリックスにした。

目的：脳の活動と伝達物質・ホルモンから導かれる情動の発生メカニズムの推定

○は合成/分泌，○×は分泌して抑制，◎は促進，CRH ◎はCRH 合成・分泌促進，前◎は前頭葉皮質で促進，全◎は脳全体で促進，前×は前頭葉皮質で抑制，低◎は低下したら促進，×は抑制，○恒常は分泌により恒常性を維持，CRH ×は，CRH 合成・分泌抑制，◎×で制御，△は調整，NK はナチュラルキラー細胞，活性は免疫機能の活性，機能は免疫機能，日周はバイオリズム，?は報告情報，－ は文献[9] に記載なし

表を見てわかるように- が多く，心と感情と分泌物質の関係では不明な部分が多い．CCK 系統と5-HT, GABA, DA は複雑にお互い影響しあって情動に作用するようである．また，性ホルモンは闘争と深く結びついているようである．これらの分泌物や物質は脳神経活動に制御され，大脳辺縁系と情動と記憶は密接に連携している

Presumption of Emotion Model

- **Objective：**

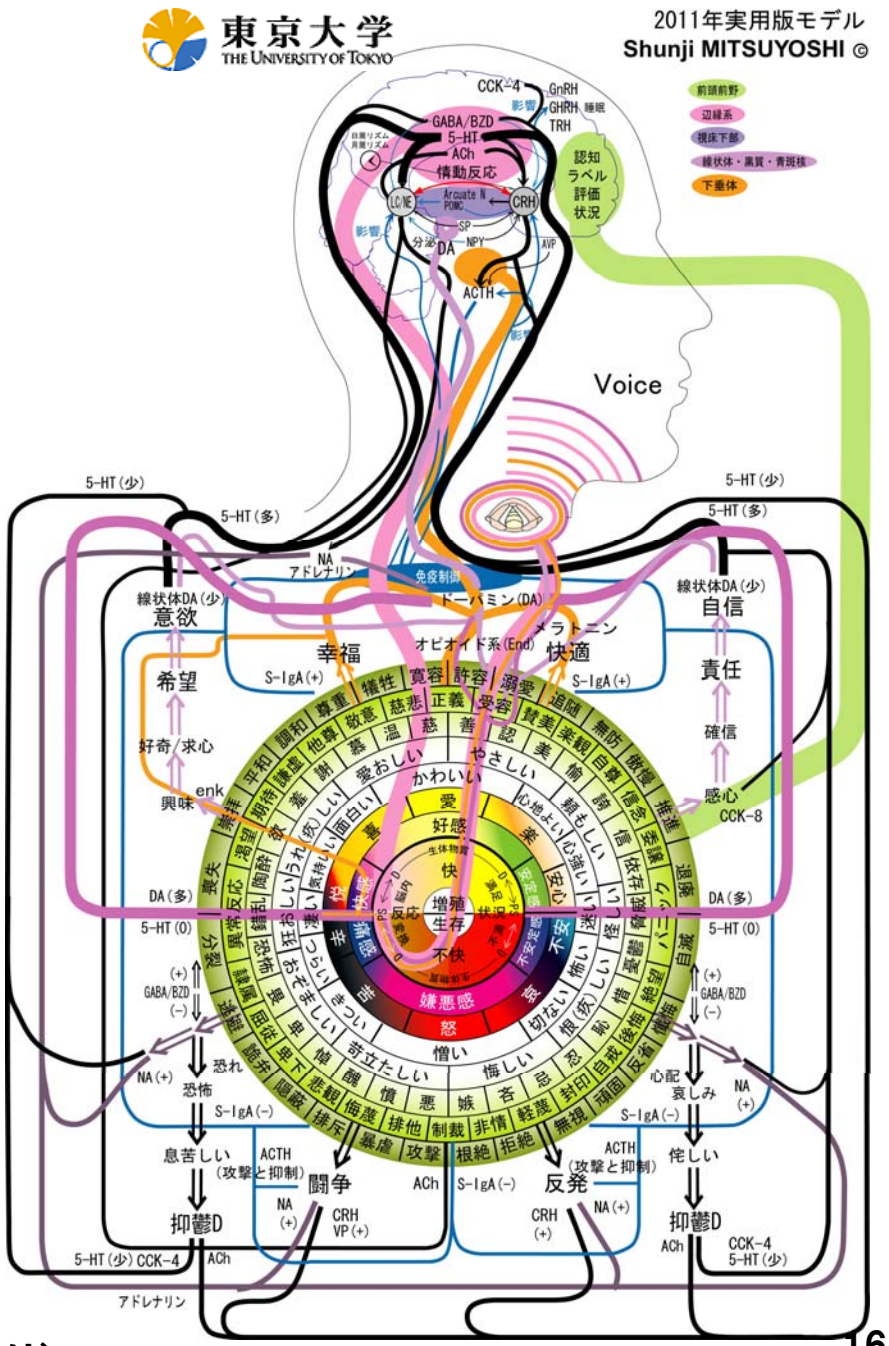
  To be visualized correlation between brain, emotion and action based on medical research

- **Progress：**

  How built a map that shows a matrix what is comparable correlation between mental or physical operations and biological materials

- **Modeled/Framed：**

  Represented substances and brain function on a circular diagram as indicated on the angle



仮説図（博士論文・日本機械学会編集「感覚・感情とロボット」より）

Four colors grouping (RGBY) of **223** emotions

i. Composed the emotion map classified in five colors

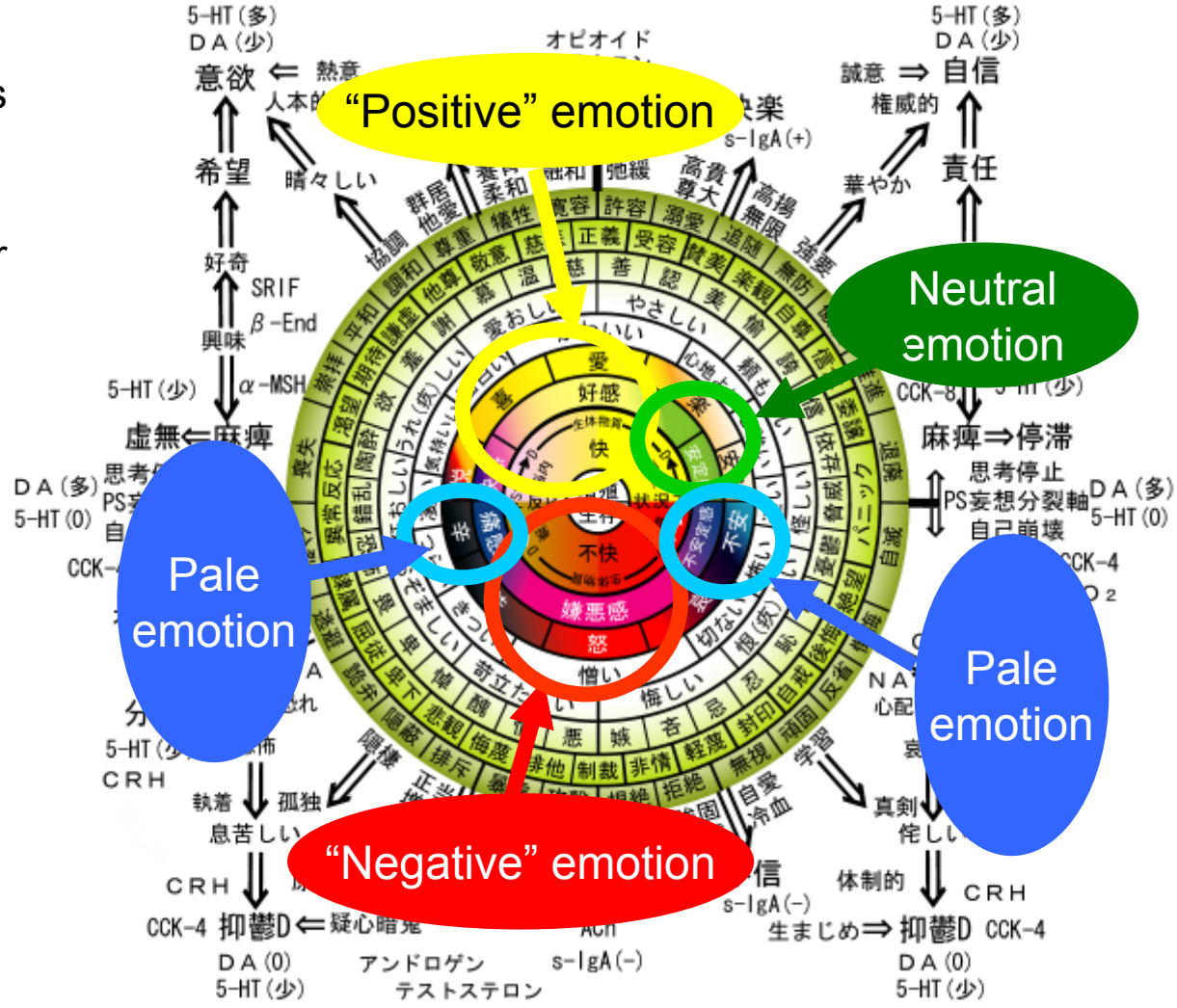
ii. The primitive reaction of emotion from survival and breeding is shown in center

iii. Action shown in outline

iv. To analyze emotion, read a map outline toward center

v. To predict or analyze behavior, read core area toward outline

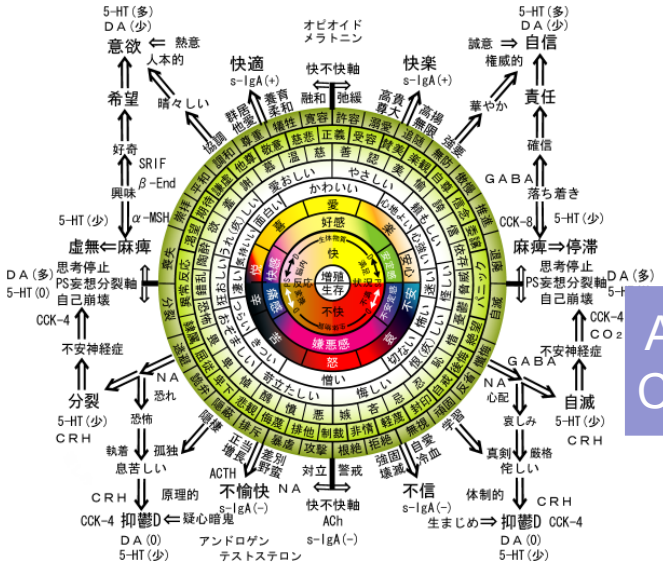
vi. The outline is circulated so that can be distinguished individual character. The idea is enable to apply psychiatric test in medical field.



仮説図(博士論文・日本機械学会編集「感覚・感情　ロボット」より)

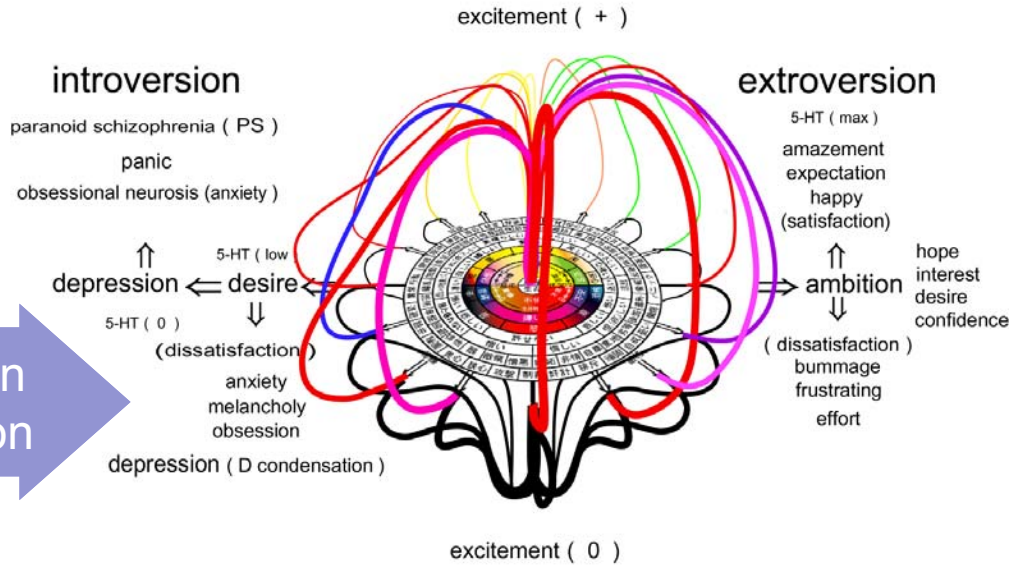
Excitement (activation) and Anxiety (corruption) Emotions

The advanced study of emotions' mechanism



The core area that shown 18emotional feelings
（A color chart included dis/pleasure movements）

Activation
Corruption



The position of excitement and anxiety emotions

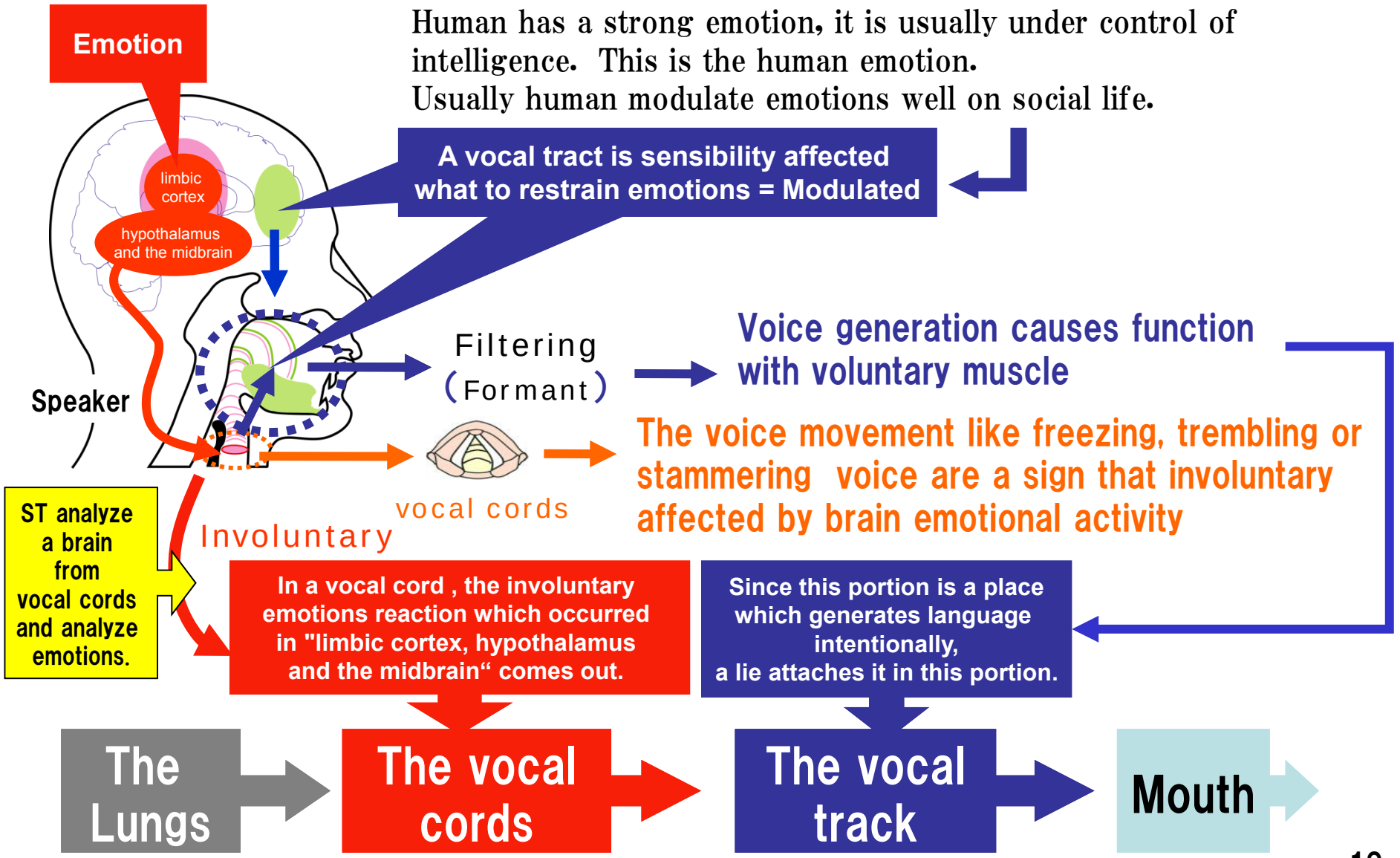
Anxiety (corruption) may happen upon the condition above

Hypothesis by Dr. MITSUYOSHI

Body structure A

<A short term effect on brain emotion activity>

Human has a strong emotion, it is usually under control of intelligence. This is the human emotion.
Usually human modulate emotions well on social life.



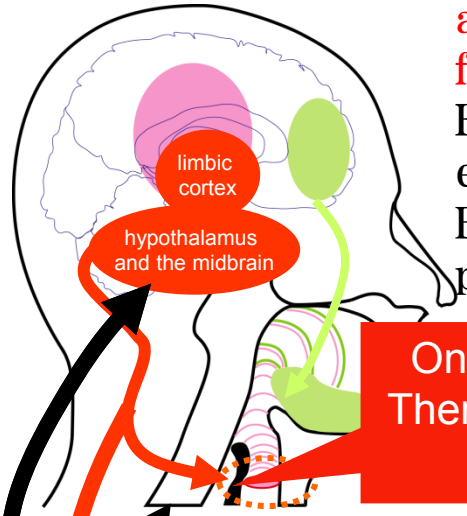
Body structure B

<Feedback=a long term effect of feelings (emotions)>

A core of emotion affect in short. In general, when a strong emotion appears in a brain, it occurs high blood pressure by a hormones or a frequent pulse.

Focusing physical action may be concluded that it is a long term effect of emotion.

Beside, a hormone effect goes back to a brain and thus it is difficult physiologic measurement considering a recognition effect.



Only voice output has not fed back in the circuit of human body structure. Therefore, the sound can carry out the output of the related state of a brain and the body directly..

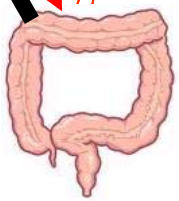
Important

Fed back!

Usually both link with each other.
So, it become blur what is happing

It is an involuntary activity, and feed back

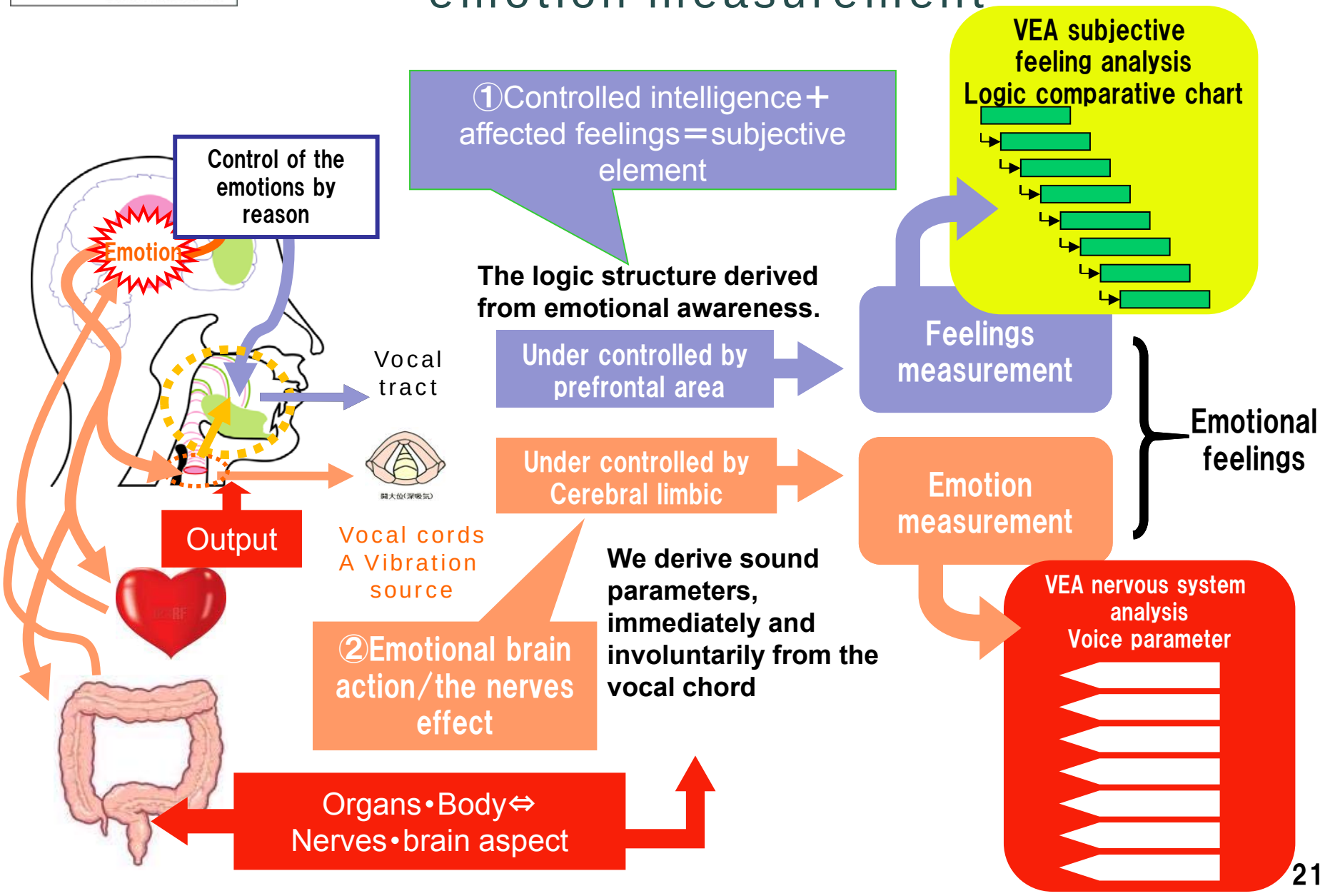
Complexity system



Hormones

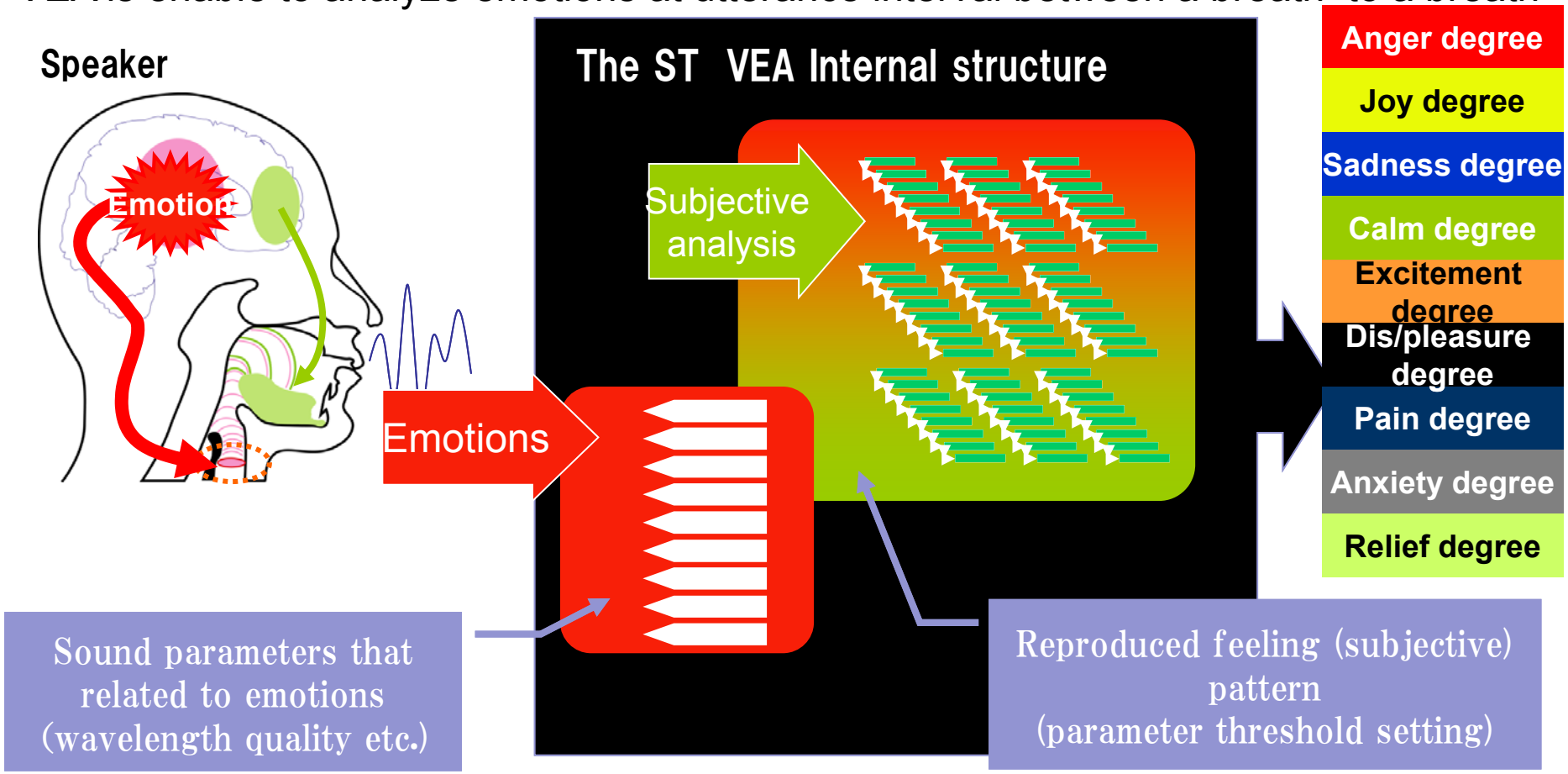
Actually it is affected by blood circulation and biological materials

VEA structure / The concept of emotion measurement



VEA structure and its output

Emotions and respiration are both related.
VEA is enable to analyze emotions at utterance interval between a breath to a breath



The strongest emotion will be selected by majority decision on judgment logic and display as classified colors and strength.
An other emotions will also list following the first chosen.

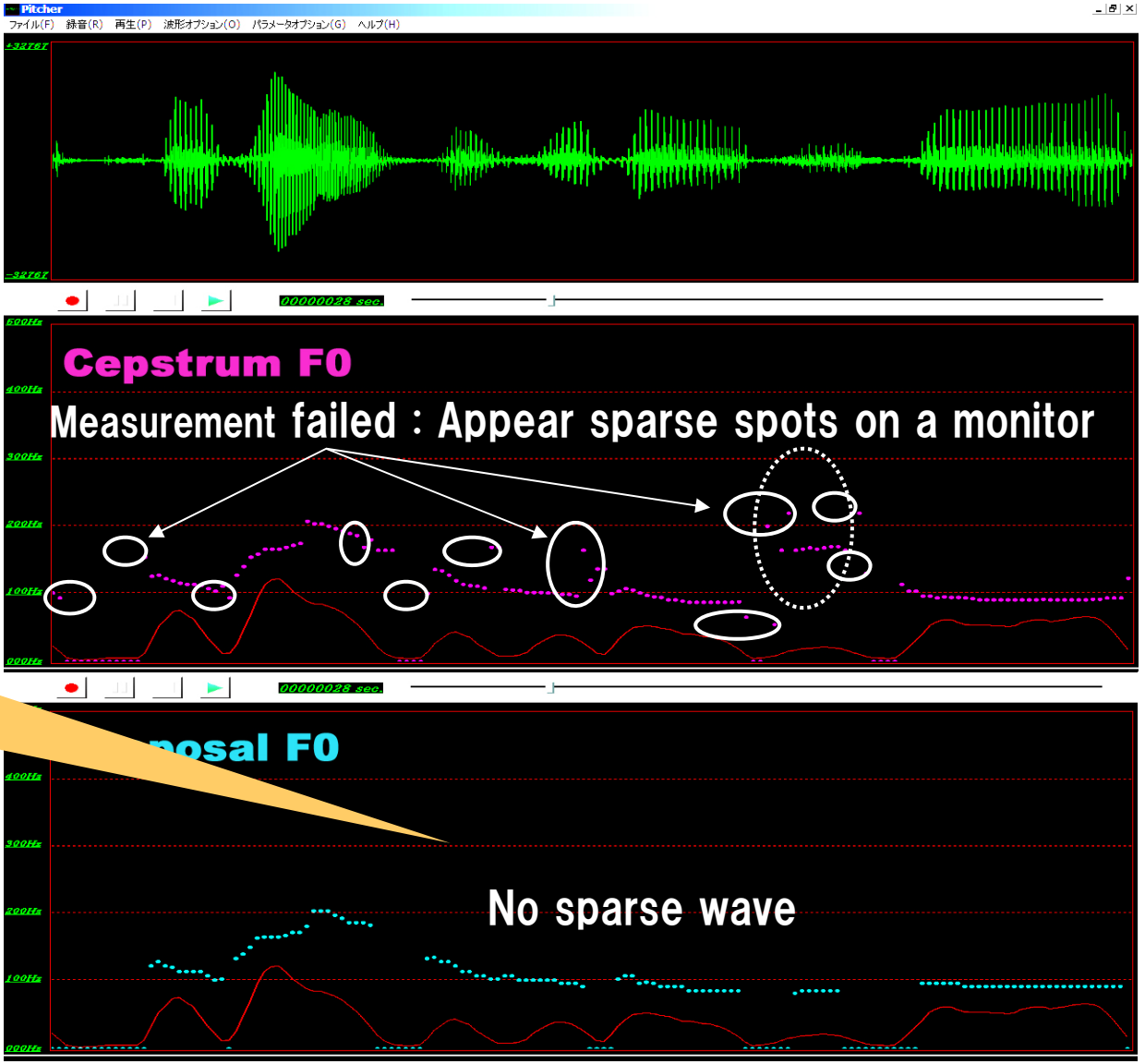
Fundamental frequency detection of solid vocal cords

A voice wave

Previous Cepstrum presumption shows a sparse wave.
Not to be automatic detection

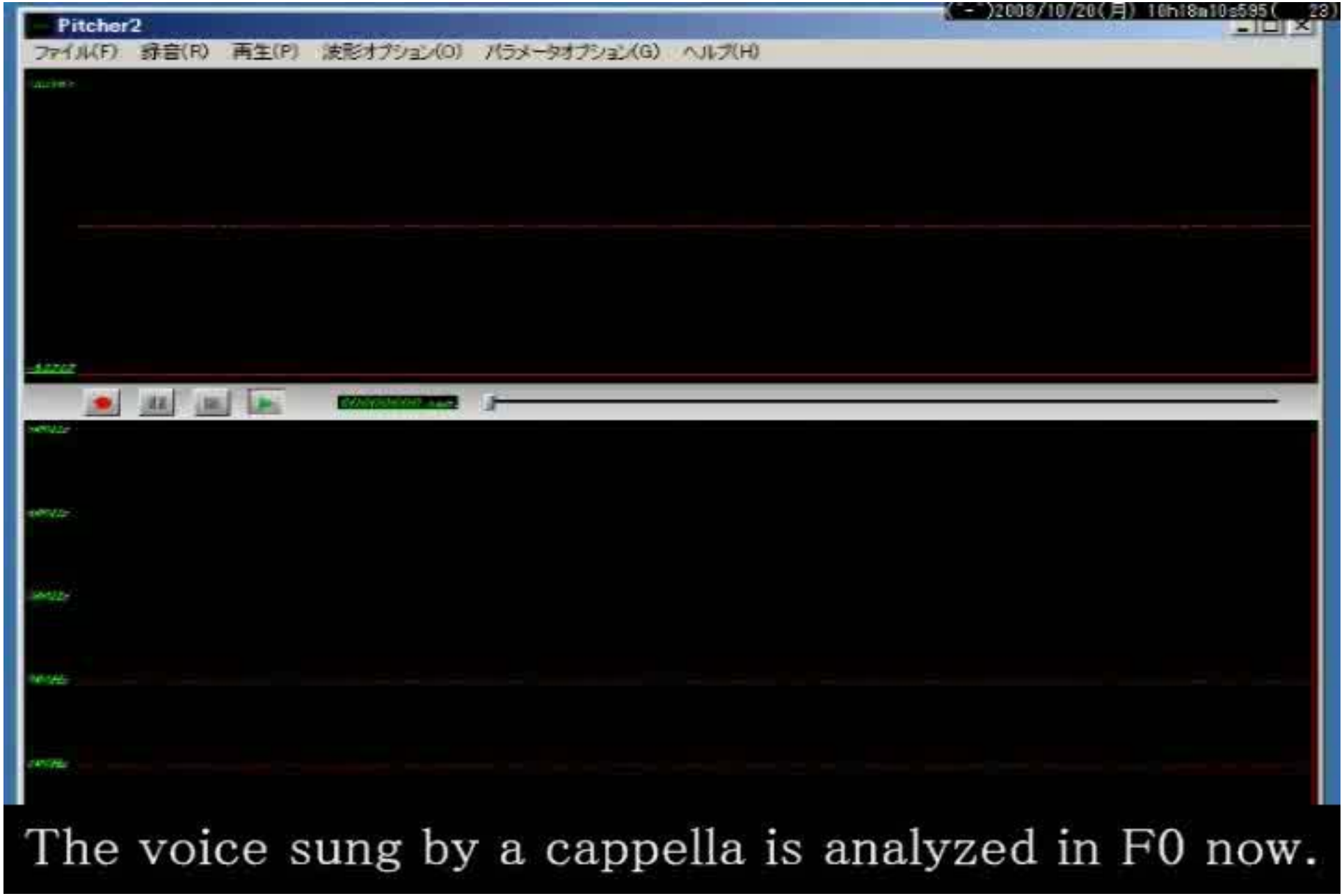
It made possible to analyze subjective emotion automatically

VEA presumption method applied non-Cepstrum enabled presume a basic wavelength under ambient noise



光吉俊二 博士論文「感情認識及び情動の脳生理信号分析システムに関する研究」から

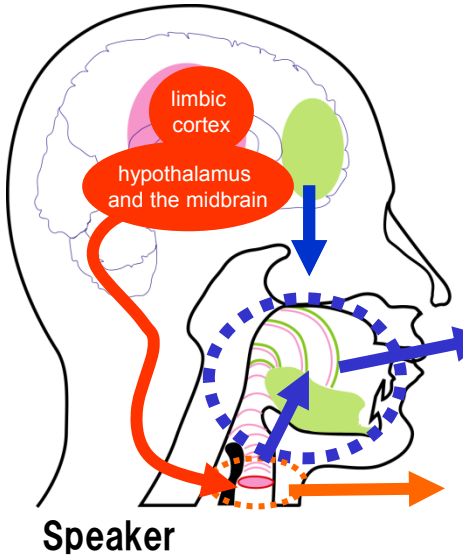
F0 ST ver2.0


Pitcher2
ファイル(F)　録音(R)　再生(P)　波形オプション(O)　パラメータオプション(G)　ヘルプ(H)
The voice sung by a cappella is analyzed in F0 now.

agi Sensibility Technology

ST Software

東京大学 THE UNIVERSITY OF TOKYO
株式会社 AGI



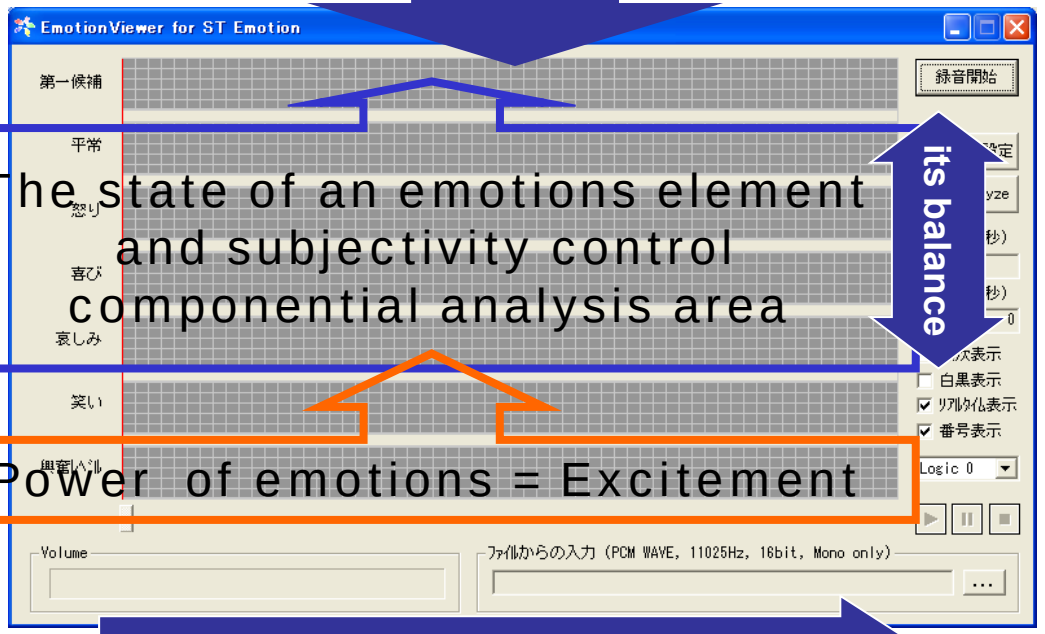
(Principle)
The result of having controlled emotions

The activator action state of the brain emotions of a nerve level (Real intention)

Emotional brain action

(Autonomic Nerve)

The highest result among analysis output
Sadness, Pleasure, Anger, Calmness

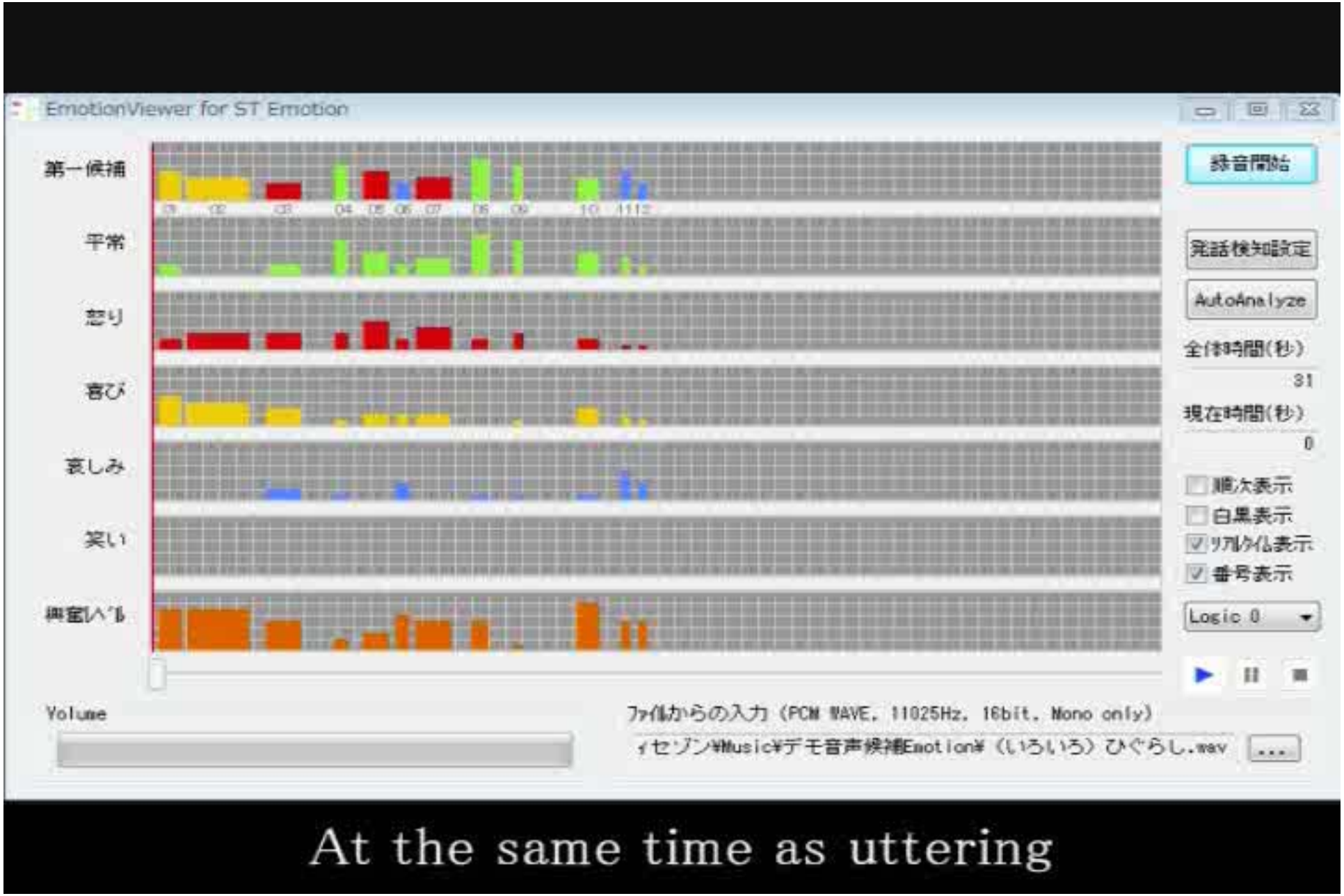


Real-time procedure (A time axis)

ST enabled to visualize quantity of emotions in colors

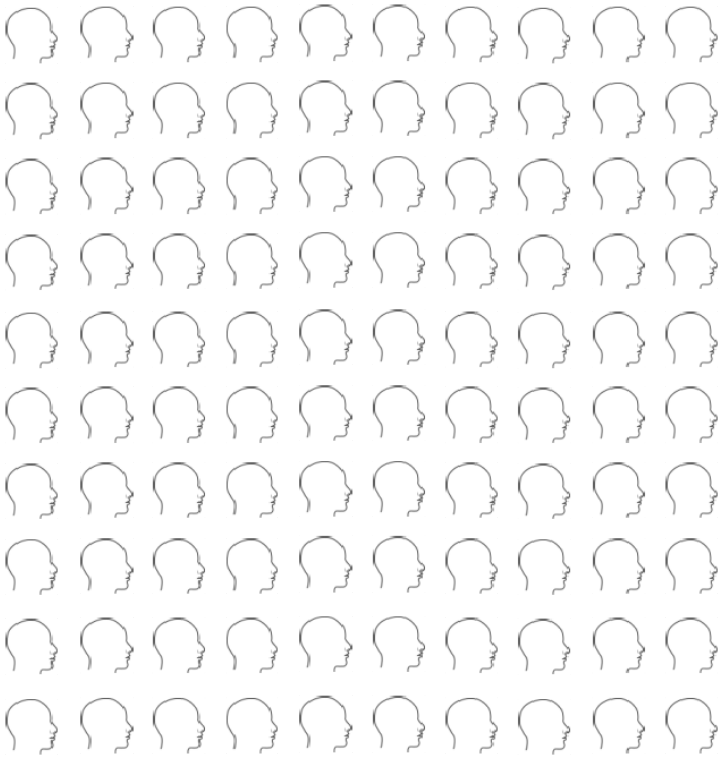
特許取得済み

ST2004


EmotionViewer for ST Emotion
第一候補
平常
怒り
喜び
哀しみ
笑い
興奮ﾚﾍﾞﾙ
01 02 03 04 05 06 07 08 09 10 1112
録音開始
発話検知設定
AutoAnalyze
全体時間(秒)
31
現在時間(秒)
0
順次表示
白黒表示
リアルタイム表示
番号表示
Logic 0
Volume
ファイルからの入力（PCM WAVE, 11025Hz, 16bit, Mono only）
ィセゾン¥Music¥デモ音声候補Emotion¥（いろいろ）ひぐらし.wav
...
At the same time as uttering

Evaluation of human's feeling utterance

Standardized subjective feeling <Learning data (2800 speakers) Test data (1100 speakers)>



Natural emotional utterance data:

Conversation was recorded showing the image out of which natural feeling tends to come.

Acting emotional utterance data:

The utterance person did feeling utterance using the scenario.

Evaluation technique:

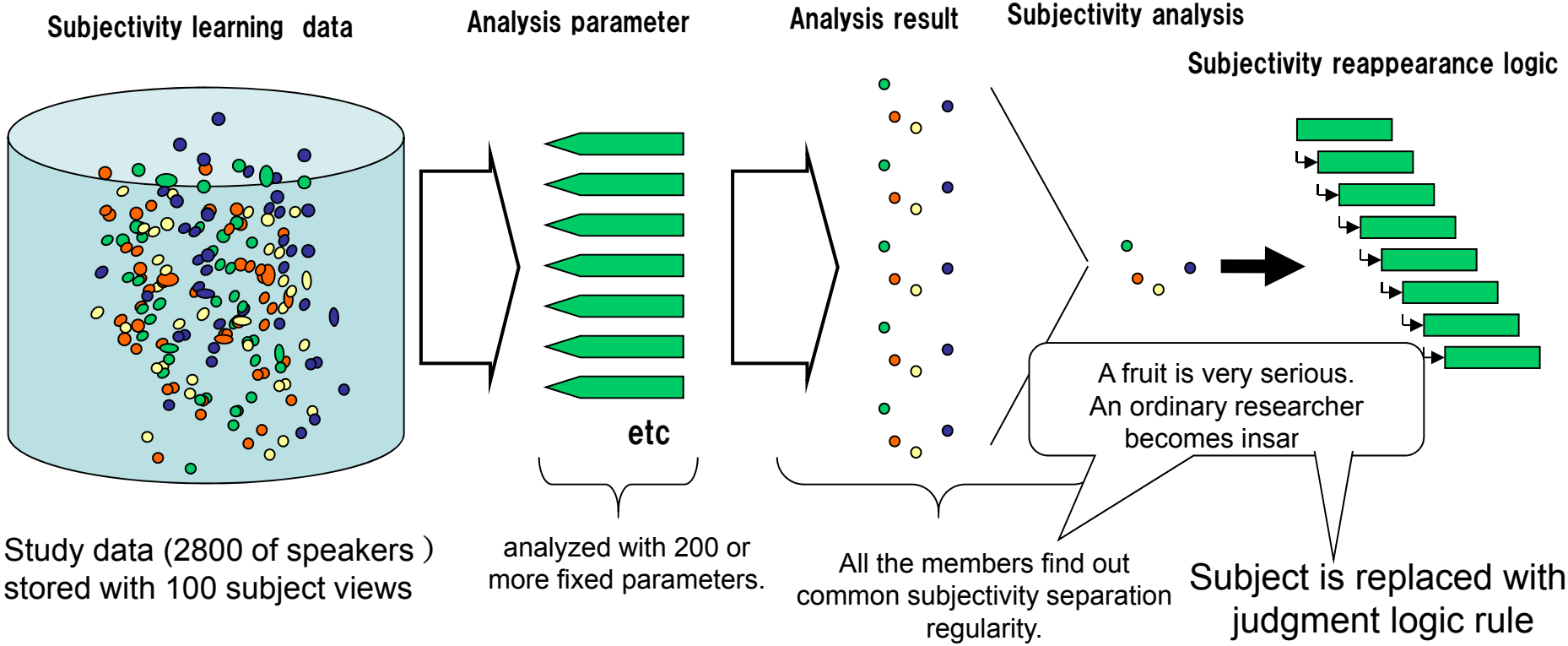
100 evaluators (man-and-woman age was equalized) judged emotion for "the sound put together at random" repeatedly with "the exclusive tool which judges a sound unconsciously."

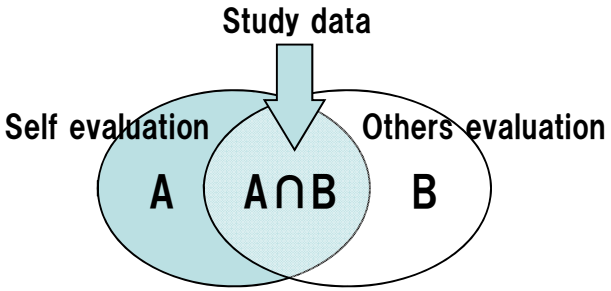
voice samples labeling with over 100 persons of subjective views

50,000 of utterance (2800 examinees) ×100 persons of subjects

1 hour / person Work of 300 utterance evaluation = 11 years survey

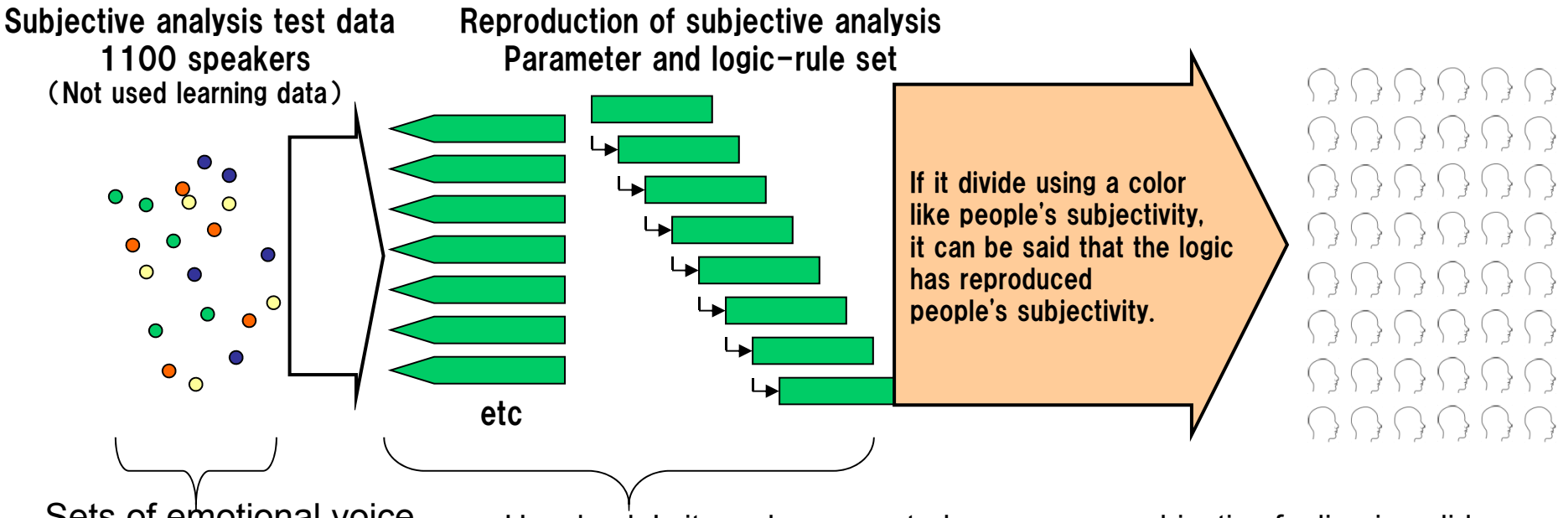
Subjectivity reappearance mechanism





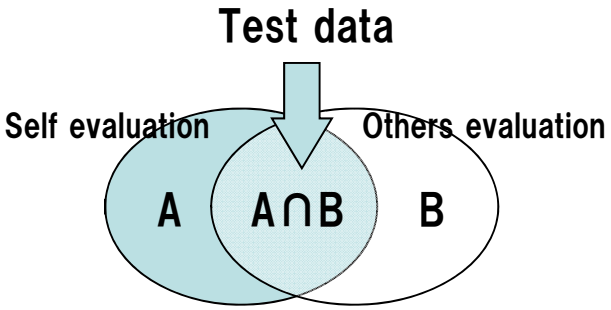
Although various analytical skills (HMM/NN/SVM/…) were failed, we reached to the practical use level by manual labor and rule base analysis.

Evaluation of ST(VEA) (Voice Emotional Analysis) ST(VEA) system (Open test)



Sets of emotional voice data labeled in objective and subjective analysis

Unsolved: Is it can be separated as same as subjective feeling in solid parameter and judgment logic ? Testing data required.

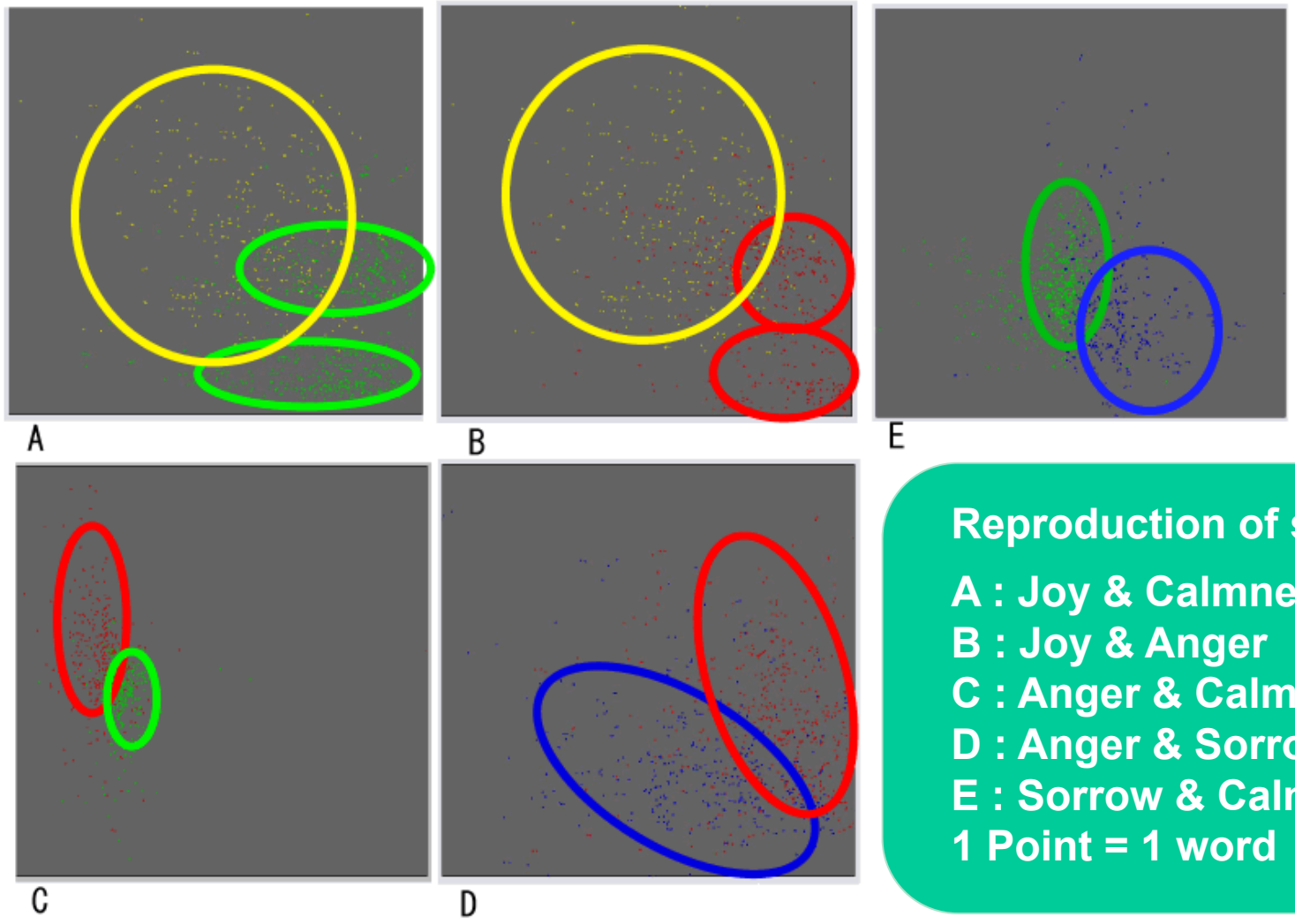


A：The data that evaluates emotion by oneself using the VEA system right after utterance

B：The data that evaluates speaker's emotion judgment objectively using VEA system as above A .

A∩B ：Set the voice data which was corresponded to evaluation (about 1/100) as study and test data.

The subjectivity reappearance performance test of ST(VEA Open test)



Reproduction of subjectivity

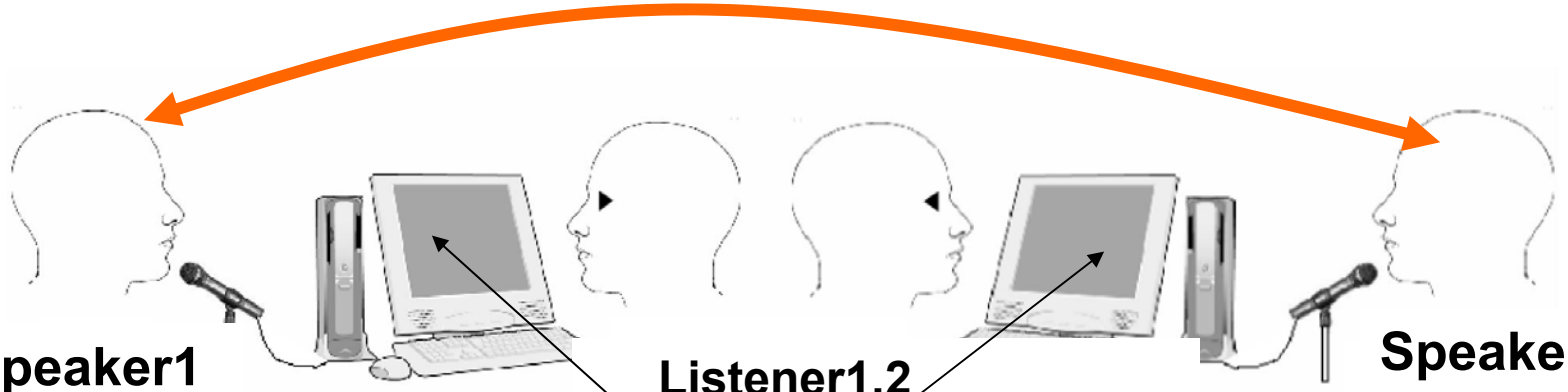
A : Joy & Calmness
B : Joy & Anger
C : Anger & Calmness
D : Anger & Sorrow
E : Sorrow & Calmness
1 Point = 1 word

Emotional elements are segregated in parameter space.

A vertical axis and a horizontal axis are various parameter sets.
B is the composition of the set which separates anger and joy.

Evaluation of VEA by human listeners

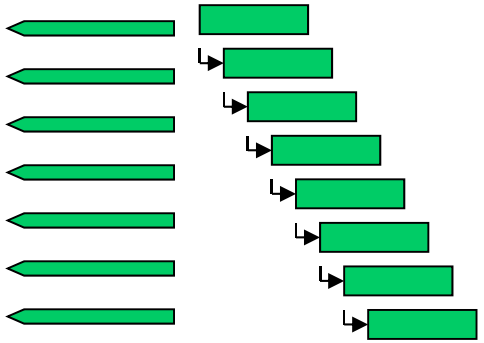
Free conversation between speaker 1 and 2

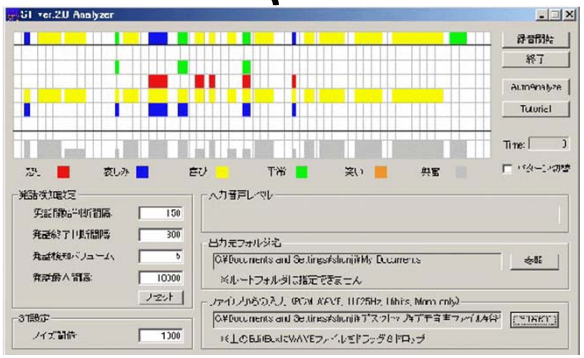


Self report

Match vs

Subjective Judgment



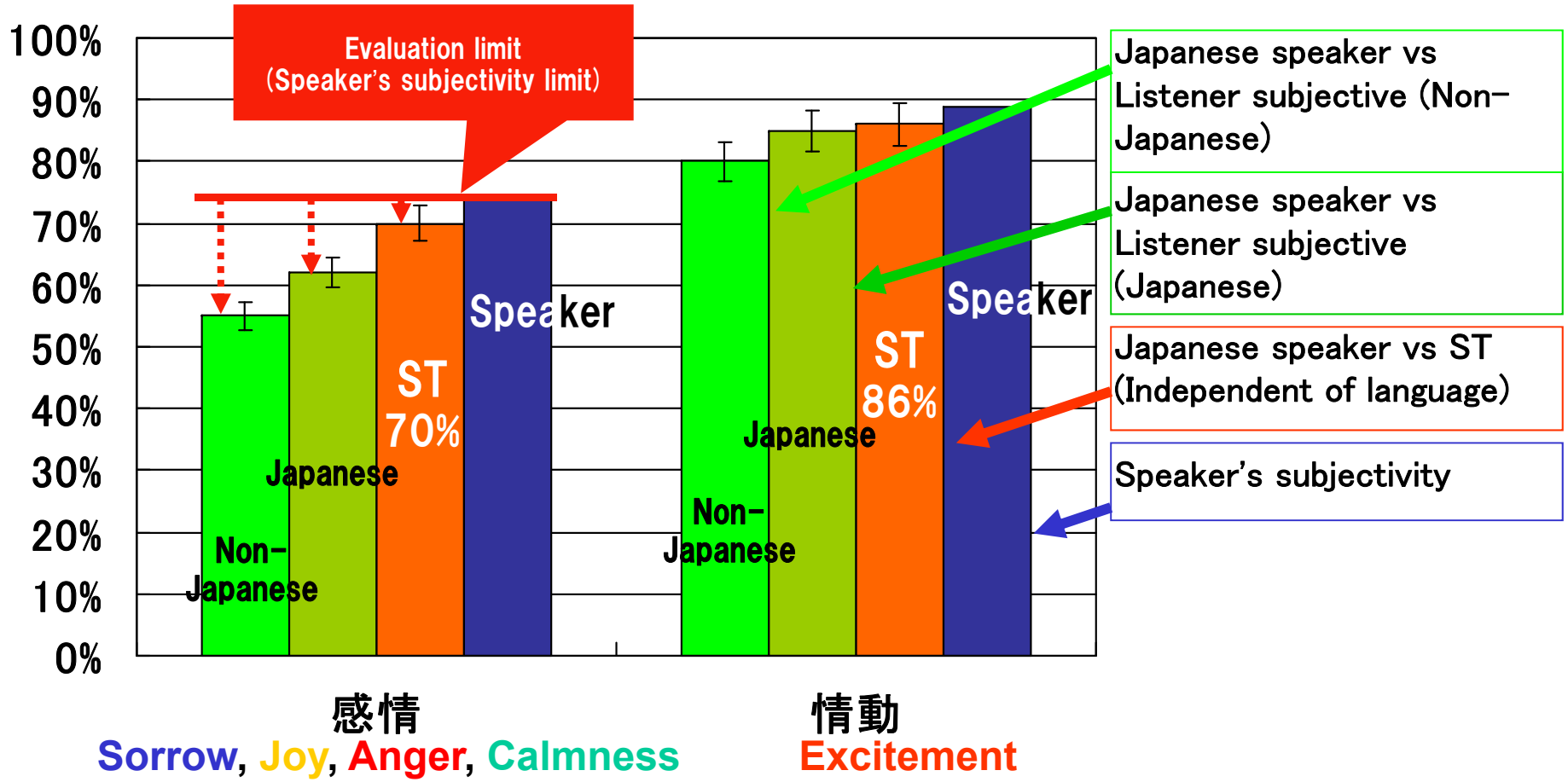


VEA 1 **etc** **VEA2**

VEA observed the emotional elements of speakers 1 and 2 independently

The subjectivity coincidence rate of ST(VEA) Intuition test

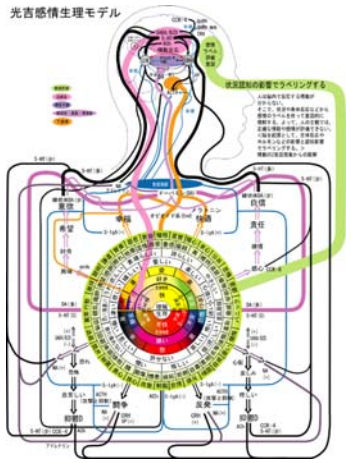
Recognition capability of feeling, and comparative experiments of the recognition rate of ST

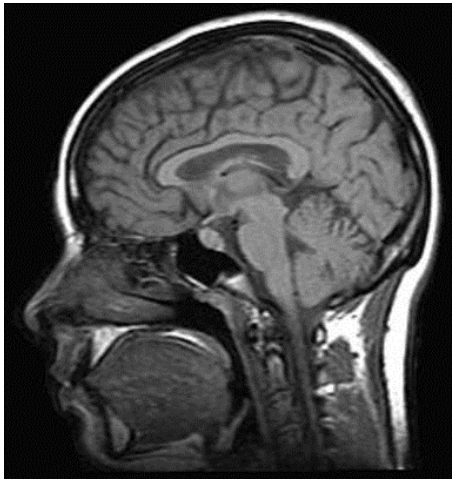


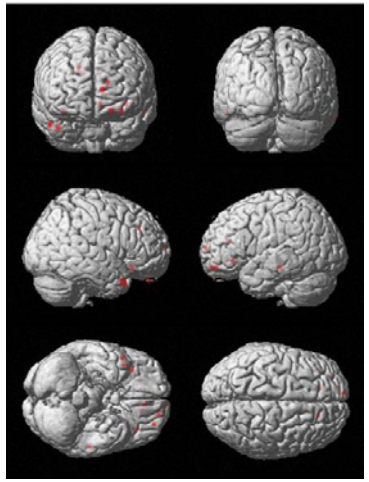
Automatic voice emotion recognition outperformed human's subjectivity.
As for the excitement, the non-Japanese and the Japanese are equal to VEA.

IEEE:「Emotion Voice Analysis System Connected to the Human Brain」Shunji MITSUYOSHI

Comparison of ST(VEA) and brain emotions activity







fMRI and physiology system

We constructed a system that parameterizes the brain activity and physiological body state.

Stable measure

fMRI input (Non-invasive type brain imaging corrugated information input station)

Emotional voice signal input from microphone inside fMRI

Fundamental frequency parameter analysis

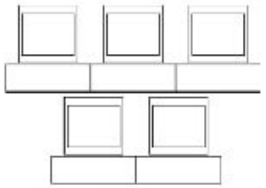
Time syncchronization parameter analysis

FFT （Voice）

Prosodic intonation parameter analysis

Physiological signal 1 (Heart beat)
Physiological signal 2 (Pupil)
Physiological signal 3 (Instant eye)
Physiological signal 4 (Body temperature)
Physiological signal 5 (Blood pressure)

Physiological index indication output



Emotion physiological analysis indication output
&
Brain emotion data base record

The physiological signal , the voice signal , the brain activity signal mapping on the indentical time base , visualizes.
< with the time synchronizaition pulse input as a standard >

etc

The advantage:
Stable physiological measure makes influence of subjective feelings minimal.

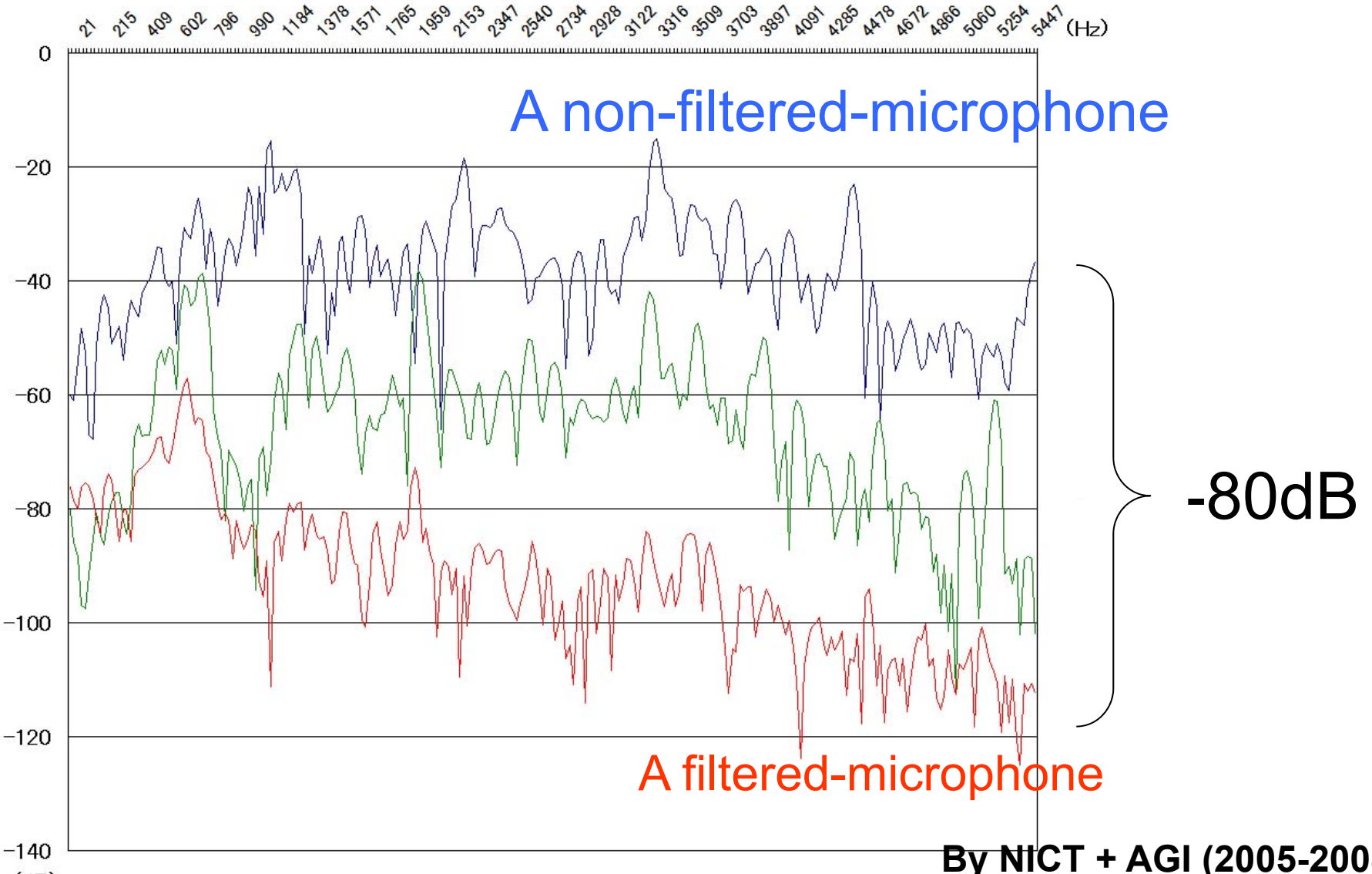
Problem:
MRI sound noise is extreme (130dB).
Difficult to conduct sound experiments.

By NICT + AGI (2005-2008)

Solution: A noise-free microphone and a head set system created

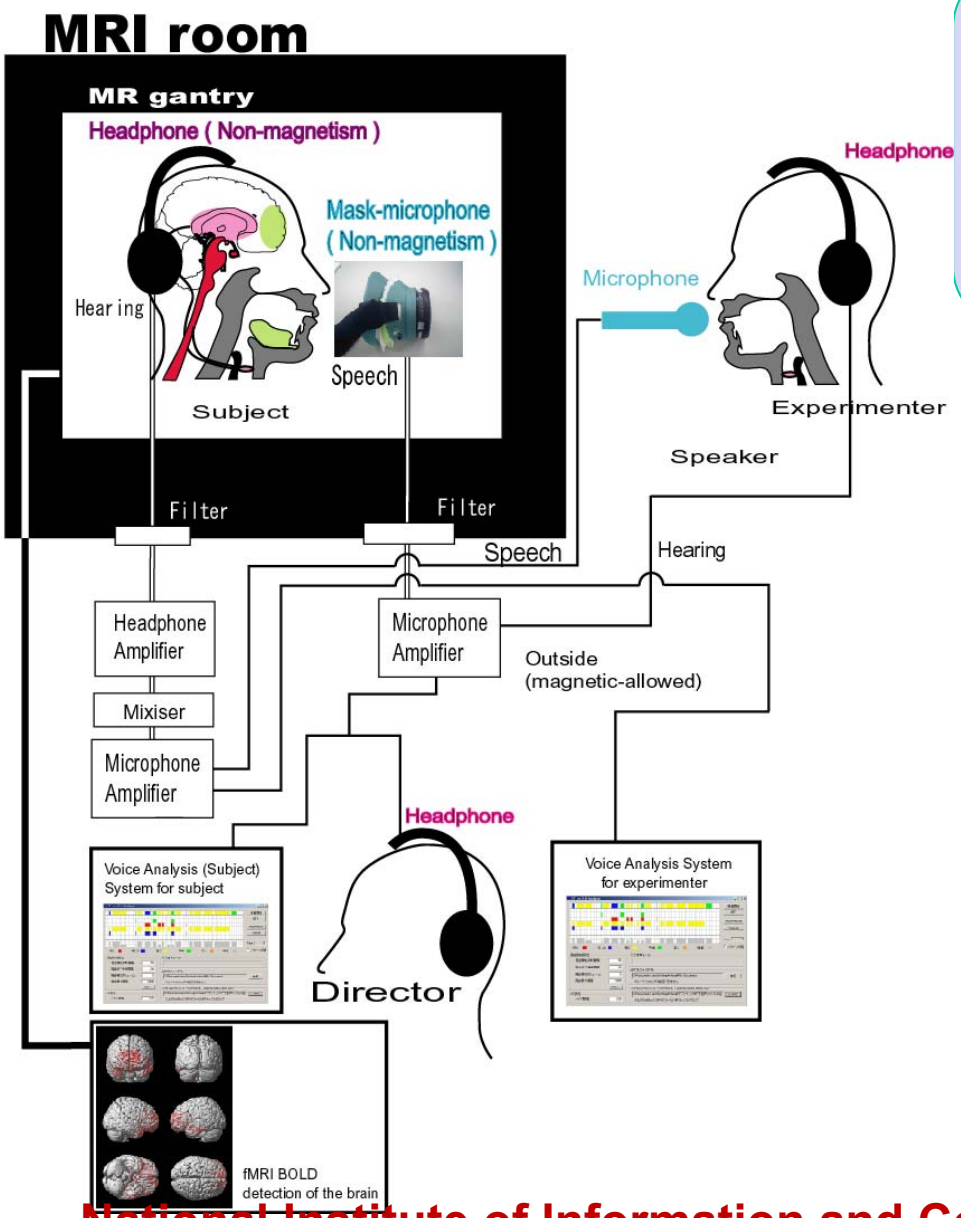
The F0 detection and the VEA were achieved under the fMRI noise of 130 dB
By NICT + AGI (2005-2008)

MR noise reduction by 80 dB with a filtered-microphone



By NICT + AGI (2005-2008)

Procedure and analysis



☆MRI: Trio (3T, Siemens, Germany):
BOLD was measured for the subject who wore a filtered-microphone with headset.
Subject had conversation with the experimenter for 150 x 2 seconds or 300x3 seconds. 1 min rest followed the conversation. The director guided conversation if little sign of emotion.

Experimenter: YT, Subject: SM, TO, TN.
Director: Koichi Shibasaki (AGI)

★Emotional Analysis:
Emotion (excitement), feelings (normal, anger, fear, laughter) was identified by the VEA system (ST2.0™) producing the event trigger.

☆BOLD analysis (brain):
SPM2.0 (UCL, England) was used on MATLAB v6.5.

★Event-related analysis done for each emotion event and compared with the rest of the period.

★*Informed consent was obtained from all subjects.*

By NICT + AGI (2005-2008)

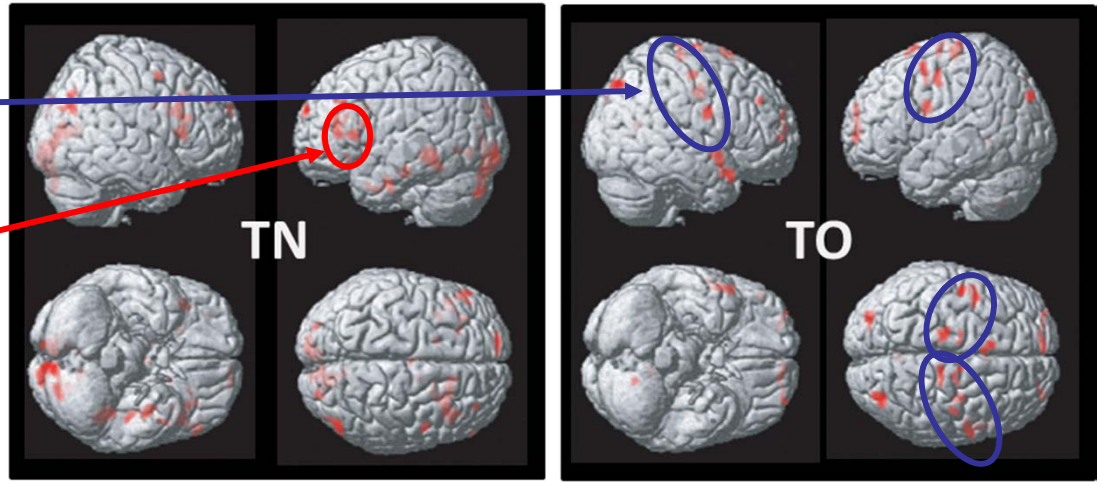
This is a proof with which subjects talk and sympathize.

BOLD Activation

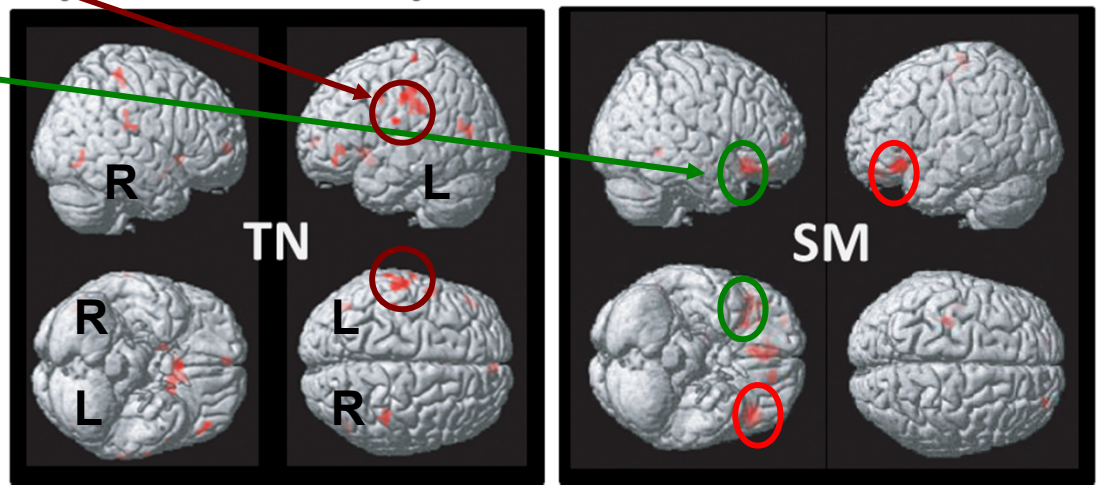
- Motor cortex
  <A motion of a mouth>
- Blocca area
  <Conversation utterance>
- Welnicke area
  <Language recognition>
- Right Blocca area
  <Sympathy, mirror neuron>

Feeling is induced by conversation.

Speech

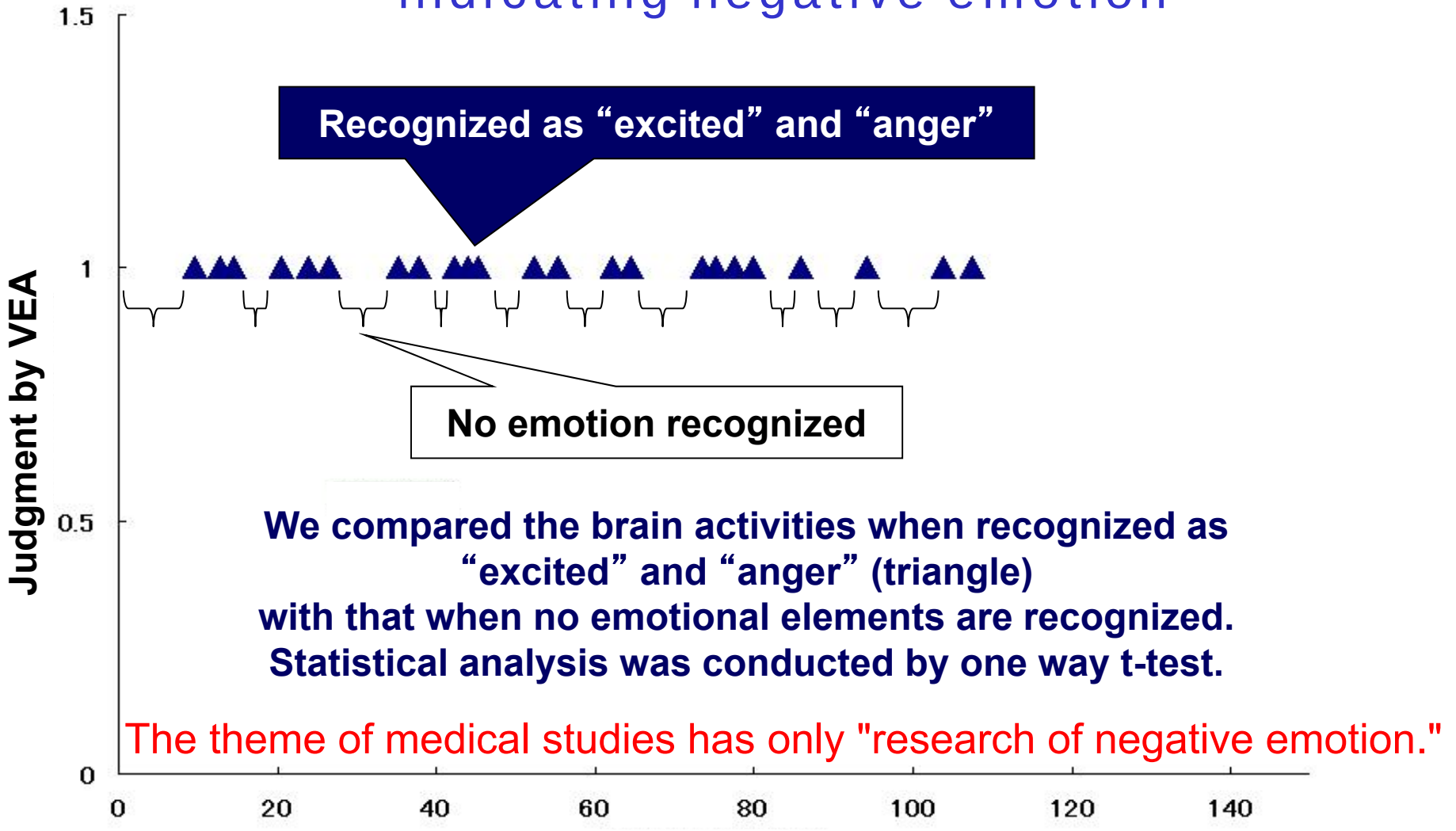


Speech > Non-Speech



By NICT + AGI (2005-2008)

Emotional judgment by ST(VEA) indicating negative emotion



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.

The theme of medical studies has only "research of negative emotion."

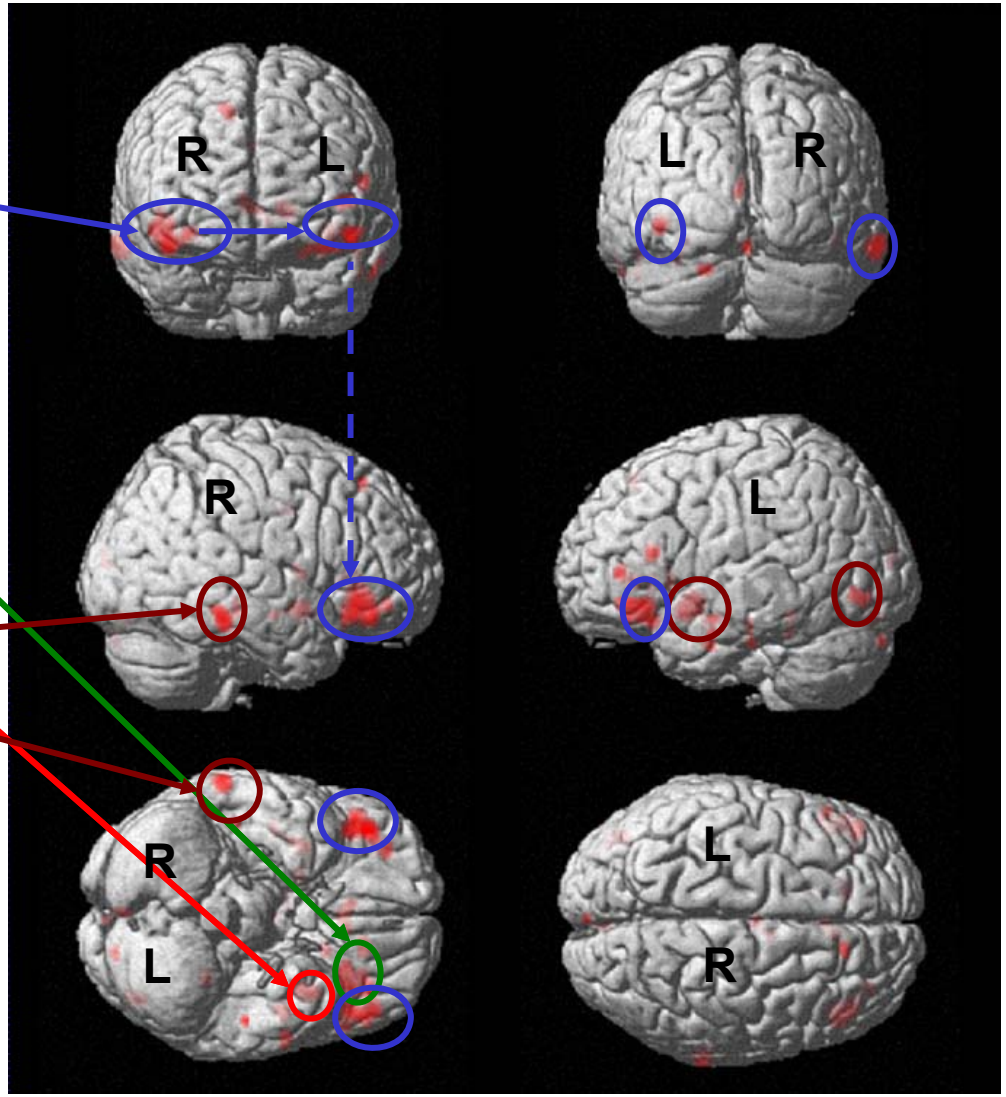
By NICT + AGI (2005-2008)

This is a proof which ST had judged to be a negative emotion only when brain activity was a negative emotion.

Activation area:
(**t-test, p<0.001,**)

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)

2009
Action prediction test

We performed the behavioral prediction experiment.
It has done to compare with voice data shown by ST(VEA) and the fact of action <payment, nonpayment, suicide and admission> at a major domestic credit company.

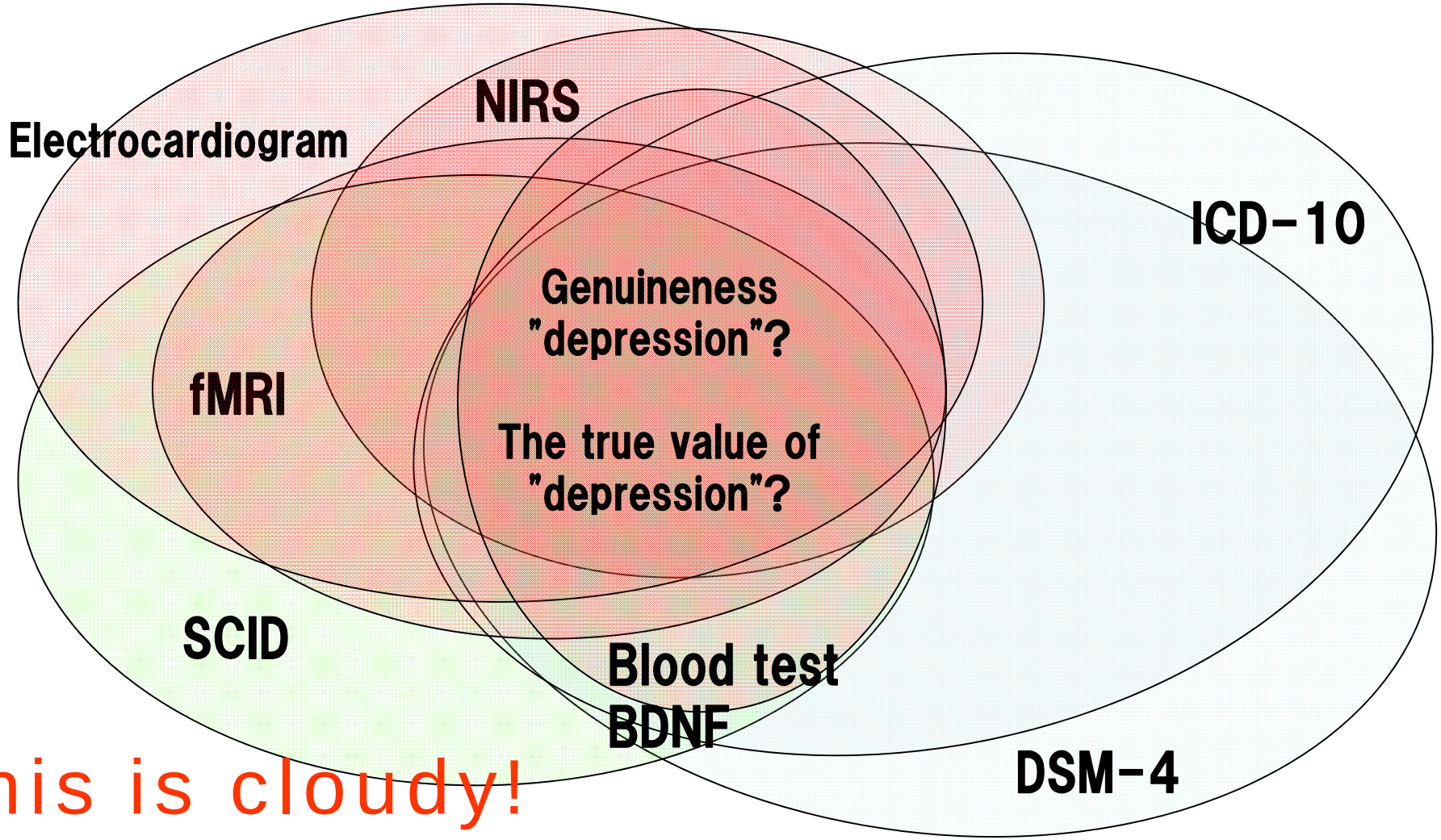
The experiment has done used **2000 voice files** selected at random.
We produced <a software which predicts customer's “attribute and behavior"> using ST(VEA).

The fact of customer's action was verified later. It asked for the coincidence rate.
Now, precise ratio of **prediction is 80 %.** (reached 90 % after a week)

Under the condition of non-payment rate 50%.

2009
Voice analysis research of
"the depression and
the anxiety disorder state"
for the prevention from suicide

The problem of depression diagnosis

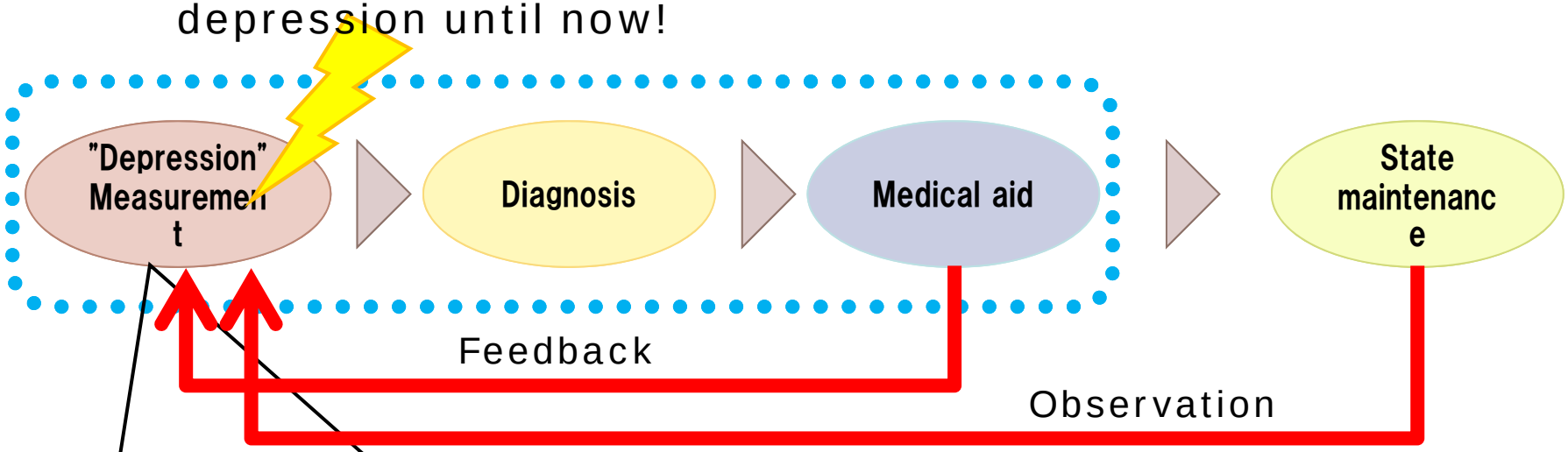


This is cloudy!

In the present condition, the clear index of "depressed state" have not be appeared.

There is no technology measured every day!

We have faced issue that nobody is able to quantify depression until now!



An old consultation questionnaire

1: "Depression" is normally not identified causes that patients often tries to hide "depression."
2: Lie Attaches.
ex. Those who want to neglect to work pretend as if they have "depression."

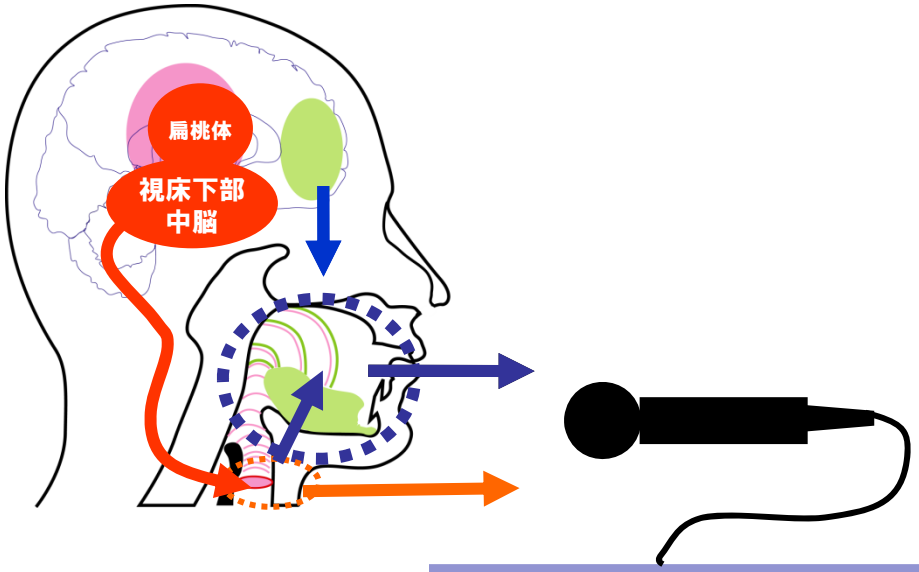
A social contribution increases rapidly.

PST enables medical innovation.

A brain is analyzed from a voice.

PST allows diagnose to identify illness easily.

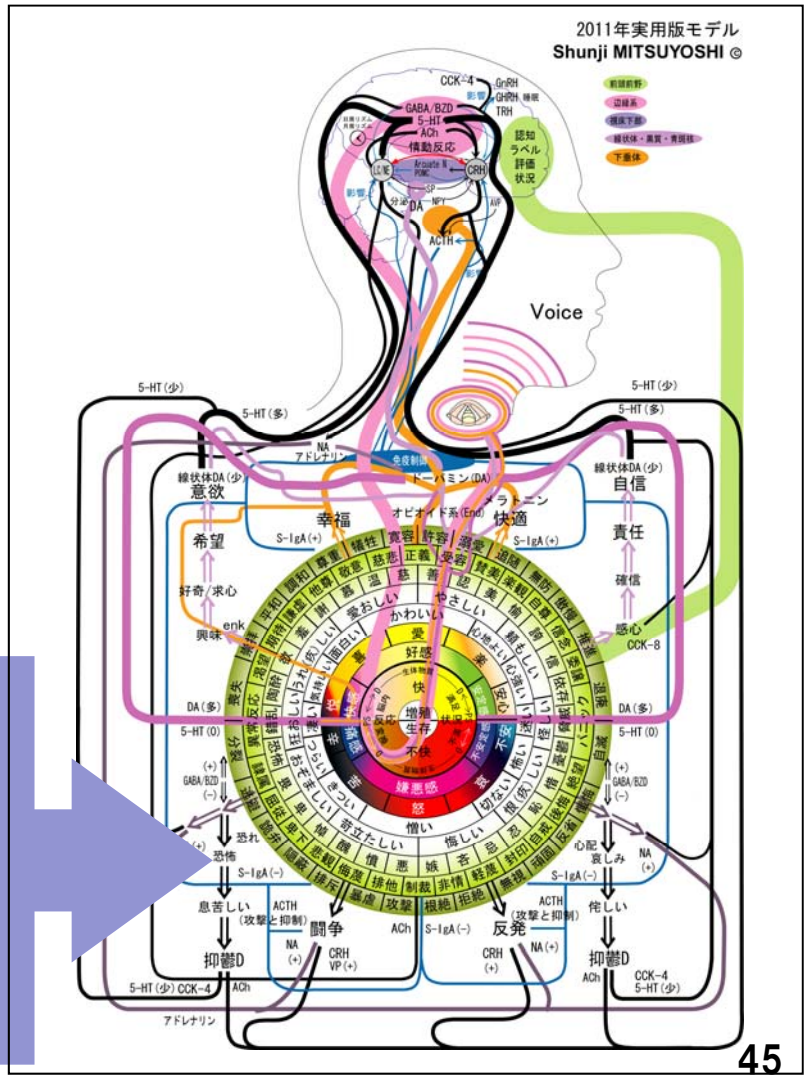
PST = Psychoanalysis System Technology



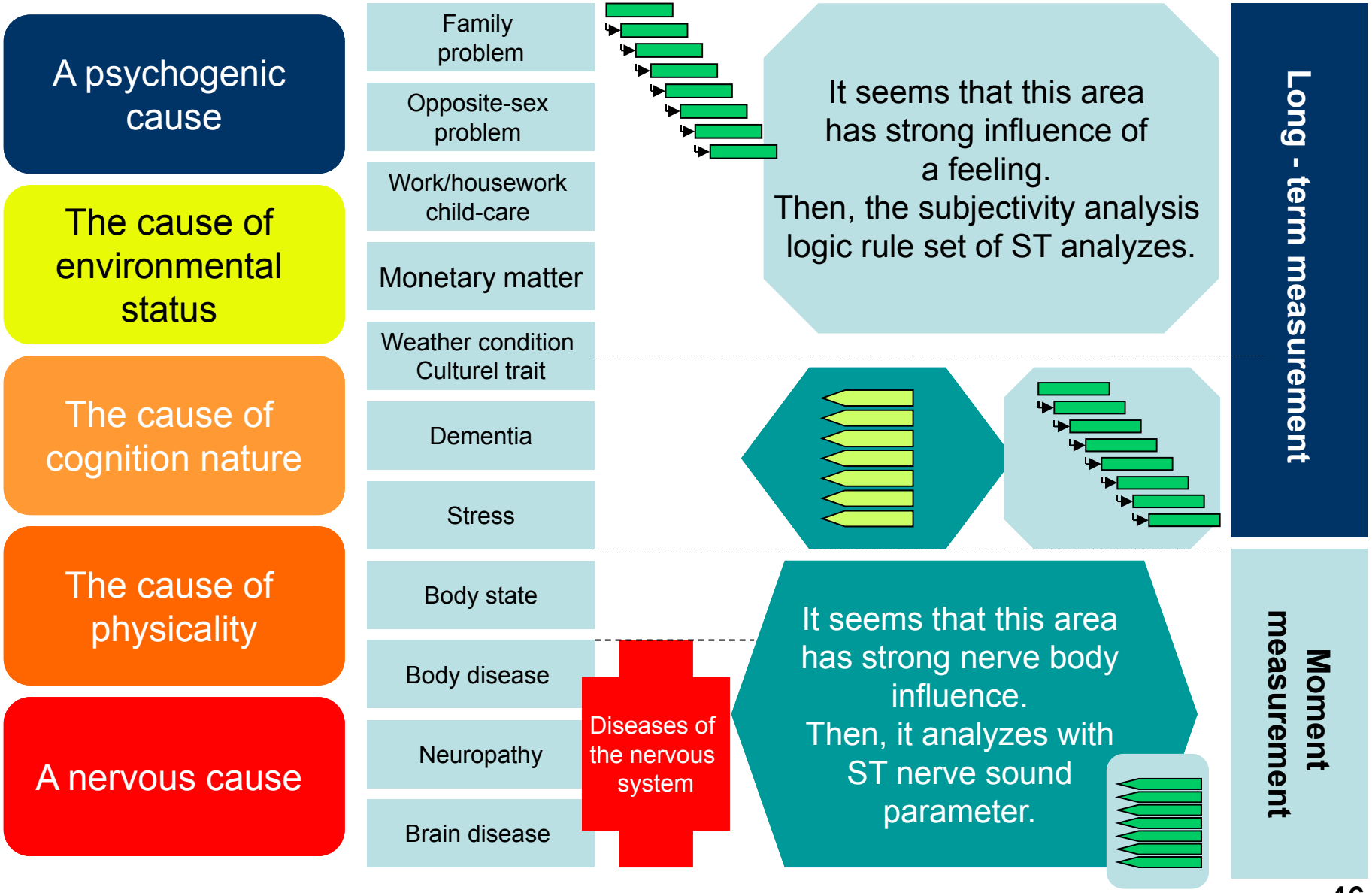
Cranial nerve voice parameter

Biological material voice parameter

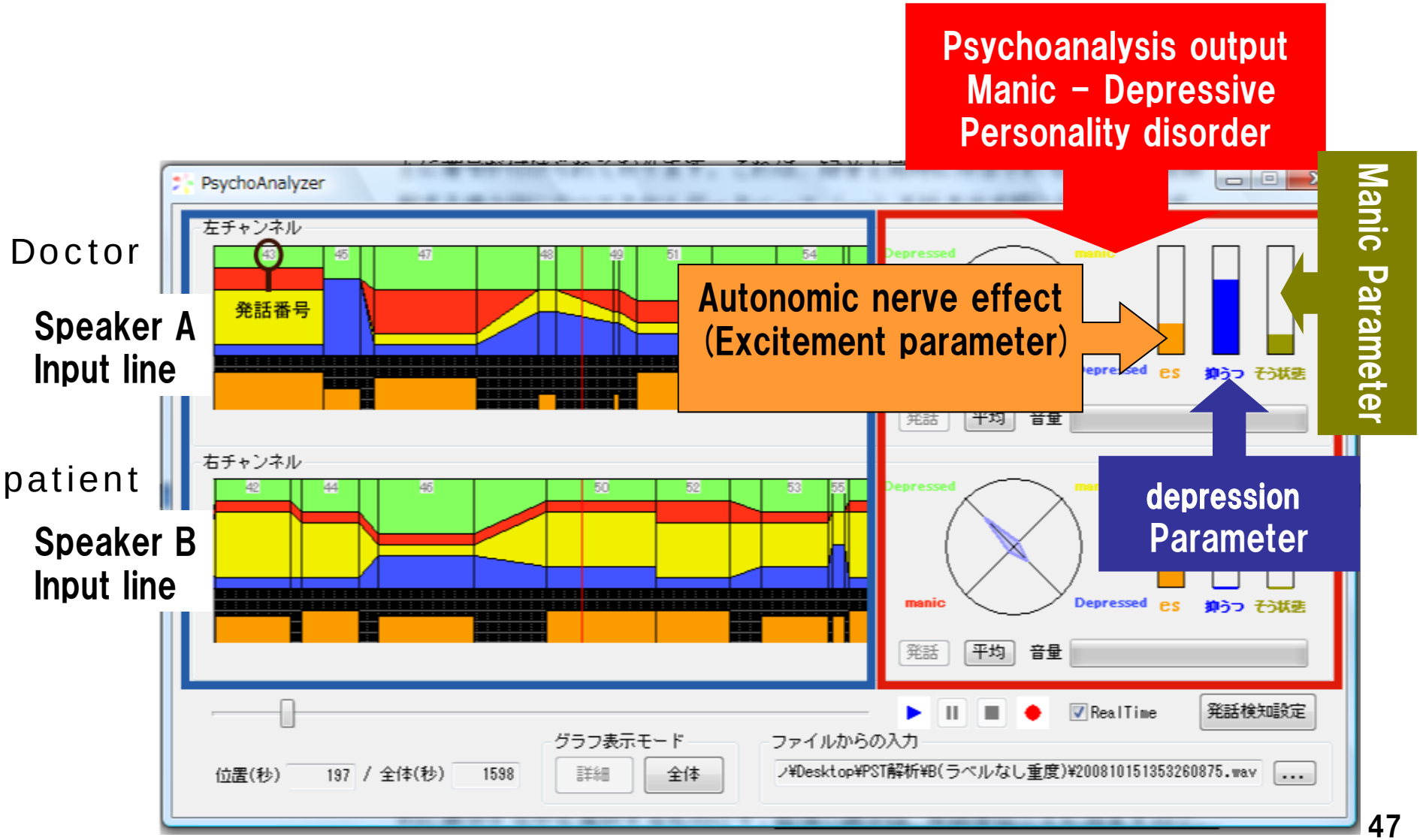
ST



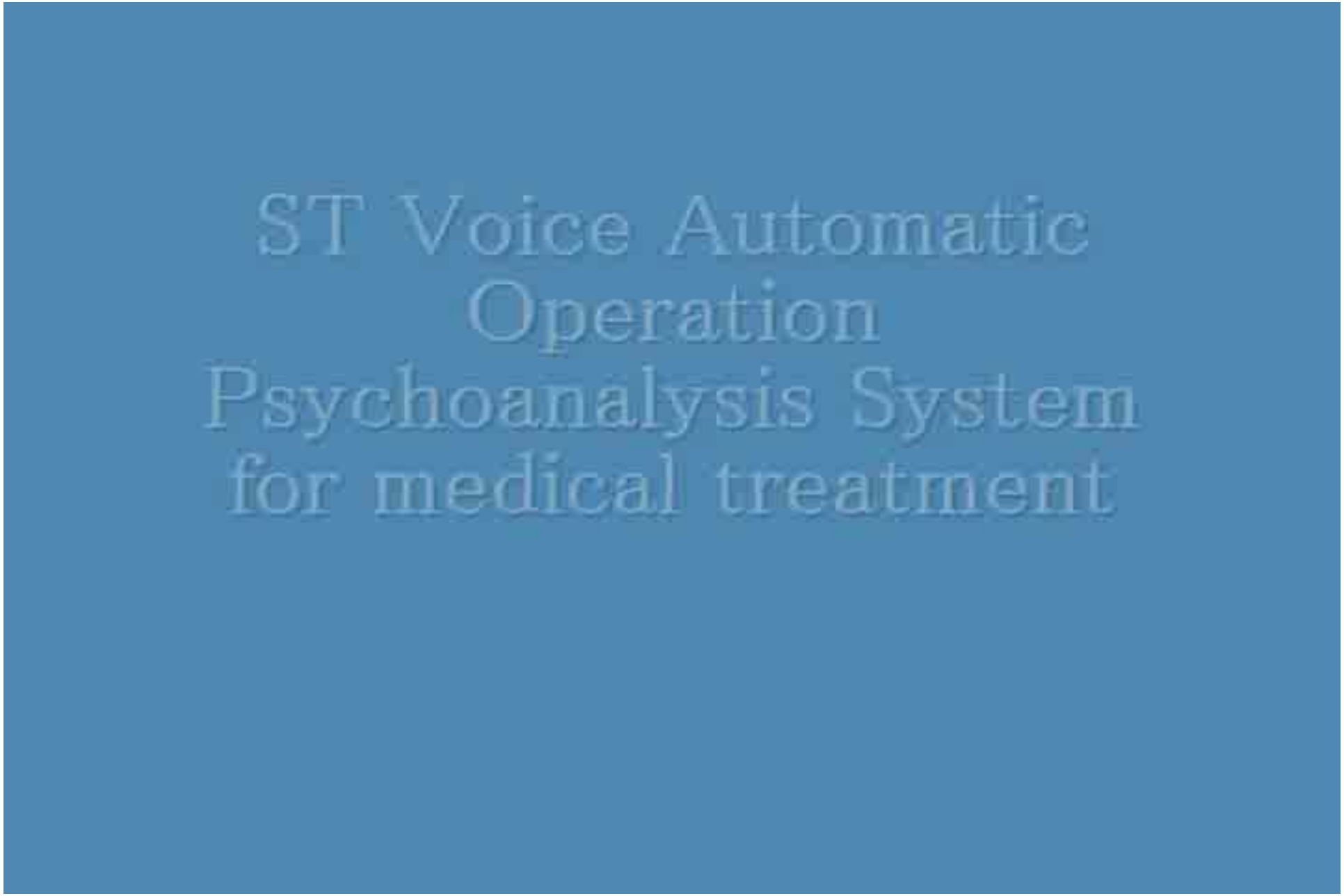
A possibility of PST is speech analysis of "the five states from a cause for a disease"



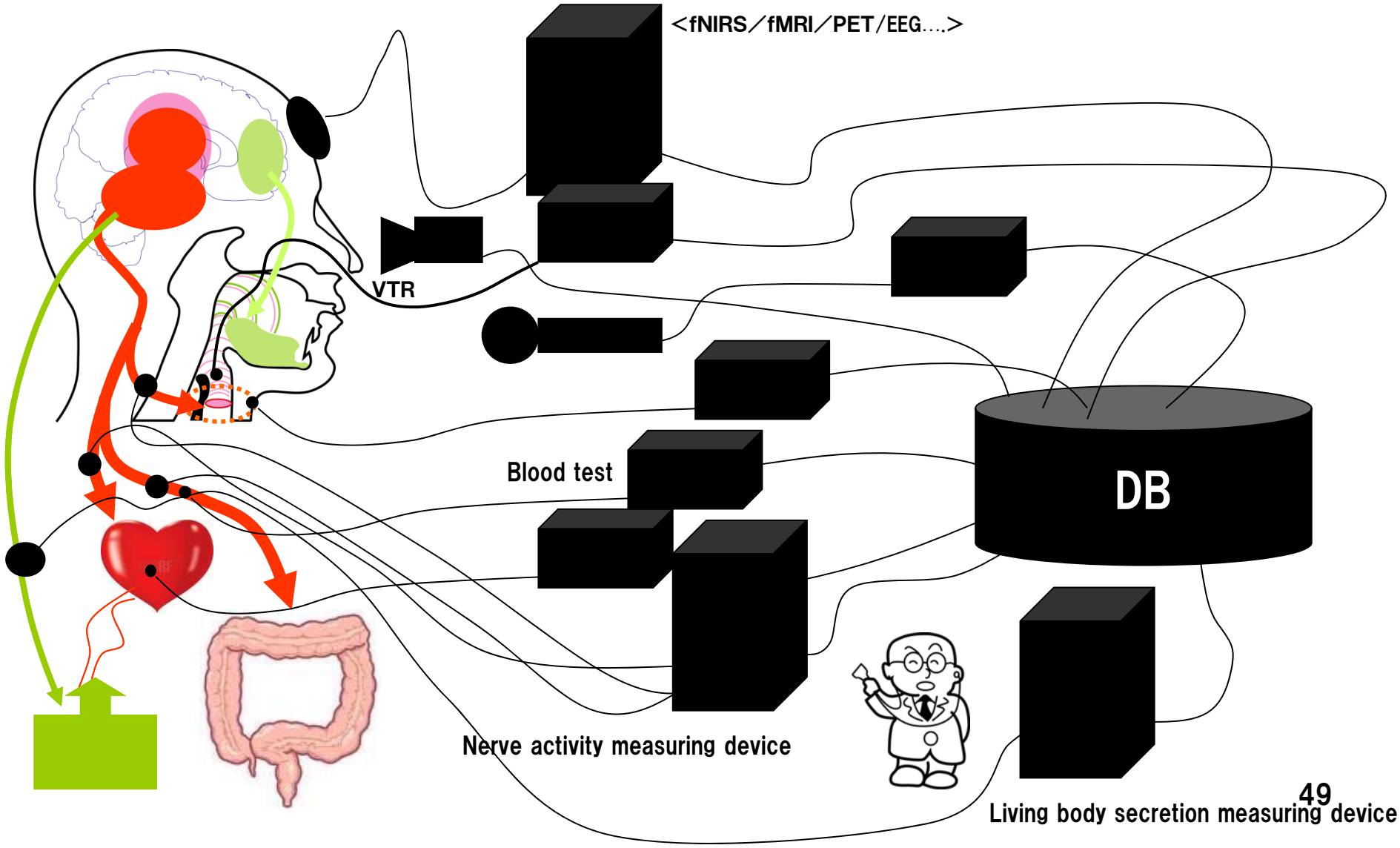
PST2009


Psychoanalysis output
Manic - Depressive
Personality disorder
Manic Parameter
Autonomic nerve effect
(Excitement parameter)
depression
Parameter
Doctor
Speaker A
Input line
patient
Speaker B
Input line
PsychoAnalyzer
左チャンネル
発話番号
右チャンネル
Depressed
manic
es
抑うつ
そう状態
発話
平均
音量
RealTime
発話検知設定
グラフ表示モード
詳細
全体
ファイルからの入力
位置(秒)
197
/ 全体(秒)
1598

PST2009

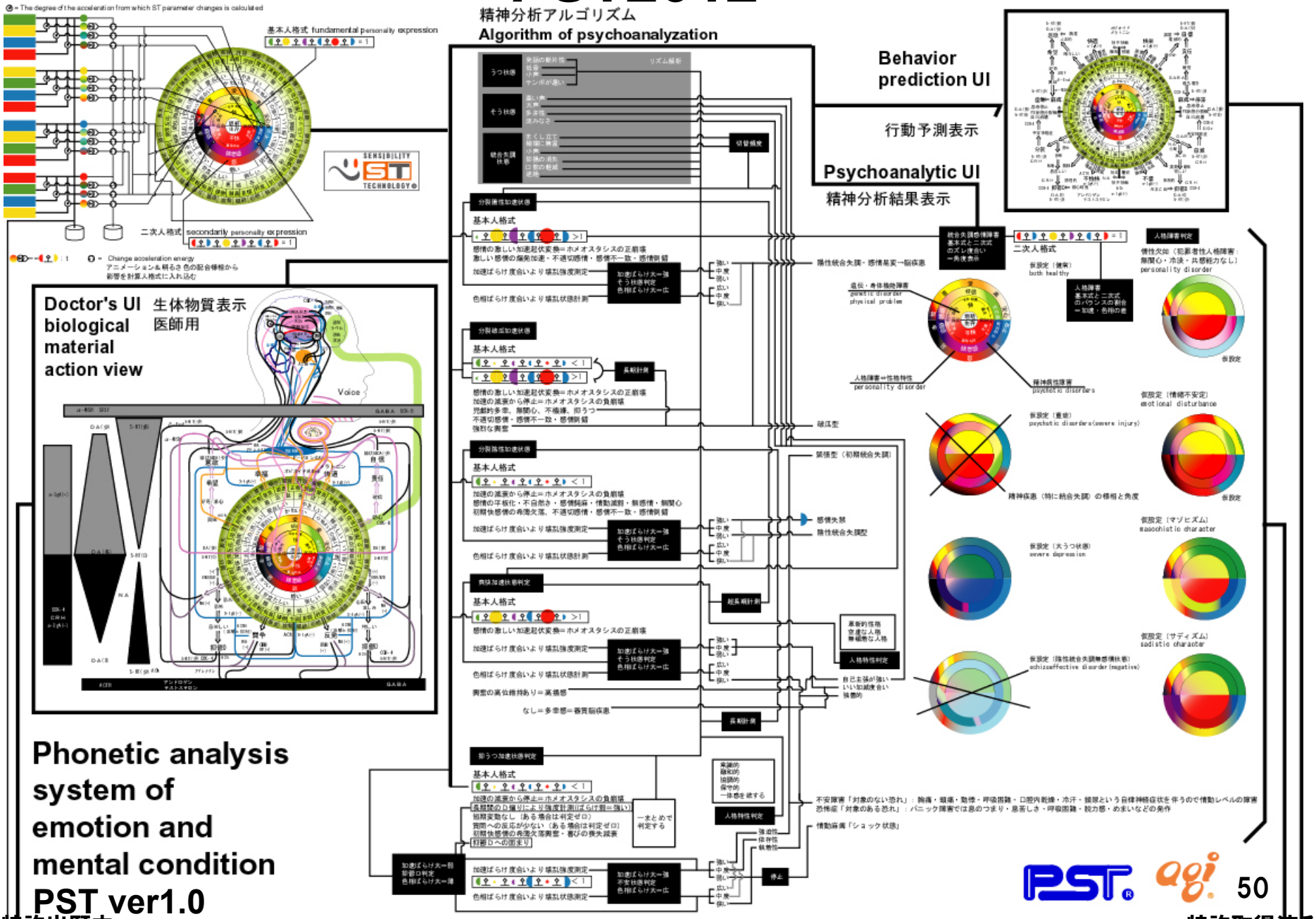

ST Voice Automatic
Operation
Psychoanalysis System
for medical treatment

PST2012


<fNIRS／fMRI／PET／EEG….>
VTR
Blood test
DB
Nerve activity measuring device
Living body secretion measuring device

PST2012

精神分析アルゴリズム
Algorithm of psychoanalyzation



特許出願中

特許取得済み

Are they individual difference or a pathology difference?

* **Neurological analysis**（**NIRS**・**fMRI**）comparison of tested Voice and healthy (control) voice.
* **Interview (SCID):** comparison of tested Voice and healthy (control) voice.
* **DSM-4/ICD-10**: comparison of tested Voice and healthy (control) voice.
* **Heart beat**: comparison of tested Voice and healthy (control) voice.
* **Blood test**: comparison of BSDN tested Voice and healthy (control) voice.

Neural parameter

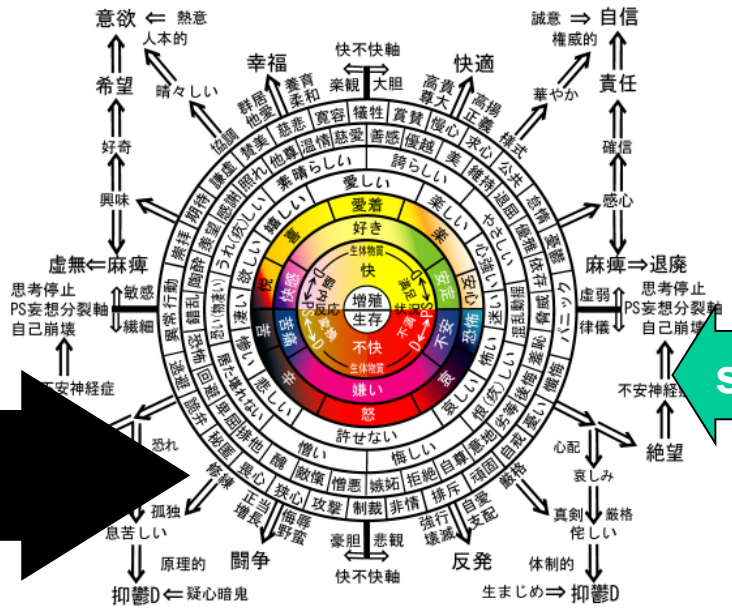
Logic set

LF/HF?

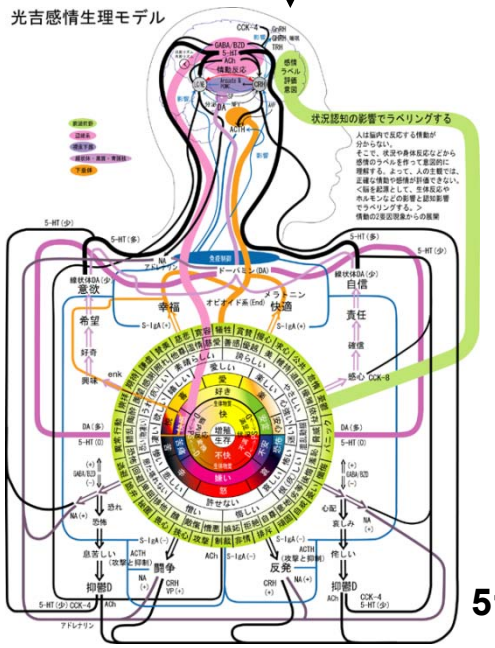
Comparison With Doctor Diagnosis

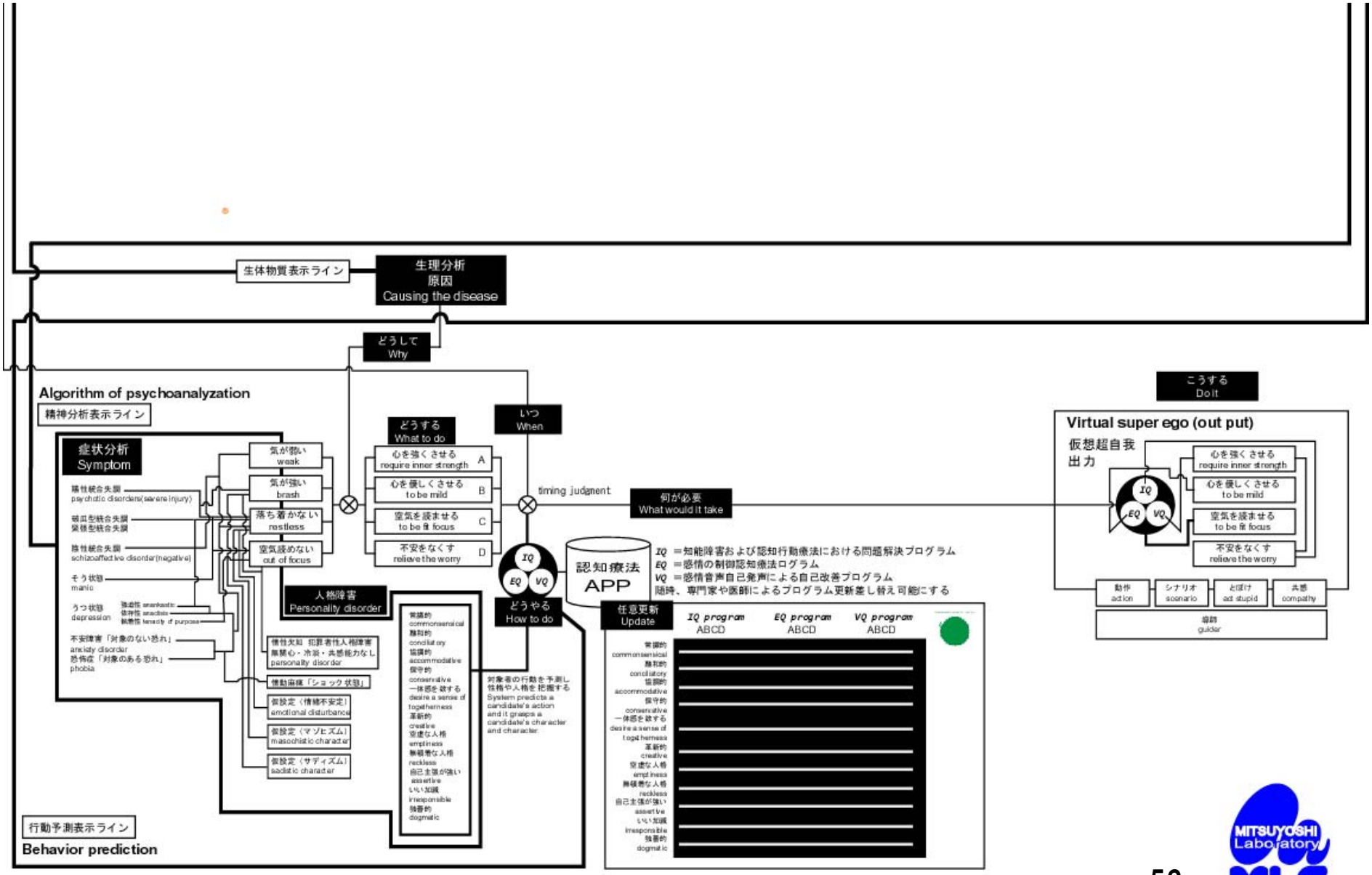
*Mental comparison
* Neuronal diagnosis

Synthesis Diagnosis Comparison Adjustment



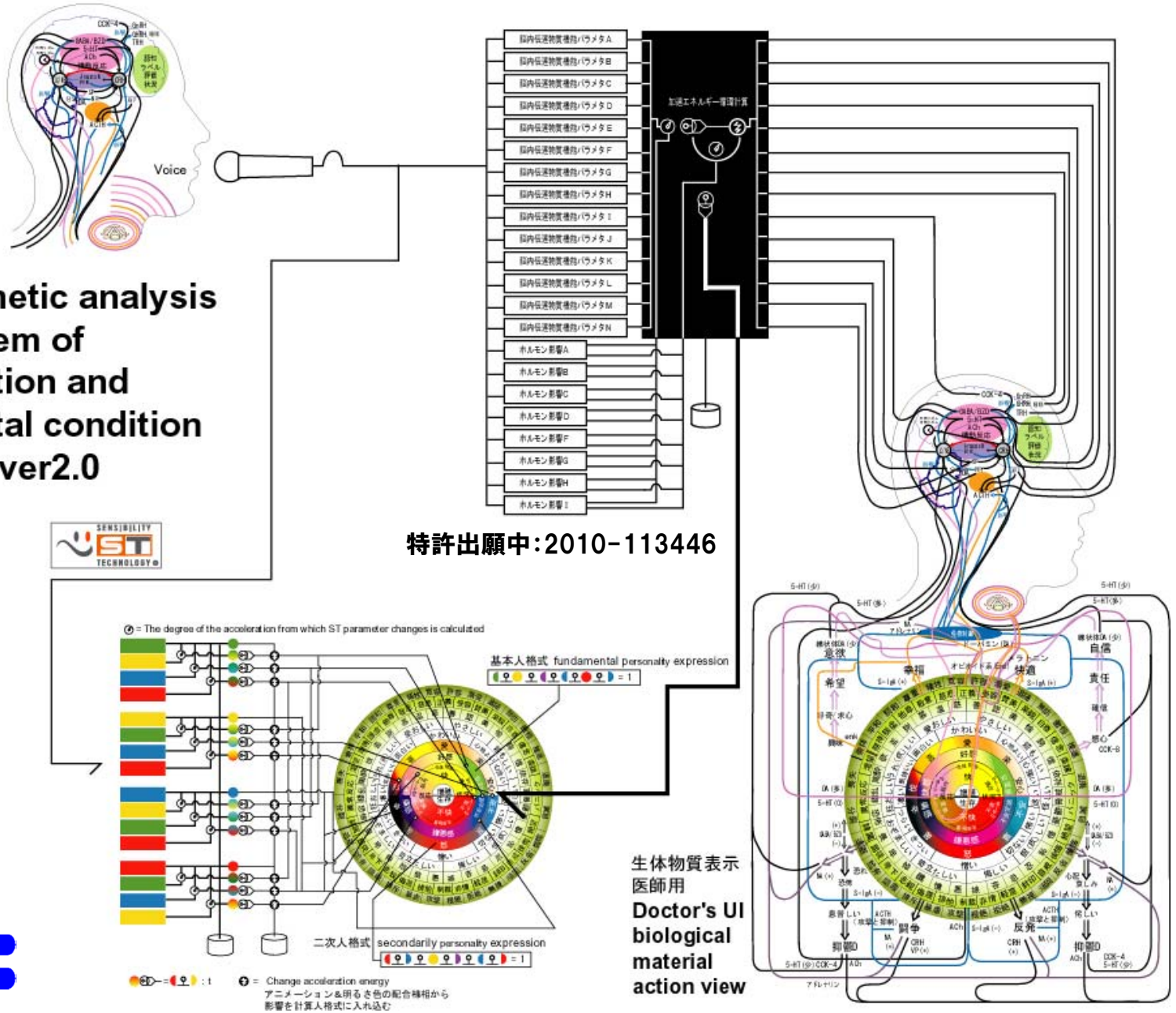
show





特許出願中

特許取得済み



特許出願中

特許取得済み

ST Emotion (VEA)
Software Development Kit

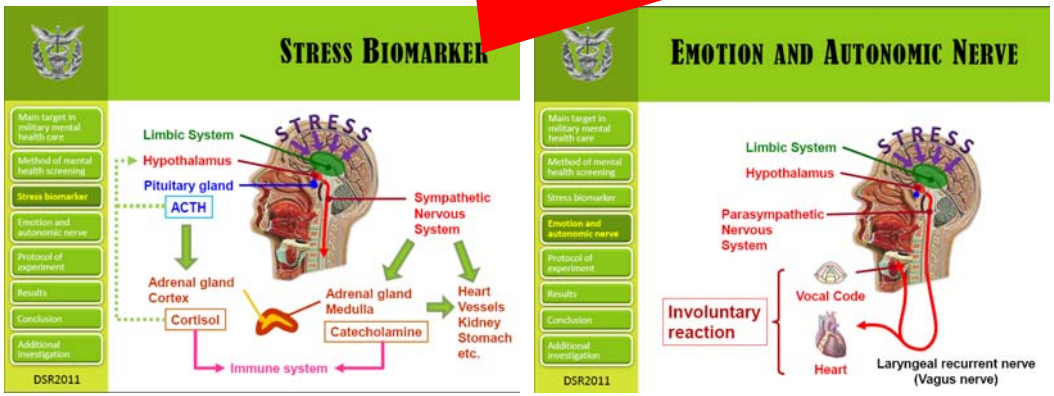
- **Required platform**
  - Windows: Windows XP, Windows Vista（developing environment : Visual C++ .net 2003 and later versions）
- **Sound format**
  - PCM WAVE format
- **Required hardware**
  - CPU: Intel Celeron processor，or compatible processors: speed more than 1GHz
  - Linux: Fedora Core 5/6, open SUSE 10.0 or later versions
  - Sound boad: sampling frequency 11kHz, 16bits or more.
  - Memory: 512MB or more（recommended）

The stress research

防衛医科大学校

The Ministry of Defense and National Defense Medical College joint research

The basic principle of ST/PST
Proof in which the National Defense Medical College did formal adoption



as stress detector

The Self-Defense Forces Subject group

- Army school student
- Special force member
- Overseas dispatch member
- East Japan great earthquake contingent member

→ Normal group

→ Stress group

→ Prolonged stress group

→ Severe stress group

Ministry of Defense formal adoption was carried out.
For the first time in the world, formal adoption of the voice psychological analysis system was carried out in the defense organization of advanced nations, and science proof of the principle was carried out.

To adopting PST, the Ministry of Defense studied performance of domestic and foreign devices compared with PST .

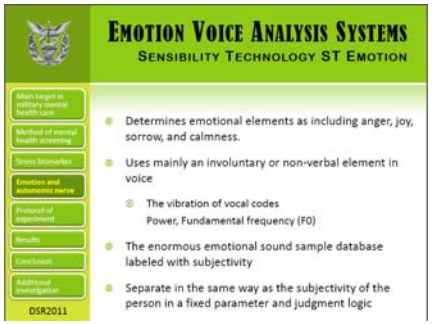
As a result, PST showed significant performance and capabilities.
PST has been proved as stress detector .

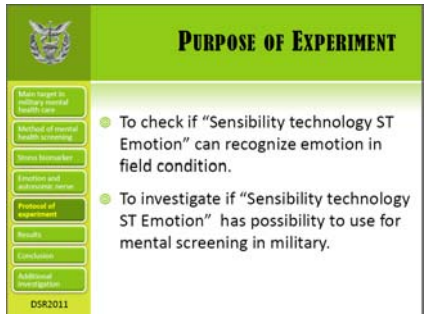
Application of the stress result of research

防衛医科大学校

The Ministry of Defense and National Defense Medical College joint research　Practical use by the East Japan great earthquake

We measured "the Self-Defense official's stress" in the East Japan earthquake disaster.
World defense Science Research Council (DSR) announced

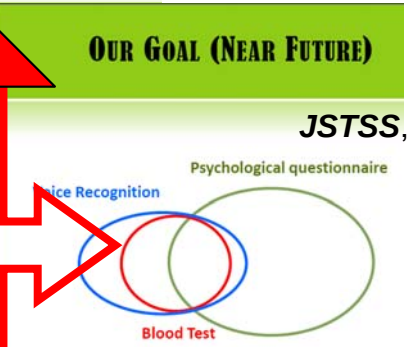




Result: Comparison of PST to a stress index
Coincidence with a blood test (herpes bacillus trace)
Compatibility with a doctor's diagnostic result
Coincidence with a subsequent condition change

He won the highest prize in an international force medical congress.

朝雲　平成24年(2012年)　1月19日



World defense Science Research Council (DSR)
International force medical congress (award)
Medical Tribune (printing)
JSTSS, ***Japanese Society for Traumatic Stress Studies***
(Refereeing passage)
Now, the contribution to ***Nature*** is prepared.

Quality assessment conclusion of ST/PST

Scientific verification

Subjectivity and **ST**：To compare human's subjectivity with ST

A: ST enable to reproduce emotion as same as human being.

B: It has been proved that ST performs accurate evaluation of what speakers actually felt. Also accuracy for this evaluation is higher than what outsiders presume it.

Brain activity and **ST**：To compare brain (excitement) with ST used fMRI

C: When the brain activity showed negative reaction with the rate of disagreement 0.1%, ST also judged feelings as negative （by six examinees using fMRI（3T）device）

Stress and **PST**：Stress index and PST with Blood test + doctor's result + condition

D: Coincidence with a blood test (herpes bacillus trace)

E: Compatibility with a doctor's diagnostic result

F: Coincidence with a subsequent condition change

Practical examples

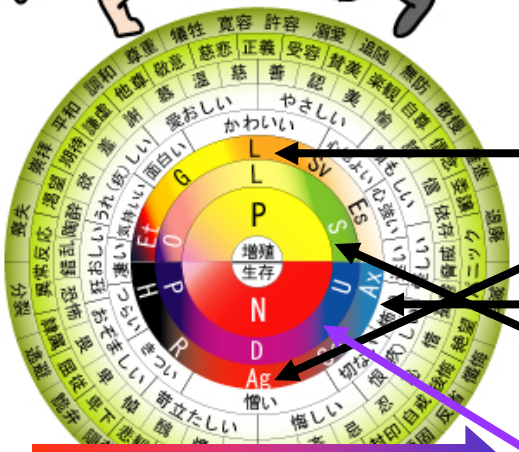
Action and **ST**：The behavioral prediction experiment at a major domestic credit company

ST device succeeded to predict consumer's action with 80% accuracy without voice analysis under the condition of non-payment rate 50%.
(Reached 90% accuracy after a week）

Our technology has been recognized as formal adoption by the world first army in advanced nations, doctor's degree acquisition, the international patent, the National Research Institute test result and the test result in the Ministry of Defense. The effect in the East Japan great earthquake was inspected.
Thereby, it has proved that technology of our company is the highest performance.

Standardization of emotional RGBY ver-1.0

東京大学 THE UNIVERSITY OF TOKYO



Regulation	1st circle	2nd circle	3rd circle	4th circle	5th	6th	7th	8th
①	STY	<P>	-L	-L				
②	STR	<N>	-D	-Ag				
③	STB	<N>	-U	-Ax				
④	STG	<P>	-S					

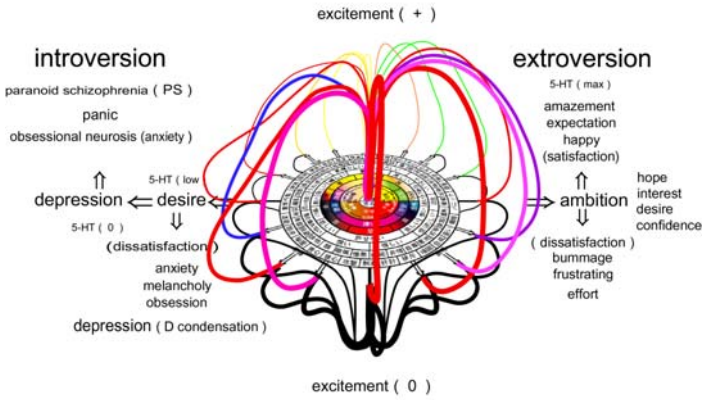
Basic emotions

and STB<N>-D-P

Activation = EX
Corruption = CO

⑤ STR♀B <N>- 3♀7 (EX89)(CO=$\underset{i=1}{\overset{n}{♀}} X_i$)

red-violet ⇔ blue-violet ?



$$X_1 \underset{a_1 b_1}{♀^{k_1}} X_2 \underset{a_2 b_2}{♀^{k_2}} X_3 \underset{a_3 b_3}{♀^{k_3}} \cdots \underset{a_n b_n}{♀^{k_n}} X_n$$

$(X_n ♀ X_1)$ ← Circulation

X = Continuous quantity

$\underset{}{♀}$ = Quantity division chain operator

$\underline{a\ b}$ = Change threshold

Our demand

- The partner who can research together with PST overseas.
  1. Clinical study (Brain, Nerve, Intervention trial)
  2. A little different from one culture to another (UI)
  3. University PST laboratory is start

- The partner who gets business together with us overseas.
  1. With the existing technology (ST = civilian goods)
  2. With the newest technology (PST = med-tech)

ST is AGI.Inc.
PST is PST.Inc.

Thank you!

information @ agi-web.co.jp