Neurophysiology & Sleep Medicine Lab

PI: Fang-Chia Chang, PhD

Distinguished Professor

Expertise: neuroscience, sleep medicine

Research interests: sleep disorders, neurological diseases (e.g., epilepsy, Alzheimer's disease, Parkinson's disease, PTSD, Prader-Willi syndrome), neuroimmunomodulation

Lab skills: EEG, local field potential, optogenetics, chemogenetics, behavioral tasks, molecular biology techniques, sleep analysis

Contact info:

fchang@ntu.edu.tw

Lab websites:

Chang's Lab

Chang's NTU Lab

心理學系 張玉玲 (BrAIN Lab)

利用多種取向優化早期偵測失智高風險族群準確性 & 非藥物性介入

Brain Aging Integrative Neuropsychology (BrAIN) Laboratory

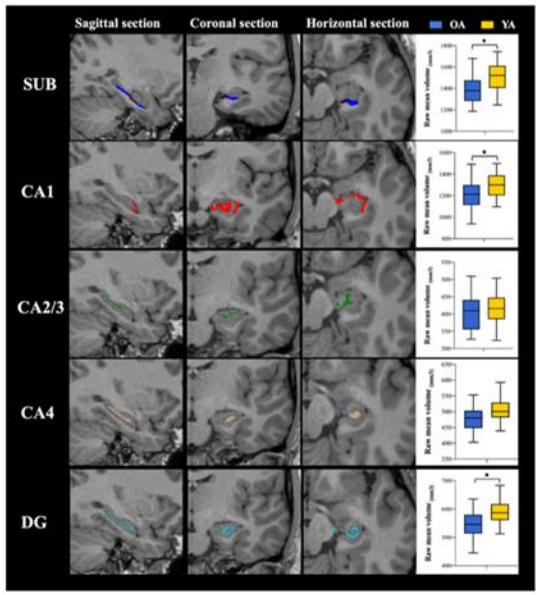
開始出現客觀認知功能衰退

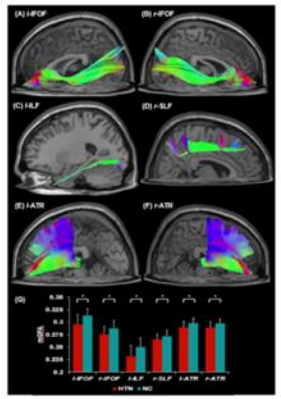
目前健康但帶風險因子者 (例如風險基因)

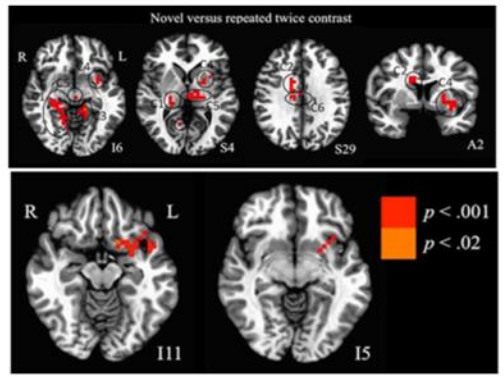
出現主觀記憶抱怨

輕度認知功能障礙

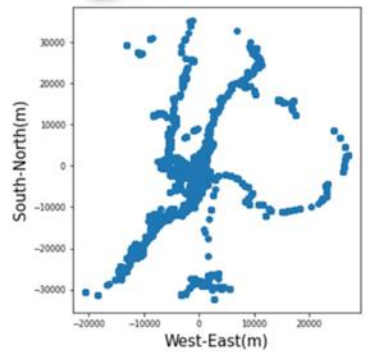
失智症







實驗室取向的認知功能測試與結構性或功能性大腦影像分析



智慧型手機「數位表現型」(digital phenotyping)

人工智慧技術分析語音與影像/人機互動

應用認知科學實驗室

應用認知科學實驗室位於心理系，由曾祥非教授主持。

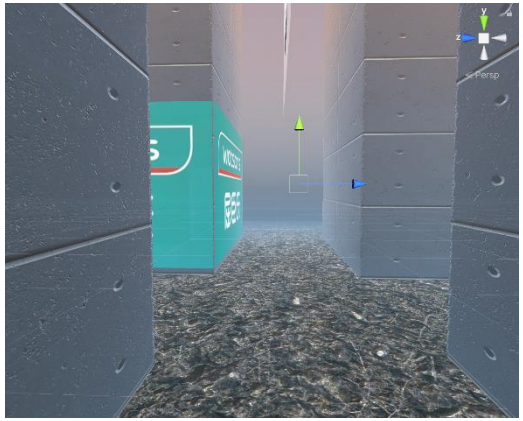
研究主攻大腦與意識、知覺、注意力與記憶的關係，並將學術成果應用於實務需求上，如神經法律(NeuroLaw)、道德、腦波測謊鑑識、假新聞、汽車人機介面、認知功能提升、病人意識偵測、失智聲光刺激治療等議題。

本實驗室使用的工具包括認知行為實驗、眼動儀、腦波儀、測謊儀、經顱電刺激、駕駛模擬器、VR。

經顱電刺激

腦波+眼動

VR迷宮



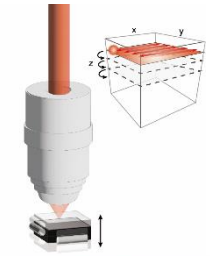
開車模擬

Shi-Wei Chu's lab

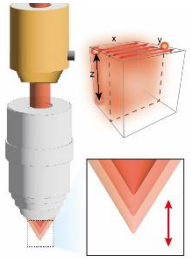
NSTC 國家科學及技術委員會
National Science and Technology Council

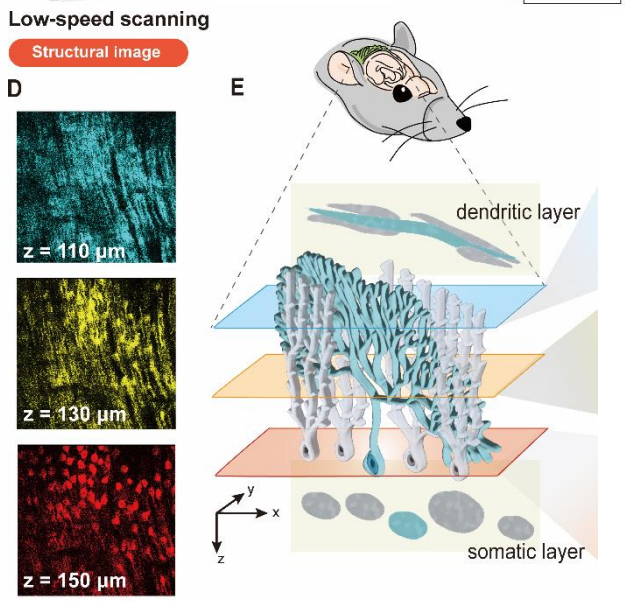
2024.12.24新聞稿 人工智慧與神經影像的共舞 首創超高速4D顯微鏡，揭開腦神經運作之謎

1. 傳統影像
每秒一張
全體積約100秒

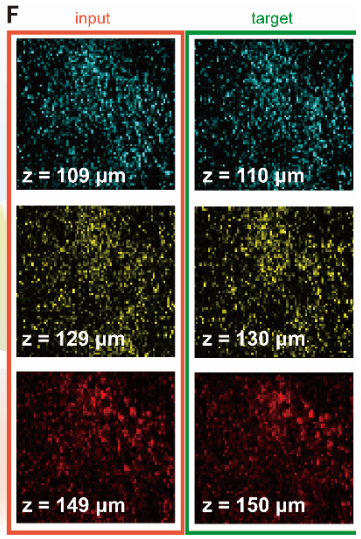


2. 高速影像
每秒千張
全體積約0.1秒

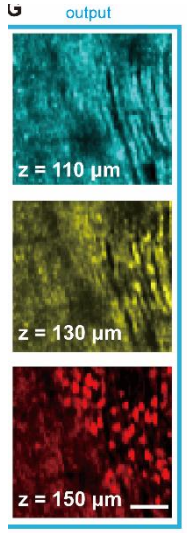




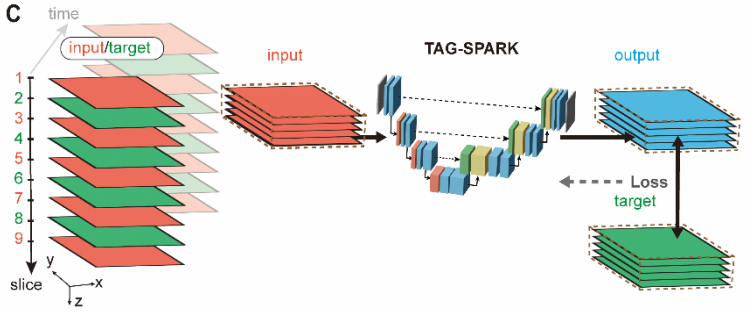
3. 但是對比很差



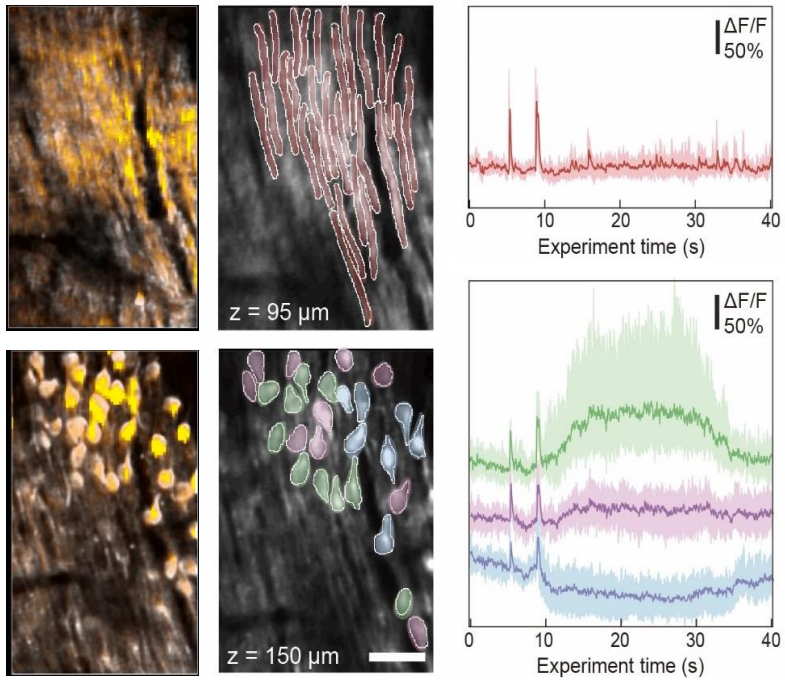
5. 影像品質提升！



4. 因此發展AI技術， 單雙張互比， 無需ground truth



6.同時觀察不同層的神經，發現就算樹突信號相似，到軸突會有正負差異！

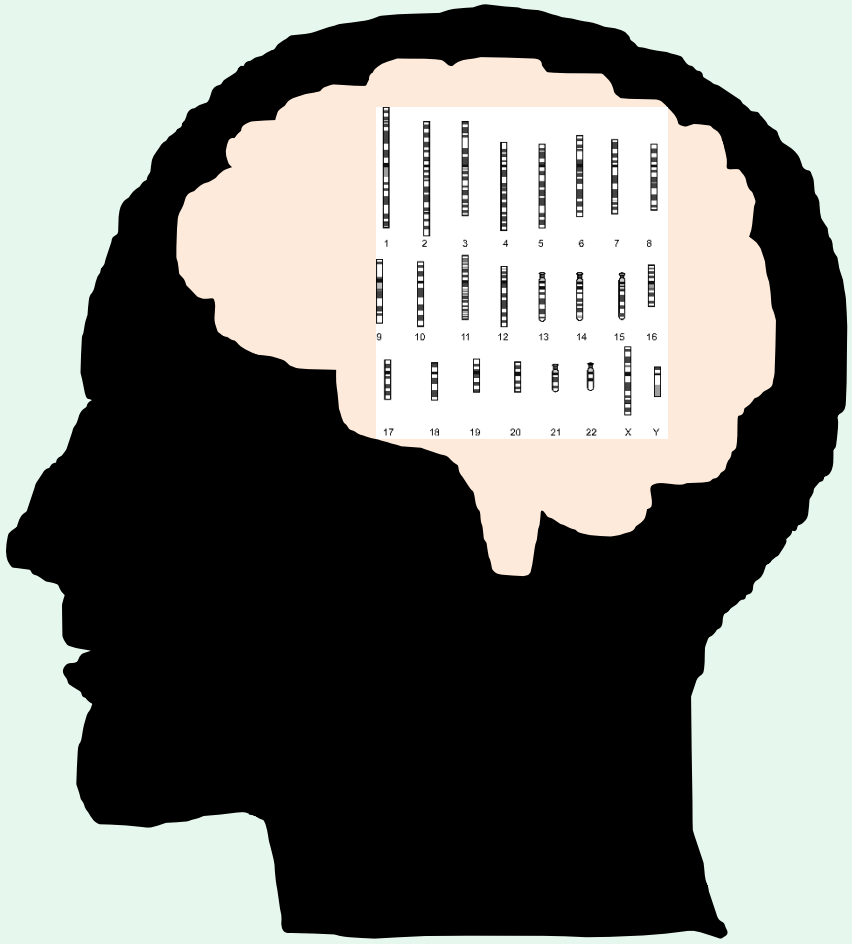


Adv. Sci. 11, 2405293 (2024)

腦心所 黃憲松實驗室

Brain in Health and Disease

Genetic and Epigenetic Code of Neurodevelopment

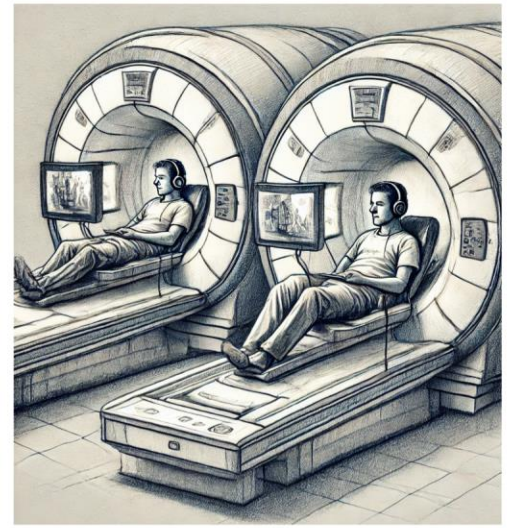


Neurodevelopmental disorders

ADHD: attention-deficit hyperactivity disorder
OCD: obsessive-compulsive disorder
SAH: subarachnoid hemorrhage

AI & Collective Emotion

Neuroimaging & Interacting Brains



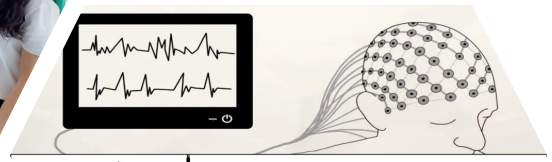
CHEN Lab

CHENLab QR code

台大心理系
陳品豪老師實驗室

VR & Shared Experience

Social Relationship & Wellbeing



FON (瘋) Lab

我適合嗎？如果你……

Spontaneous speech

喜歡訪談、喜歡聽人說故事
覺得不同的聲音很有趣
覺得切音檔就像切蛋糕

L2 acquisition

喜歡語言學習、語言教學
對口音或方言差異有極佳敏感度
會說兩種、三種或N種語言
好奇不同語言間會擦撞出什麼火花

Prosodic encoding

具備基本音樂素養
具有節奏律動感
靈活運用語調的抑揚頓挫
深入了解語言的韻律之美

Phonetic variation

對各地方言口音有興趣
對聲音變化很敏感
想要了解語音演變的過程

歡迎加入
Fon Lab

NTU FONetics Laboratory

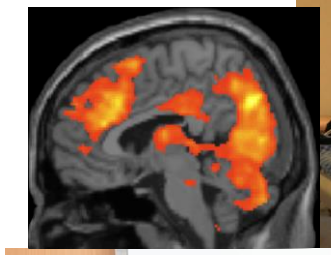
Tseng's Pain and Somatosensory Lab

The overarching goal of our research is to understand how people process, percept, and respond to information related to pain and somatosensation using functional imaging and computational modeling

Research Topics:

- Pain modulation by expectancy (placebo effect)
- Reward and Punishment Learning
- Empathy and social neuroscience
- Sensory deficits in neuropsychiatric disorders
- Tactile discrimination
- Itch sensation

Pain-related neural activation



Welcome to our lab!

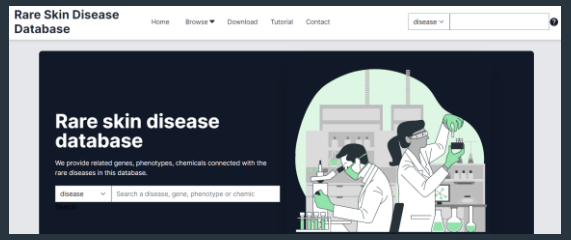
Computational Molecular Design & Metabolomics Lab
計算分子與代謝體實驗室

Director Prof. Yufeng Jane Tseng

Research content

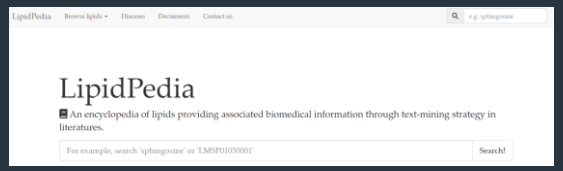
Computational molecular design

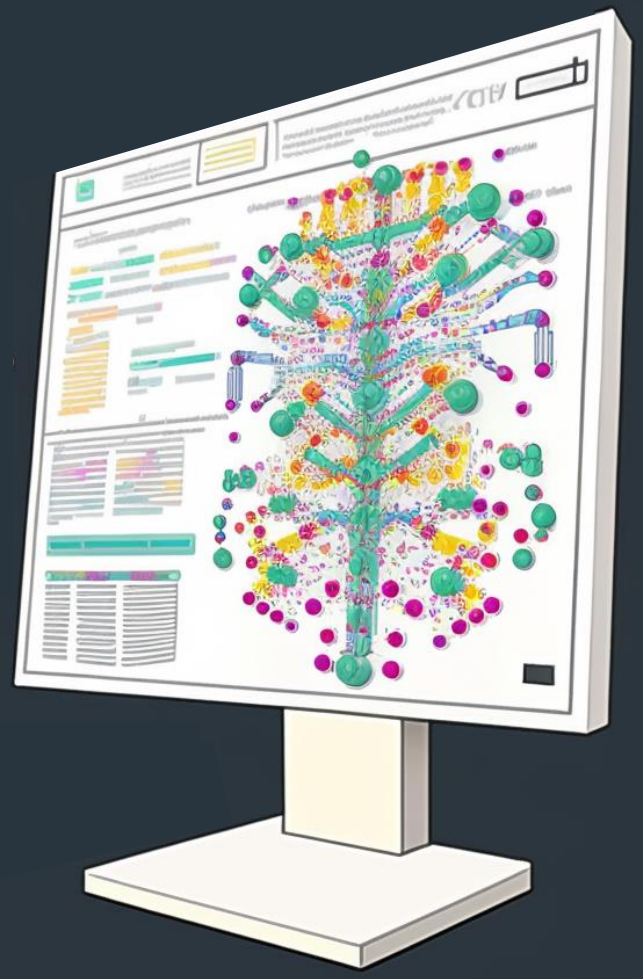
- Computer-aided drug design
- Application of A.I. in drug development



Neurology disease digital markers

- Biomarker detection
- Precision medicine





https://www.cmdm.tw/

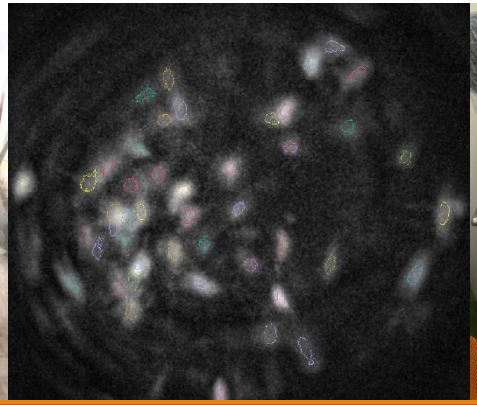
研究大腦功能與失能：以神經迴路為切入點

神經迴路與行為實驗室/腦與心智科學研究所/台灣大學醫學院

PI: 姚皓傑 HAU-JIE YAU

本實驗室的研究以小鼠為模式動物，佐之以光或化學遺傳學技術，研究腦神經迴路在神經電生理與行為層面之功能。
光遺傳學的研究乃利用雷射光，透過埋植於小鼠腦中的光纖，專一並即時地控制特定神經元或神經迴路的活性，然後觀察小鼠因此一操弄而產生的行為變化或大腦神經活動之改變。
我們透過各種小鼠行為或疾病模式，輔之以離體腦片或活體神經電生理紀錄，還有活體腦內視鏡神經細胞之鈣離子活性影像技術等，來瞭解大腦內神經活動如何因應情境而變化。
這個整合的研究平台不僅可以幫助瞭解大腦內任一神經迴路的功能，也能解析行為或疾病其背後之腦神經迴路的運作機制。






Speech Behavior and Science Lab

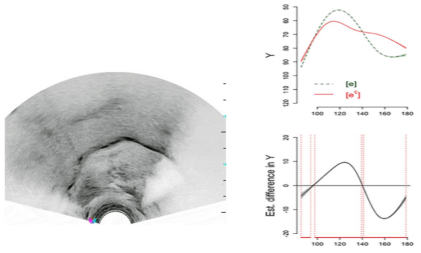
Graduate Institute of Linguistics

In SBS lab, we study speech behaviors across different body parts, including the larynx, tongue, lips, and face.

We use different equipments to examine how the sounds are produced and the science behind them.

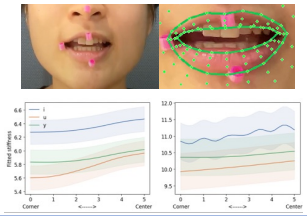
Ultrasound

- Measuring and quantifying tongue postures and movements.



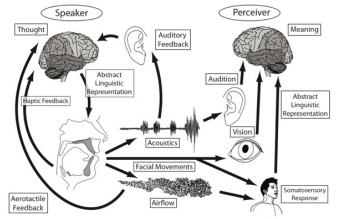
Speech Motor Control

- Examining the articulatory gestures and maneuvers through signal and image processing.



Multimodal Speech

- Uncovering how humans incorporate multimodal information in speech production and perception.



PI: **Dr. Chenhao Chiu**
chenhaochiu@ntu.edu.tw

Brain and Cognition Laboratory

Department of Psychology, National Taiwan University
Principle investigator: Bo-Cheng Kuo (郭柏呈), Ph.D.

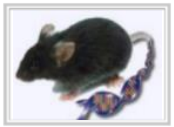
- Research topics:
  - My current research investigates the mechanisms underlying the interactions among emotion, attention, working memory and long-term memory. I am particularly interested how these core cognitive functions are integrated to support goal-directed adaptive behaviour in both healthy and clinical individuals.
- Research methods: linking brain with behaviours
  - Behavioural measures
  - Electroencephalography (EEG) and event-related potentials (ERP)
  - Magnetoencephalography (MEG)
  - Functional magnetic resonance imaging (fMRI)
  - Brain stimulation (transcranial magnetic stimulation, TMS; transcranial direct/alternative current stimulation, tDCS/tACS)
- Analysing methods:
  - Behavioural modelling
  - Time-frequency analysis (power, phase, and cross frequency coupling)
  - Functional and effective connectivity
  - Multivariate pattern analysis (MVPA) and decoding

心理系賴文崧老師：整合神經科學與行為學實驗室（LINE）

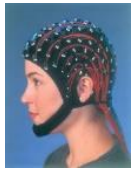
- **Laboratory of Integrated Neuroscience and Ethology (LINE)**
- **Normal functions (social learning & memory): LI"NE" - Neural Ethology**

1. To study social neuroscience and the neural basis of learning & memory using hamsters/mice as model systems

- **Abnormal functions (neuropsychiatric disorders): L"IN"E - Integrated Neuroscience**



2. **Basic**: To study mouse models of neuropsychiatric disorders, especially 思覺失調症 (SZ), 多重系統退化症 (MSA), 小胖威利症 (PWS)



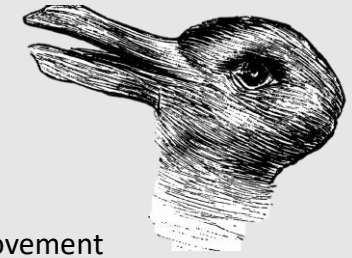
3. **Advance**: To investigate higher cognitive functions and reward-based decision making in mice and humans
4. **Translational**: new drug development - from basic science to clinical trials

視覺神經科學實驗室
Visual Neuroscience Lab

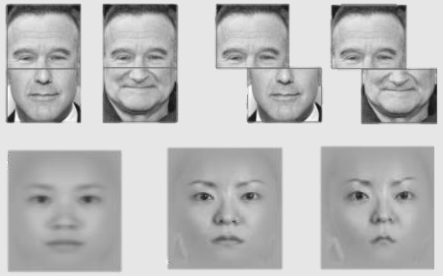
PI: 陳建中教授
Chien-Chung Chen

2024 VSS Conference, USA

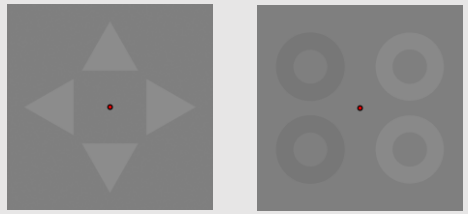
Recent Research Projects



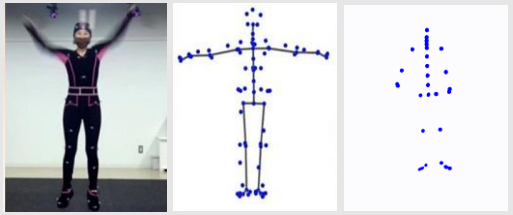
Eye-movement
Rabbit-duck illusion / Bistable figure



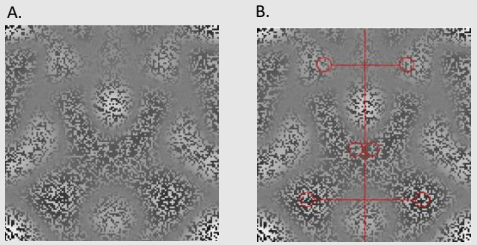
Facial attractiveness judgement



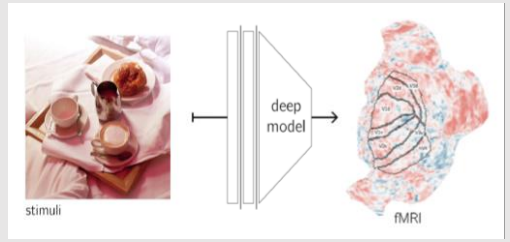
Filling-in / Contour erasure



Body expression / Light-spot display



Second Order Symmetry

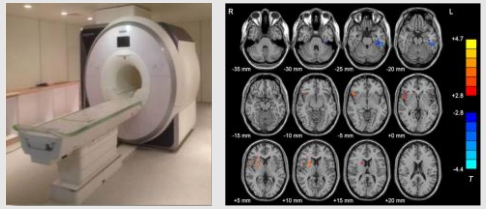


Deep learning / Modeling

International Collaboration

TOHOKU UNIVERSITY 日本東北大學

Universität Regensburg



Neuroimaging experiments
fMRI / MEG / EEG

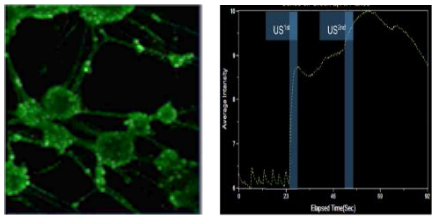
VNL website
For more info

治療用超音波應用於腦部神經調控

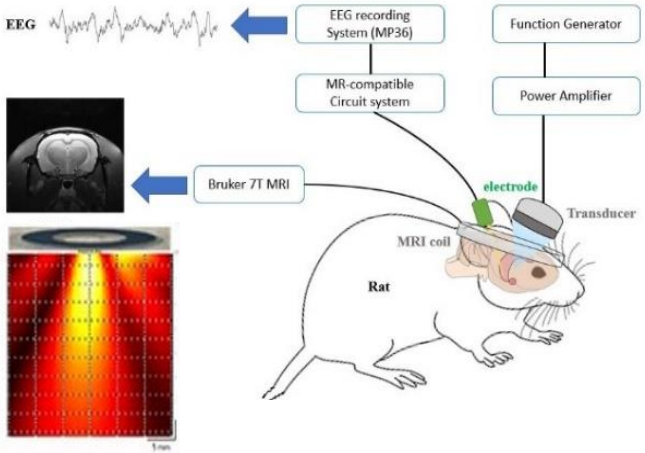
（電機系/劉浩澧）

- 研究主題
  - 以聚焦式超音波進行大腦之腦功能連結，可開發為一項腦部刺激創新工具，達到現有工具無法做到之全腦功能連接映射探索
- 研究方法
  - 超音波設計開發、神經細胞活化機制、活體動物光學觀測、動物之腦電分析、動物行為分析、功能性動物fMRI探討大腦功能連結

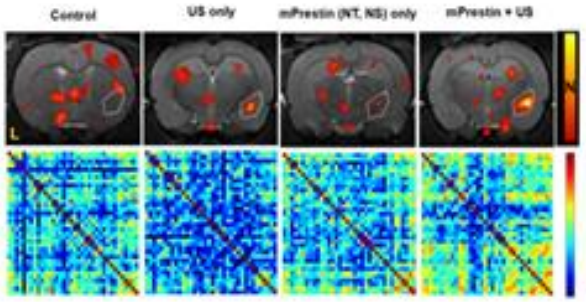
細胞光學觀測



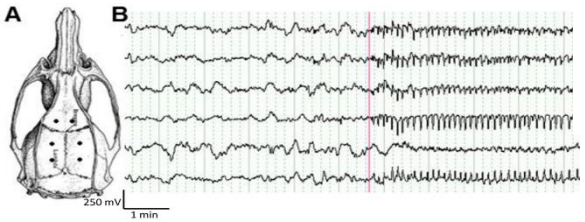
動物實驗設計



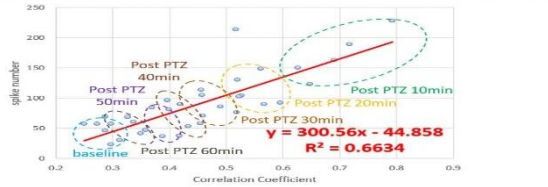
fMRI探討大腦功能連結



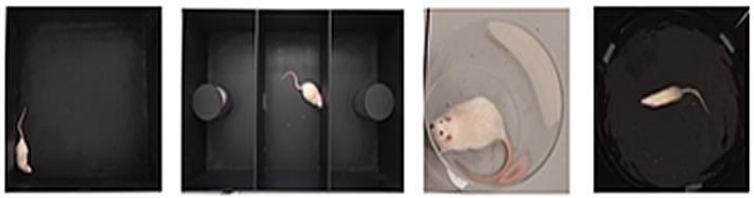
動物之腦電分析



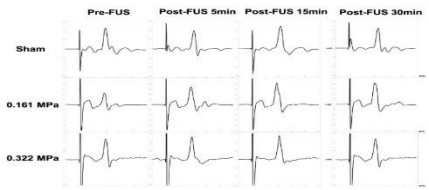
超音波設計開發

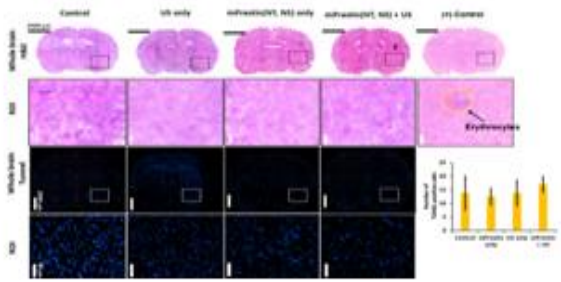


動物行為分析



神經細胞活化機制分析





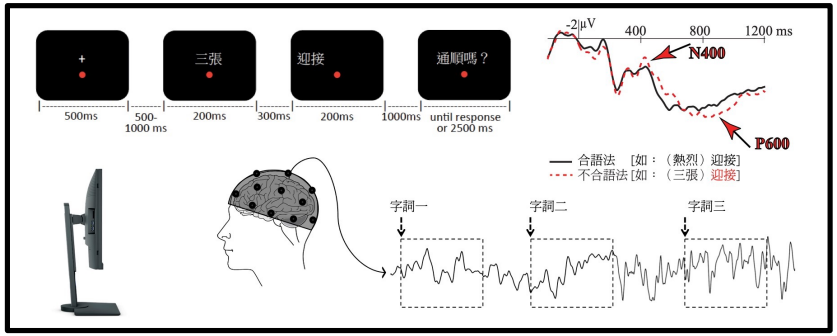
Brain and Language Processing Lab

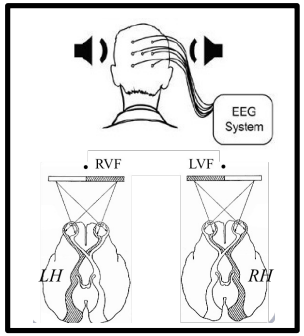
PI: 李佳霖 副教授
Chia-Lin Lee

主要研究方法

腦電波、事件相關電位

行為實驗、神經心理測驗





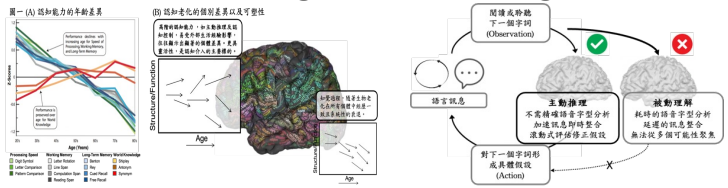
署期研究腦波實驗

New Meanings at an Older Age: Word Learning Across Lifespan

脆

背景：語言不斷變動。新意義搭載既有詞（如「脆」）或新創詞（如「哀居」）出現。從語境中快速習得新義，是語言理解的關鍵能力。**議題/目標**：語境豐富程度與意義習得以及閱讀經驗的關係。

Boosting Predictive Language Skills via Cognitive Training



背景：臺灣於2025年邁入超高齡社會，65+歲比率達到20%。高齡者的認知能力仍具有可塑性，可藉由認知介入訓練而提升。**議題/目標**：強調主動推論的認知促進課程對於語言預測式理解的提升？

The Role of Language in Shaping Emotion and Perception

背景：情緒是大腦根據經驗與生理狀態建構出的概念，語言在其中扮演關鍵角色。**議題/目標**：以即時腦波探討情緒詞是否影響表情的知覺或記憶提取？

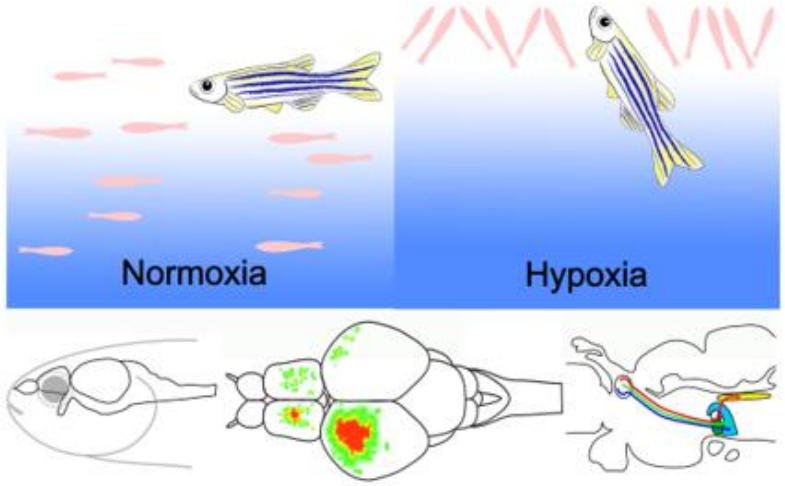
Ming-Yi Chou

Assistant Professor

Department of Life Science, National Taiwan University

E-mail address: mingyichou@ntu.edu.tw

Research Area/ Interests:



We are studying how the physiological states modulate behavioral outcomes. Using zebrafish as a model, we aim to identify the nuclei and neural circuits that control emotional or social behavioral changes evoked by different physiological states.

Selected publication

Liu ST, Chou MY*, Wu LC, Horng JL, and Lin LY. 2020. The transient receptor potential vanilloid 4 modulates ion balance through isotocin pathway. Am J Physiol Regul Integr Comp Physiol, 318(4):R751-R759.

Chou MY*, Amo R, Kinoshita M, Cherng BW, Shimazaki H, Agetsuma M, Shiraki T, Aoki T, Takahoko M, Yamazaki M, Higashijima S, Okamoto H. 2016. Social conflict resolution regulated by two dorsal habenular subregions in zebrafish. Science, 352(6281):87-90.

Chou MY*, Lin CH, Chao PL, Hung JC, Cruz SA, Hwang PP. 2015. Stanniocalcin-1 controls ion regulation functions of ion-transporting epithelium other than calcium balance.. Int J Biol Sci, 11(2):122-32.

國立臺灣大學
腦與心智科學研究所
Graduate Institute of Brain and Mind Sciences,
National Taiwan University

神經生物與認知科學研究中心
Neurobiology and Cognitive Science Center

解剖學暨細胞生物學科暨研究所
Graduate Institute of Anatomy and Cell Biology
National Taiwan University
College of Medicine

臺灣腦庫協會
Taiwan Brain Bank Association

TiGP AS Interdisciplinary NeuroScience

李立仁 教授

BS: Zoology, NTU MS: Anatomy, NTU
PhD: Cell Biology and Anatomy, LSU Medical Center at New Orleans
Post Doc: Molecular and Cell Biology, UC Berkeley

1.精神疾病(自閉症、思覺失調症)小鼠動物模式
➔神經結構、生化、生理與行為改變 ➔預防/治療策略的研發。

2.腦中表現結締組織生長因子(connective tissue growth factor; CTGF)之神經細胞的結構與功能。

3.睡眠剝奪動物模式➔改善其負面影響。

4.籌建台灣人腦組織庫➔發展神經/精神疾病生物標幟。

歡迎暑期生 1–2位

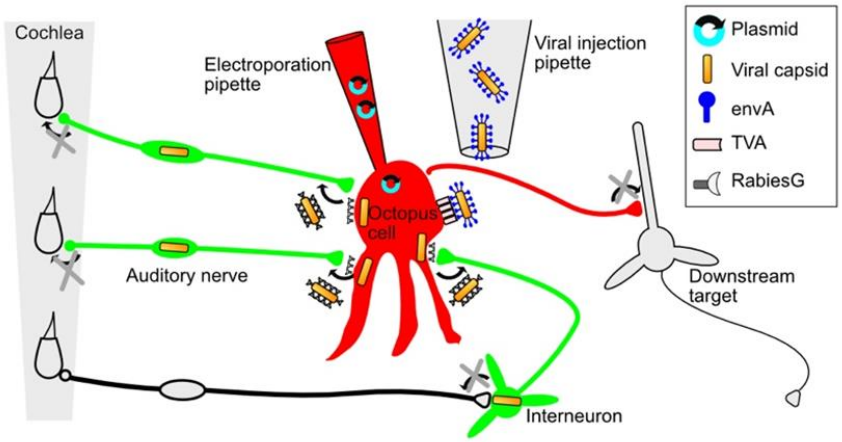
要有勇氣，想沒想過的事，解決沒解決過的問題。要認知到時間與資源的有限。

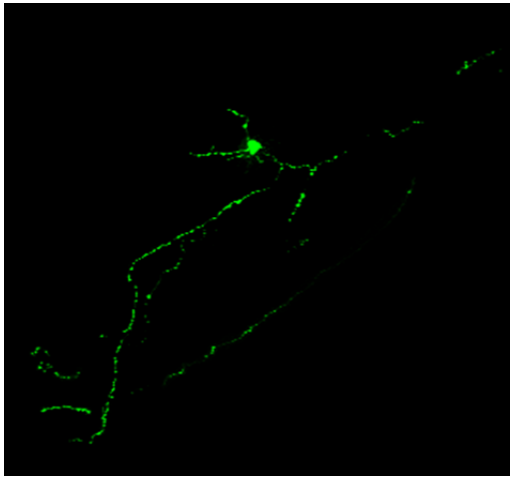
Auditory Neurophysiology Laboratory

呂昕煒 生命科學系 生命科學館827室 hsinweilu@ntu.edu.tw

Goal: to understand circuit and physiological mechanisms underlying sound encoding of auditory brainstem neurons.

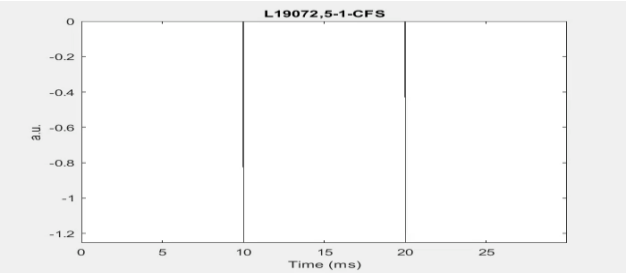
- In vivo single-cell labeling / circuit tracing

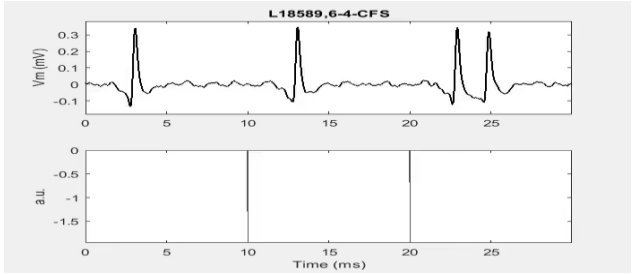


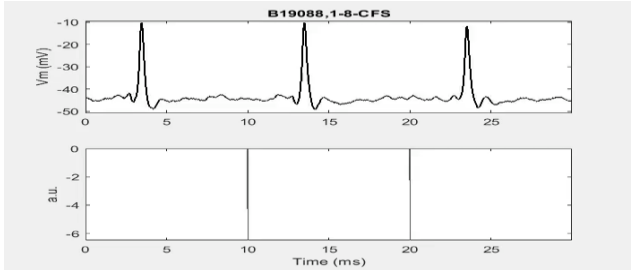


Simultaneously with

- In vivo single-cell electrophysiology (sharp / patch clamp recording)







Sound → Auditory nerve → Auditory brainstem neuron

蕭逸澤老師實驗室

研究興趣為:睡眠、壓力、記憶、學習、惡夢

台大獸醫系副教

行為神經科學實
獸醫一館408室

Sleep

https://sites.google.com/g.ntu.edu.tw/hsiao-lab