

2023/4/17

神經與自律神經回饋儀簡報

百朗國際股份有限公司
----- 黃柏淇

2023/4/17

ProComp Infiniti System 生理回饋儀



Technology for Better Health



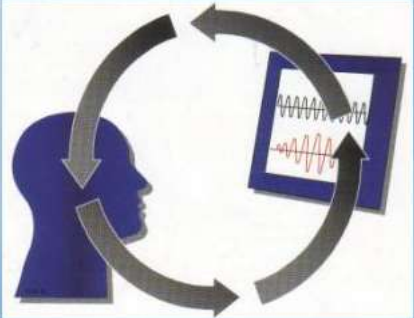
儀器特色

- ◆ 利用 ProComp/ BioGraph infinity 的多媒體回饋功能，可加入AVI影像訊號、上百種動畫影像迴饋、120種聲音迴饋(MP3、MIDI、Wav..)及可趨動CD-ROM、DVD 做更進一步的聲音及影像迴饋。
- ◆ 8頻道，樣本率(A-B 2048s/s，C-H 256s/s)
- ◆ 可擴增到32個頻道
- ◆ 光纖紅外線傳輸，雜訊小。也可增購無線藍牙傳輸器
- ◆ 可自訂Channel(輸入感應器)、Screen(回饋畫面)及Script(評估及研究劇本流程)
- ◆ 也可使用CF Card做資料儲存

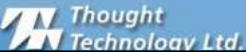


What is Biofeedback?

Biofeedback is a treatment technique in which people are trained to improve their health by using signals from their own bodies.



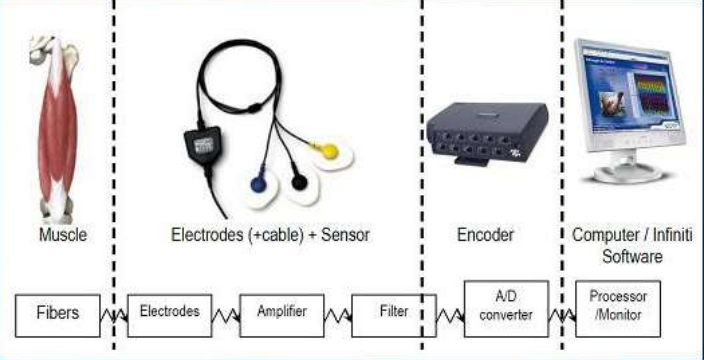
Physical therapists: help stroke victims regain motor function.
Psychologists: help stressed, anxious clients learn to relax.

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What is Biofeedback?

Capture of a Physiological Signal:

EMG is an electrical signal produced by the action potentials generated by the muscle fibers while firing



Muscle

Electrodes (+cable) + Sensor

Encoder

Computer / Inifinti Software

Fibers


Electrodes


Amplifier

Filter

A/D converter

Processor /Monitor

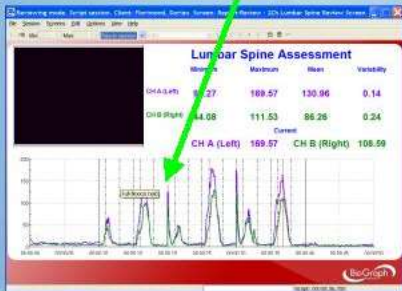


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What is Biofeedback?

Examples of Physiological Signals used in Biofeedback:

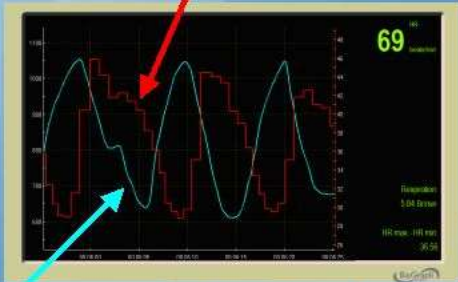
Electromyography (EMG): Muscle Tension:



	Minimum	Maximum	Mean	Variability
CH A (Left)	0.27	169.57	130.96	0.14
CH B (Right)	0.08	111.53	86.26	0.24


CH A (Left) 169.57 CH B (Right) 108.59

Electrocardiography (ECG) or Blood Volume Pulse (BVP): Heart Rate



69



Respiration





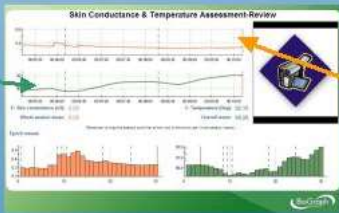

What is Biofeedback?

Examples of Physiological Signals used in Biofeedback:

Electroencephalography (EEG): Brain Activity




Skin Temperature & Galvanic Skin Response (GSR)

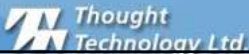


What is Biofeedback for?

Therapy: Post-Traumatic Stress Disorder

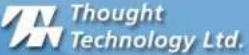



US soldiers returning from Iraq and being treated for PTSD with Biofeedback.
Similar treatments are being used for Canadian soldiers returning from Afghanistan.
Photos are courtesy of the War-Related Illness and Injury Study Center, East Orange VAMC




What is Biofeedback for?

Training: Sports



What is Biofeedback for?


Training: Sports,
Mental Training for Olympic Athletes



The psychophysiological requirements of shooting include:

- Controlled breathing and heart rate
- No excess tension in muscles
- No fluctuation between sympathetic/parasympathetic states during triggering
- No interior monologue
- Sharp focus and good reactions to trigger at the right moment.

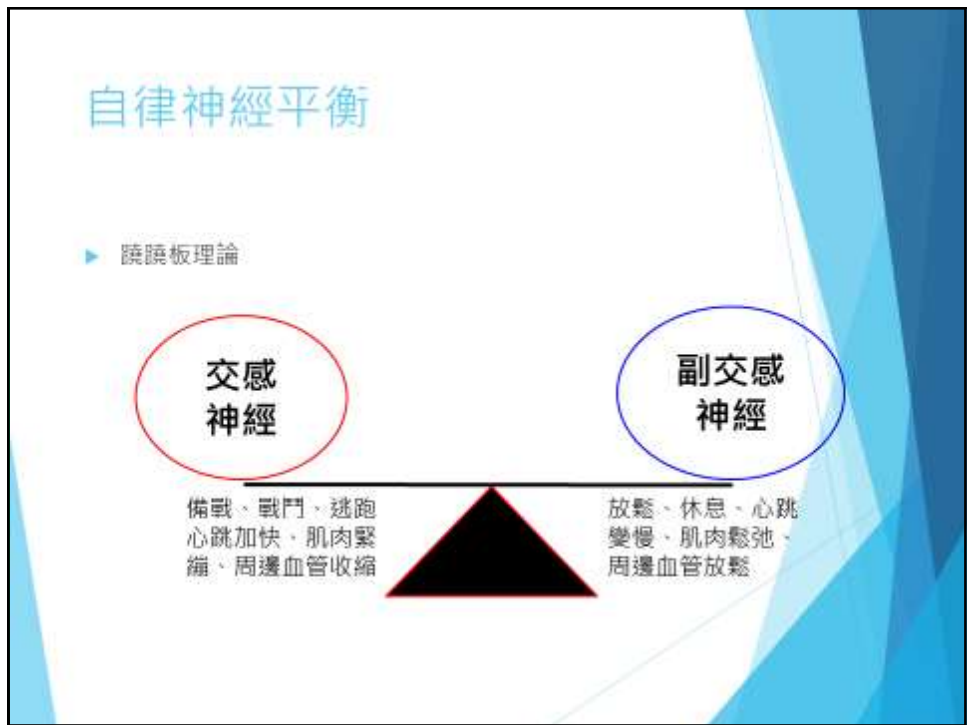
Gold for Biofeedback in Beijing: Abhinav Bindra wins India's first ever individual Olympic Gold Medal
Courtesy of Timothy Harkness, Sports Psychologist, South Africa.

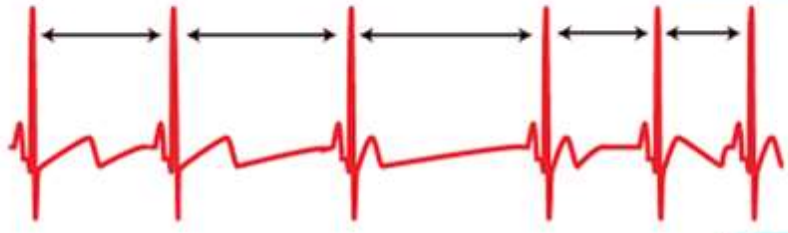
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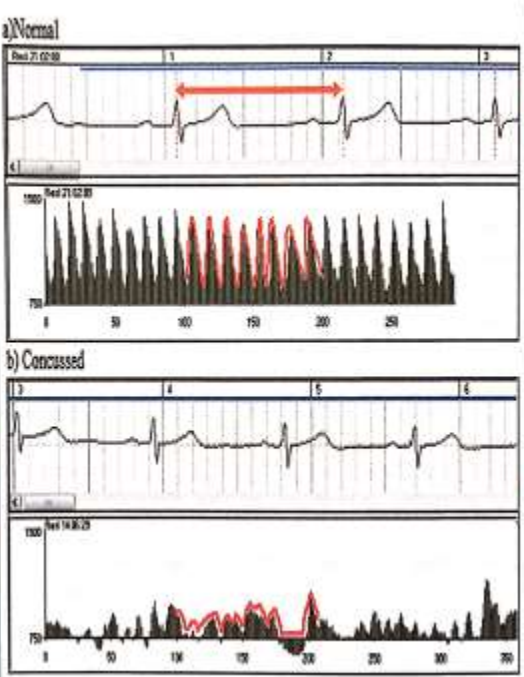
生理回饋使用之生理指標

- ◆ 表面肌電(EMG)—偵測肌肉緊張程度
- ◆ 溫度(TEMP)—偵測皮膚表面溫度
- ◆ 皮膚導電度(SC)—偵測皮膚汗腺導電度
- ◆ 心跳/末梢血流(BVP)—偵測心跳狀況
- ◆ 呼吸(RESPIR)—偵測/練習呼吸狀態
- ◆ 腦波(EEG)—訓練腦波注意力





- 心跳速率的變異：heart rate variability
- 由交感神經、副交感神經(迷走神經)共同影響



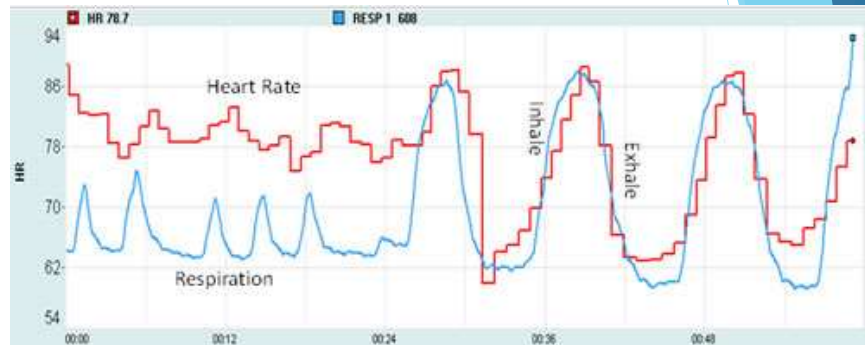
a) Normal

b) Concussed

▶ 好的心跳變異

▶ 不好的心跳變異

HRV: 頻域指標的概念

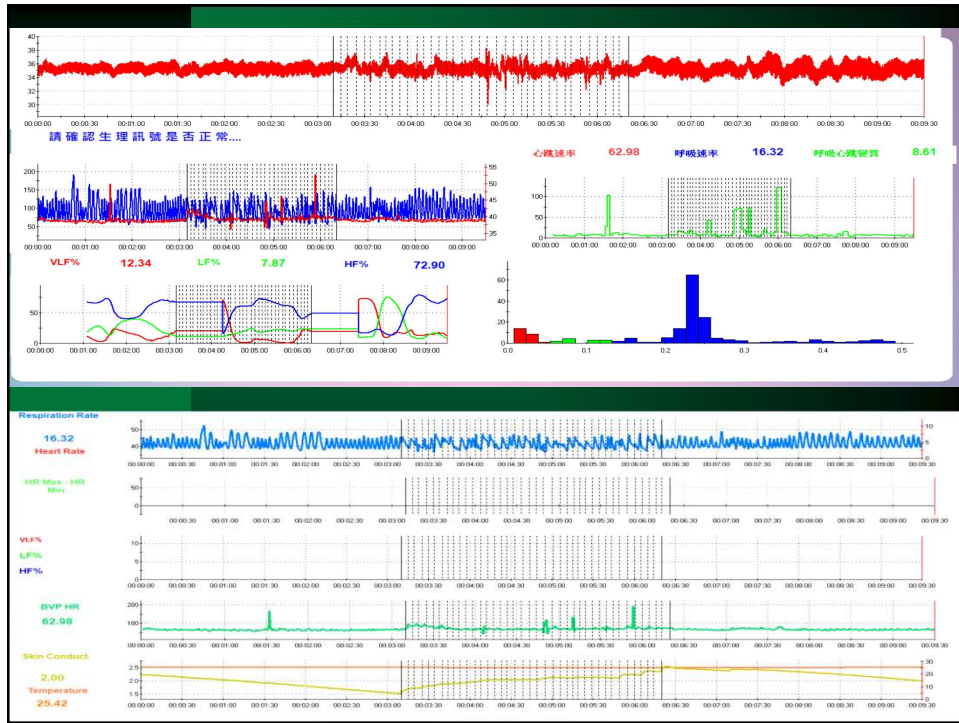


R-R interval 的波型
頻率 Frequency
震幅 Amplitude

HRV生理回饋簡介原理

- ▶ 透過呼吸，調節心跳，訓練自律神經彈性。
- ▶ 吸氣時會抑制迷走神經活性，使心跳上升；
- ▶ 吐氣時會刺激副交感神經活性，使心跳下降。
- ▶ 當心跳與呼吸產生同時上升與同時下降的現象，稱為心肺同步(RSA, respiratory sinus arrhythmia)，此時我們的心跳變異會達到最大，身體的自主神經系統也會達到最佳的平衡狀態。
- ▶ 呼吸目標：4.5-6.5下/分





Solutions for Physical Therapy

Complete Assessment & Biofeedback Solution with
EMG, ECG/BVP, Respiration,
GSR, Peripheral Temperature,
Inclinometry, Muscle Testing
and Algometry

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Solutions for Physical Therapy

Assessment Protocols:

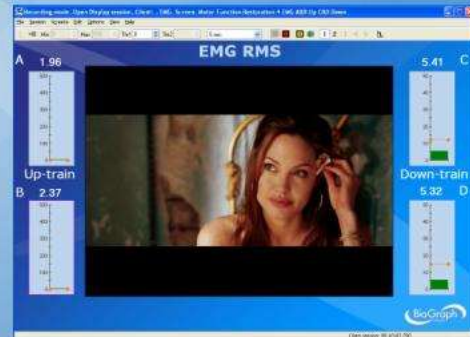
- EMG Assessment:
dynamic & static assessment, evaluation of posture, muscle tension/relaxation, muscle patterns/coordination/equilibration, fatigue



Solutions for Physical Therapy

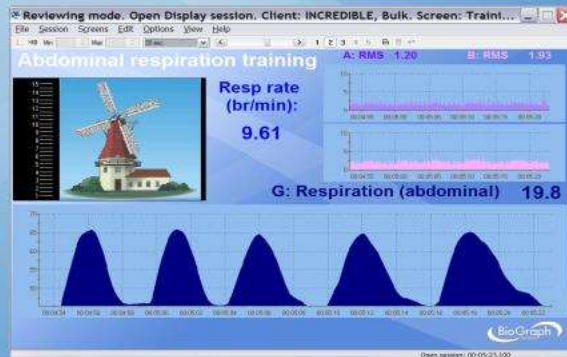
Biofeedback Training:

- EMG Biofeedback:
relaxation, strengthening, control, coordination, balance and posture.



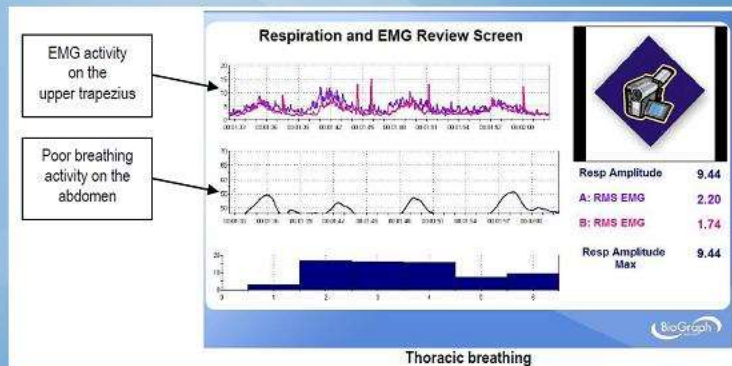
Solutions for Physical Therapy

Biofeedback Training: - Breathing Training



Solutions for Physical Therapy

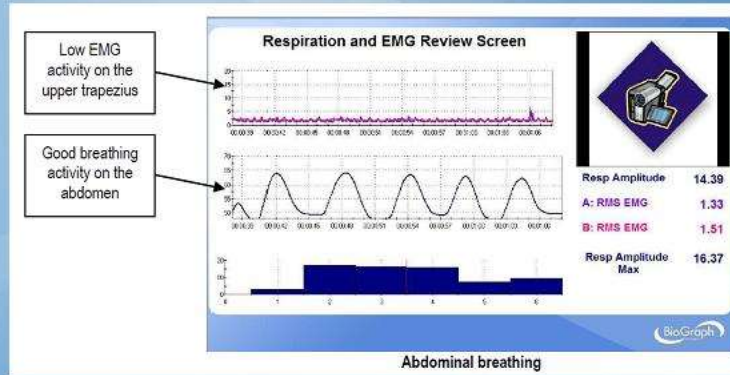
Biofeedback Training: - Breathing Training



Solutions for Physical Therapy

Biofeedback Training:

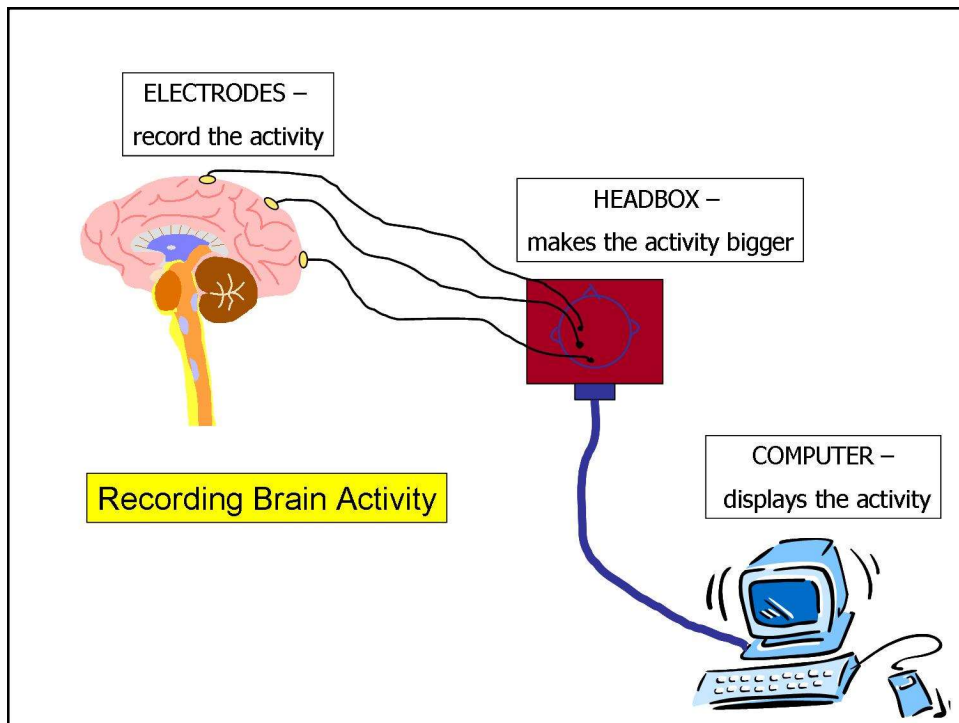
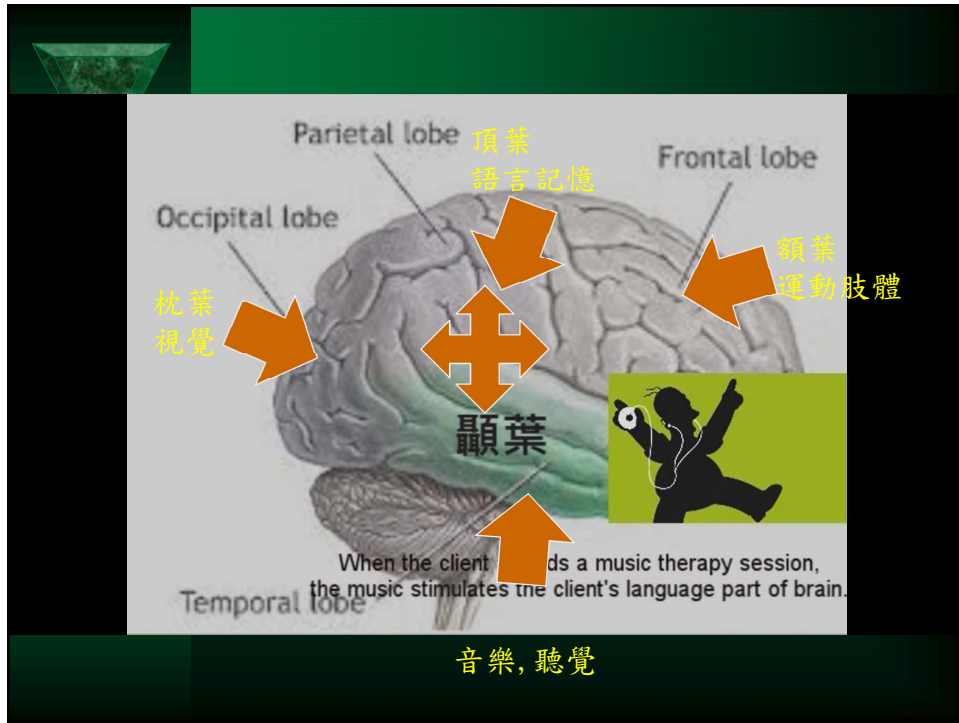
- Breathing Training

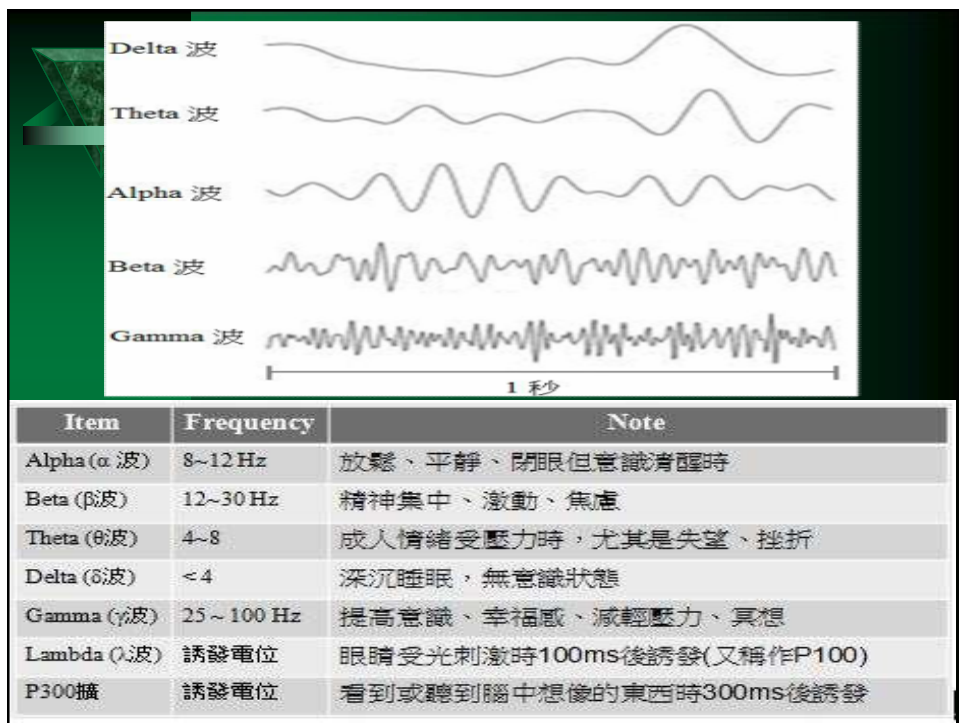
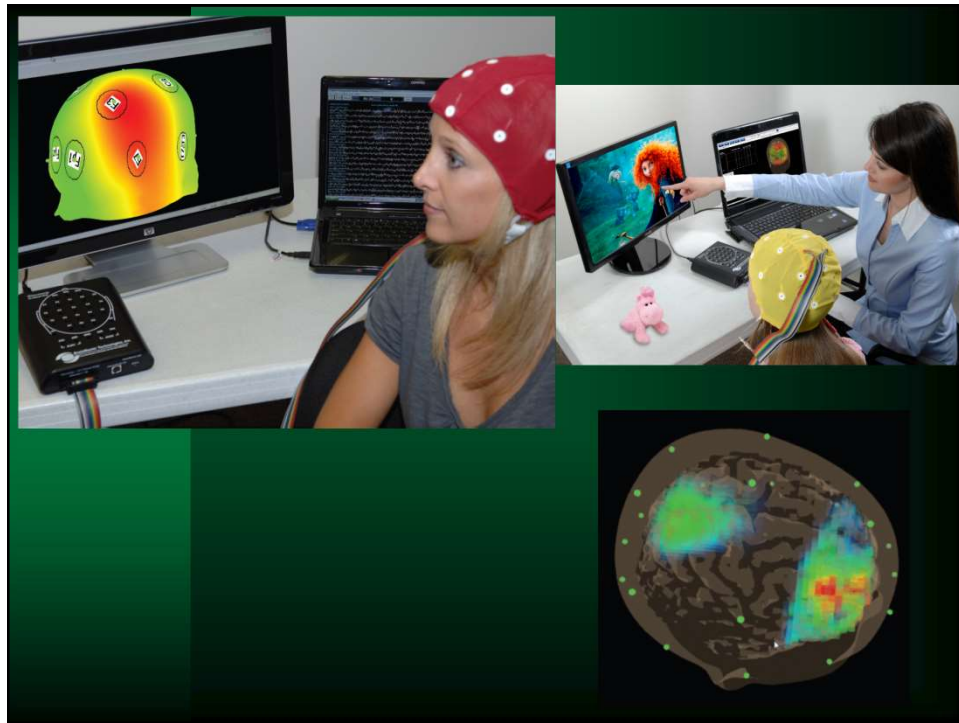


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◆ 神經生理評估





Frequency Band Name	Frequency Bandwidth	State Associated with Bandwidth	Example of Filtered Bandwidth
Raw EEG	0-45 Hz	Awake	
Delta	0.5-3.5 Hz	Deep Sleep	
Theta	4-7.5 Hz	Drowsy	
Alpha	8-12 Hz	Relaxed	
Beta	13-35 Hz	Engaged	

圖五、EEG常見頻帶 (frequency bands) 及代表性的腦狀態¹¹

Masseter Placement

Purpose: monitoring of clenching of the jaw
Commonly used in psychophysiology for: stress management, headaches, bruxism, TMJ and anxiety

Adapted from: Basics of Surface Electromyography (Applied to Psychophysiology, Thought Technology, Ltd.)

Paraspinal Placement

Purpose: monitoring back muscle activity
Commonly used in psychophysiology for: back problems, fear and startle responses (Landau reflex).

NMES - Lower Arm

Electrode Placements

- Brachioradialis:** Works as a synergist in the flexion of the elbow.
- Extensor Carpi Ulnaris:** The Extensor Carpi Ulnaris is implicated in the extension and abduction of the wrist.
- Extensor Carpi Radialis:** The Extensor Carpi Radialis is implicated in the extension and abduction of the wrist.

PATELOFEMORAL PAIN EVALUATION

Patellofemoral pain is a common anterior affective pain in knee of the general population. It is classified by sources of forces including patellofemoral joint dysfunction, Vastus Medialis Obliquus (VMO) dysfunction, tight lower extremities and tight quadriceps and posterior muscles.

The condition often develops gradually and is characterized by a diffuse ache of the anterior knee that worsens on certain activities, which is present from Patellofemoral pain. The femur is treated by a medial and distal condyle under surface on some acute dynamic repairs or surgery.

The VMO muscle is the only dynamic medial stabilizer of the patella, and is active throughout the full range of the extension of the knee.

Placement of the electrode:
Place the active electrode on the distal end of the Vastus Medialis Obliquus (VMO) and the active electrode on the distal end of the Vastus Lateralis (VL) and distal in the patella. The reference electrodes have to be placed proximally (above the active placements, closer to the heart).

Repetitive Exercise:
The subject lay on their stomach on the table block. The goal is to sit up, joining the other leg, then stop.

MyoFlex Infrared Clinical Guide

ELECTRO-STIMULATION (NMES)

NMES Basics
Neuro-muscular electrical stimulation (NMES) is used to elicit voluntary muscle contraction. Motor stimulation is most commonly used to target motor units and/or motor axons of the motor nerve.

Parameters: The frequency of the electrical stimulation is called pulse rate. The intensity of the current is called current intensity. The amount of time that the current is applied is called pulse duration. The number of pulses is called pulse number. The number of pulses per second is called pulse rate.

Indications for NMES:

- Treatment of neuromuscular disorders
- Muscle re-education
- Pain management
- Rehabilitation of patients with motor deficits
- Research in neurophysiology of motor control
- Research in motor unit properties
- Research in motor unit recruitment

MyoFlex Infrared Clinical Guide

居家練習方案



CLINICAL POWER
AT YOUR FINGERTIP

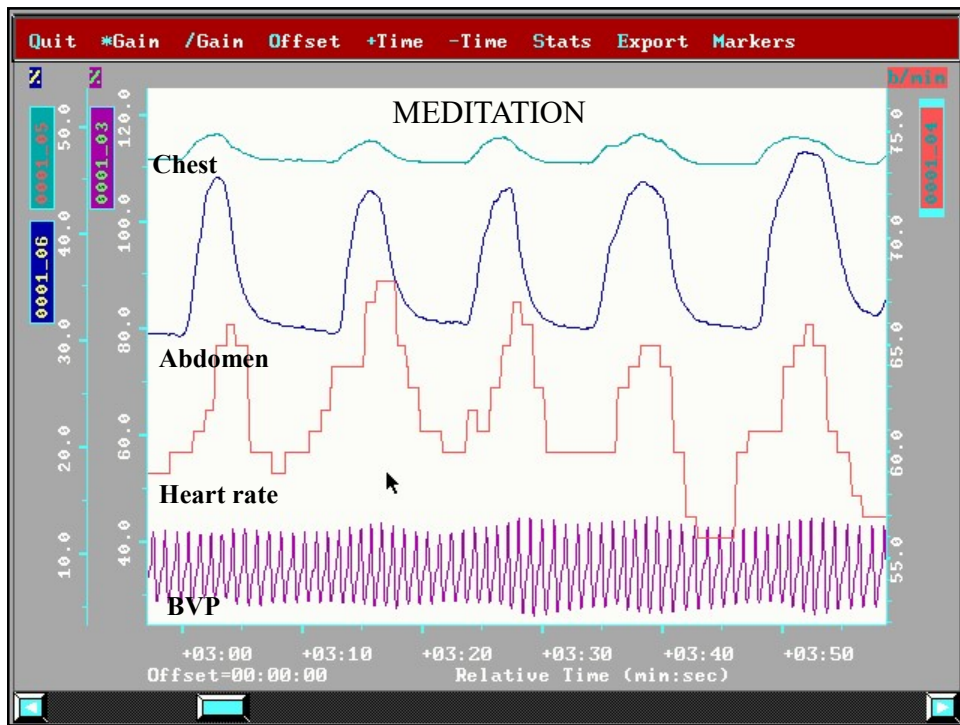


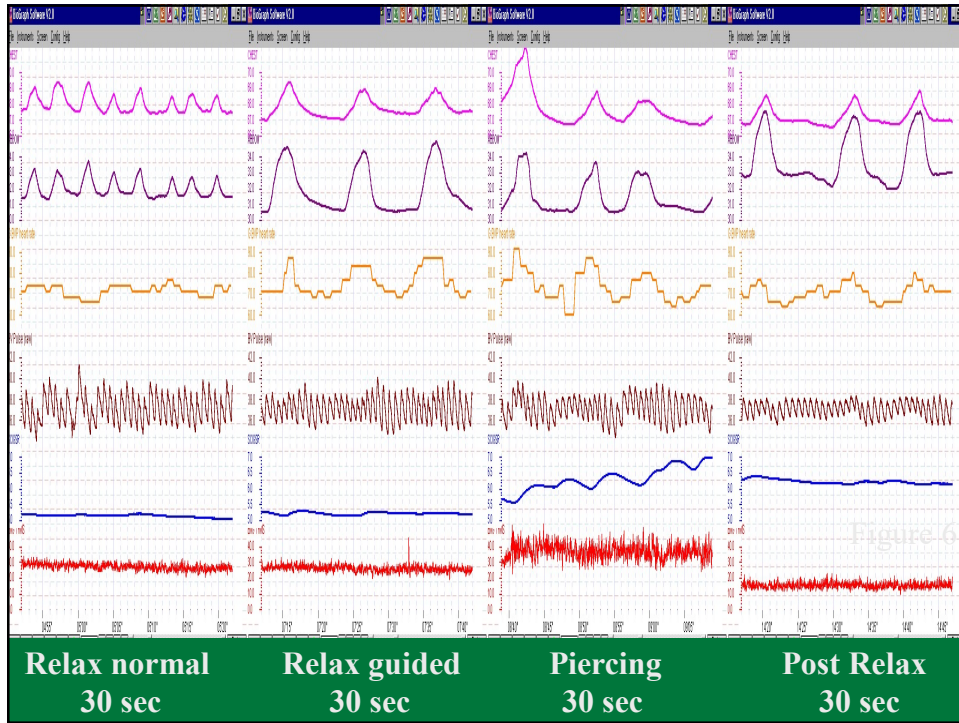




Monitor heart rate variability, skin conductance and temperature using a smartphone/tablet and just one finger.







神經心理測驗評估

Psychometrics - In- and output devices

Unlock the full potential of the Vienna Test System by using our specially developed, test-specific in- and output devices.

ADVANCED RESPONSE PANEL

UNIVERSAL RESPONSE PANEL

FOOT-OPERATED KEYS AND FOOT PEDALS

The foot-operated keys are connected to the rear of the response panel.

They are used in a number of tests, including some of the VTS-TRAFFIC tests, ...

Used in: DT, SMK and various test sets

Overview of test dimensions	
<p>Attention</p> <p>Attention is the central basic component for a variety of processes, such as perception, memory and problem-solving ability, and thus represents one of the most important prerequisites for all types of cognitive performance.</p> <p>Attention</p>	<ul style="list-style-type: none"> Alertness Concentration Divided attention Focused attention Neglect Selective attention Spatial attention Sustained attention Vigilance Visual search
<p>Memory</p> <p>Memory skills serve to retain, organize and, if necessary, retrieve recorded information. Memory disorders often occur in a highly specific way, for example only in long-term memory or only when calling up verbal information.</p> <p>Memory</p>	<ul style="list-style-type: none"> Long-term memory Short-term memory Working memory
<p>Executive functions</p> <p>Executive functions play a decisive role in steering action, i.e. in anticipating, planning and executing an action in a targeted manner. In everyday life, executive functions are needed above all in complex situations, such as driving a car or doing sports.</p> <p>Executive functions</p>	<ul style="list-style-type: none"> Cognitive flexibility Figural fluency Interference Logical reasoning Persistence Planning ability Response inhibition Task switching
<p>Social Cognition</p> <p>Social cognition is the ability to understand fellow human beings and to put oneself in their place. It develops in childhood, but can also be impaired in adulthood by various psychological disorders and after neurological diseases.</p> <p>Social Cognition</p>	<ul style="list-style-type: none"> Empathy Theory of Mind

<p>Spatial processing</p> <p>Spatial processing means being able to imagine objects in a three-dimensional space and move them in front of the inner eye, for example by mental rotation. This is not only important in many technical professions, but also in everyday life, for example when orienting yourself in unknown environments.</p> <p>Spatial processing</p>	<ul style="list-style-type: none"> Mental rotation Visual orientation ability Visuoconstruction
<p>Language and number comprehension</p> <p>Through speech processing, people are able to understand and speak language. Disruptions in this processing can severely impair the independence of people from verbal communication to simple tasks such as writing shopping lists.</p> <p>Language and number comprehension</p>	<ul style="list-style-type: none"> Language comprehension Number comprehension Object naming Verbal fluency
<p>Processing speed</p> <p>Processing speed describes how quickly information from the environment is understood in a meaningful way. Processing speed decreases with age, but can also be slower in a variety of neurological and psychiatric disorders.</p> <p>Processing speed</p>	<ul style="list-style-type: none"> Processing speed
<p>Reactive behavior & visual functions</p> <p>In critical situations, such as when crossing an intersection, it is important both to get a quick overview of potential dangers and to react adequately to them so as not to endanger oneself or others.</p> <p>Reaction behaviour & visual abilities</p>	<ul style="list-style-type: none"> Ability to react Arousal Obtaining an overview - traffic Peripheral perception Stress tolerance

Sensomotor functions

Sensomotorics is the interplay of visual information and motor actions that enables targeted movements. This ability enables everyday activities such as cooking or sewing, right up to controlling heavy machines.

Sensorimotor activity

- Eye-hand coordination
- Fine motor skills

Clinical-psychological dimensions

Clinical-psychological symptoms often occur in connection with and interact with organic damage, for example, depressive symptoms can occur in response to organic damage. Their recording is therefore an important part both for the diagnosis of disorders and for deriving rehabilitation measures.

Clinical-psychological dimensions

- Aggression
- Alcohol dependency
- Clinical-psychological symptoms
- Mood and wellbeing
- Social self-concept
- Stress & burnout
- Suicide risk

WAF Kandidat
 WAF männlich 29.0 Jahre
 WAF
 Datum: 21.04.2018
 Beginn der Testung: 13:49
 Dauer: 43 Min.

Testvariable	1	2	d ₁₋₂
Aufmerksamkeitsleistung	9 (23)	7 (20)	0,27
Ablertness	8 (21)	9 (23)	-1,22
Intrinsische Ablertness (visuell)	2 (6)	4 (10)	-4,45*
Intrinsische Ablertness (auditiv)	1 (4)	1 (4)	1,34
Unimodal-phonische Ablertness (auditiv)			
Modale Reaktionszeit	302,00	3	31
Steuergewicht, Reaktionszeit	1,636*	0	20
Vigilanz/Daueraufmerksamkeit			
Vigilanz (visuell), Kurzform	74 (24,8)	44 (24,4)	2,96*

Erklärungen zu den Testvariablen

Ablertness
 Ablertness beschreibt die kurzfristige Aufmerksamkeitsumlenkung bei unvorhergesehenen oder auditiven Reizen. Diese Reize können eine Vorgabe eines Fixationspunktes, ein akustischer Stimulus oder ein visueller Stimulus sein. Ein höherer Wert spricht für eine niedrig ausgeprägte Ablertness.

Vigilanz & Daueraufmerksamkeit
 Vigilanz beschreibt die längerfristige Aufmerksamkeitsumlenkung einer Person im unvorhergesehenen Reiz. Die Daueraufmerksamkeit beschreibt die längerfristige Aufmerksamkeitsumlenkung einer Person im unvorhergesehenen Reiz. Ein höherer Wert spricht für eine niedrig ausgeprägte Vigilanz bzw. Daueraufmerksamkeit.

Profilvergleich

Aufmerksamkeitsleistung

Ablertness

Vigilanz & Daueraufmerksamkeit

Visuelles Scanning

Item	1	2	3	4	5	6	7	8	9	10
1-10	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
11-20	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
21-30	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
31-40	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
41-50	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
51-60	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

79%

Report SARAF Start

Report SARAF

Report SARAF

SCHIFFER