



眼動追蹤與醫療健康

醫學評估與治療應用

4/17/2023

眼動追蹤在醫療市場的關鍵地位

眼動追蹤技術是一種能早期檢測、診斷與治療的客觀方法

Eye tracking reveals early communication problem in autistic children

BY ALIX KATZMELSON | 18 JULY 2019



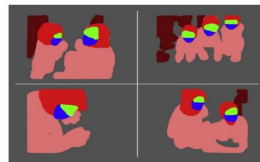
Eye tracking tests may predict Alzheimer's risk

New research finds that eye tracking tests can accurately detect people who have a form of mild cognitive impairment that predisposes them to Alzheimer's disease.



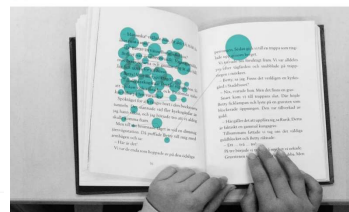
Social attention shifts differently over time for autistic adults

BY ANDRÉ VOULSE ADRIAN | 23 OCTOBER 2020



How AI and Eye Tracking Could Soon Help Schools Screen for Dyslexia

By Stephen Huxton | 190-05-3517



Science News

from research organizations

Eye-tracking tech helps aged care assessment

Eye-tracking tech helps all older people have better aged care quality assessment

Date: August 4, 2020

Source: Flinders University

Summary: Memory loss among older Australians is on the rise as the Baby Boomer generation enters retirement - but a new technique that investigates cognitive skills through eye-tracking technology may be used to help incorporate all older people's preferences into aged care policy and practice.

Show examples

XRHealth debuts at-home VR therapy app for ADHD

Jeremy Horwitz | @horwitz | September 22, 2020 7:00 AM





眼動追蹤發揮作用的主要領域

眼動追蹤正在逐漸影響醫療行業

疾病篩檢



- 閱讀障礙
- 過動症
- 視覺缺陷
- 神經退化性疾病

評估



- 腦震盪
- 癲癇
- 中毒
- 誠信與詐欺(測謊)

診斷



- 斜視
- 乾眼症
- 青光眼
- 視覺敏銳度
- 精神分裂症

治療



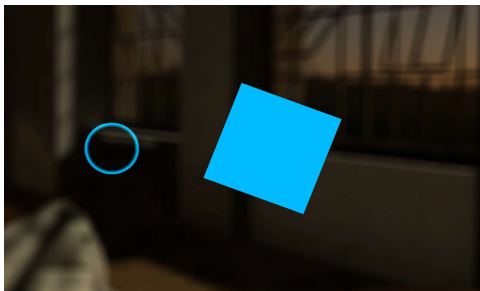
- 弱視
- 自閉症
- 過動症
- 創傷後壓力疾患
- 憂鬱/躁鬱症

腦健康 | 視力健康 | 行為

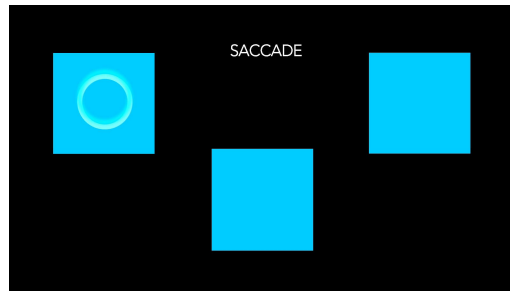


眼動儀能測量什麼?

眼球有幾種不同的運動類型。
這些行為有助於視網膜建構大腦中穩定的視覺成像。



注視行為能夠揭露訊息的處理與加工過程



眼跳行為能夠揭露人們對複雜訊息的搜索方式

<https://vr.tobii.com/sdk/learn/eye-behavior/eye-movements/>



眼動追蹤作為診斷方式的獨特之處

眼球運動與行為異常是診斷的生理指標，可用於檢測與治療特定的健康問題。

生理指標	<ul style="list-style-type: none"> ○ 眼跳介入 ○ 眼跳速度 ○ 瞳孔不均 ○ 視覺平滑追蹤提前/延遲 ○ 目標追蹤誤差 <ul style="list-style-type: none"> ○ 空間精度 ○ 時間精度 ○ 追蹤效益 (眼球速度/目標速度) ○ 視覺搜索模式 ○ 左右注視一致性
眼動行為分類	<ul style="list-style-type: none"> ○ 眼跳 ○ 注視 ○ 平滑視覺追蹤 ○ 眼動速度
眼動的生理特性	<ul style="list-style-type: none"> ○ 瞳孔測量 ○ 視線位置 ○ 眨眼頻率 ○ 眼瞼閉合



眼動追蹤在關鍵缺陷與損傷的評估中發揮獨有作用

眼動追蹤工具為非侵入式、能準確地測量眼動數據，揭露認知障礙與視覺相關問題被後蘊藏的訊息。

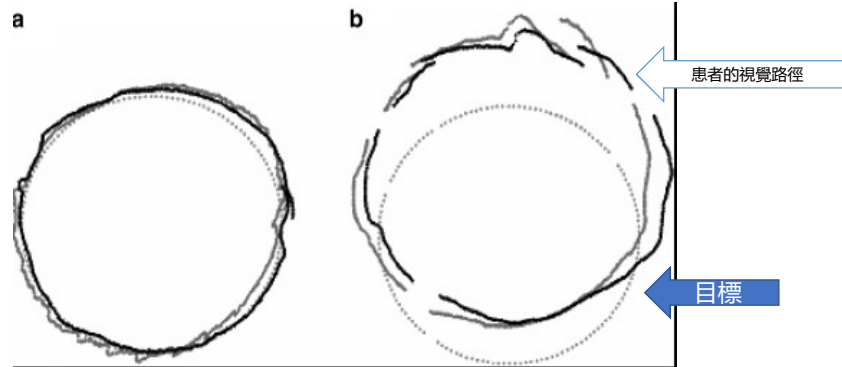
- [Cognitive performance through decades of life — test, analyze, refine, repeat \(tobii.com\)](#)
- [New technology advances eye tracking as biomarker for brain function and brain injury \(medicalxpress.com\)](#)
- [Clinical application of eye movement tasks as an aid to understanding Parkinson's disease pathophysiology - PubMed \(nih.gov\)](#)
- [Eye-tracking therapy eases patient's double vision, dyslexia | WOQDTV.com](#)
- [Scientists Eye Ocular Movements for Clues to Brain Pathology | ALZFORUM](#)

疾病	生理指標	眼動追蹤評估
Traumatic brain injury 創傷性腦損傷	Saccadic intrusion 跳視介入	Separate Left/Right vectors and origin, Calibration左/右眼注視向量與坐標, 校準
Schizophrenia 精神分裂症	Scanpath, horizontal position gain 掃視路徑, 水平位置效益	Combined gaze vectors 雙眼平均注視點向量
Intoxication 中毒	Pupillometry, convergence and Anisocoria 瞳孔測量、聚合和錯位	Pupil size / dilation 瞳孔大小/擴張
Brain swelling 腦腫脹	Horizontal/Vertical eye movement ratio 水平/垂直眼動比例	Combined gaze vectors, Calibration 雙眼平均注視向量, 校準
Alzheimers 阿茲海默症 ADHD 過動症	Fixation patterns 注視模式	Combined gaze vectors, Calibration 雙眼平均注視向量, 校準
Parkinson's 帕金森氏症	Smooth pursuit and tracking gain 平滑追蹤與效益	Separate Left/Right vectors and origin, Calibration 左/右眼注視向量與坐標, 校準
Dyslexia 失語症	Fixation patterns 注視模式	Combined gaze vectors, Calibration 雙眼平均注視向量, 校準



使用眼動追蹤評估缺陷與損傷

範例 – 創傷性腦損傷

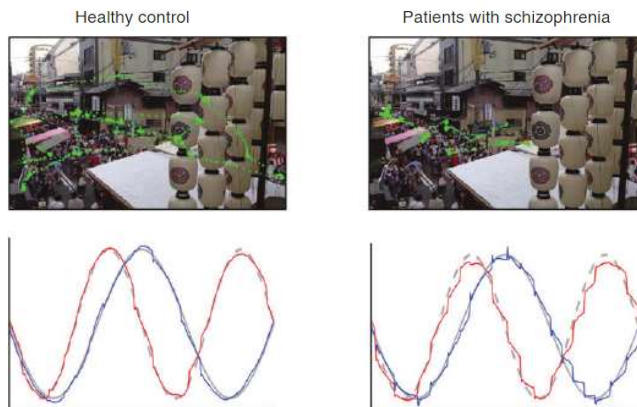


Source: [Eye-target synchronization in mild traumatic brain-injured patients](#)



使用眼動追蹤評估缺陷與損傷

範例 – 精神分裂症

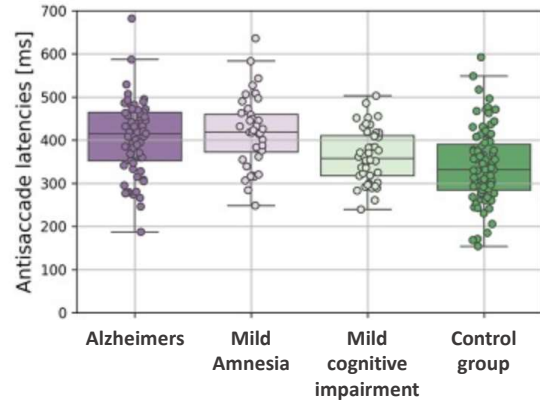
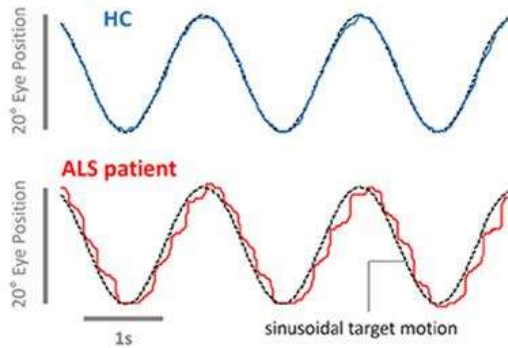


Source: [Eye movement as a biomarker of schizophrenia: Using an integrated eye movement score - Morita - 2017 - Psychiatry and Clinical Neurosciences](#)



使用眼動追蹤評估缺陷與損傷

範例 – 阿茲海默症



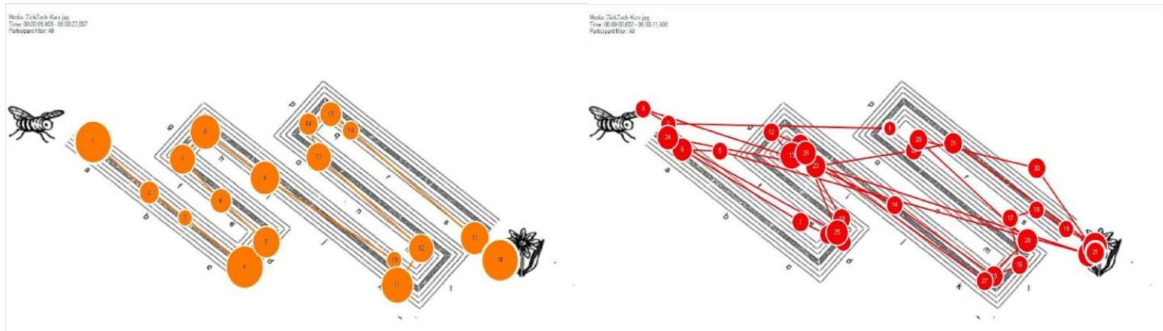
眼動追蹤可檢測這些疾病的徵狀，這些徵狀可能在臨床準段前幾年出現，從而提早介入與治療，並改善這些疾病的相對應過程。

Source: [Scientists Eye Ocular Movements for Clues to Brain Pathology Abnormalities of saccadic eye movements in dementia due to Alzheimer's disease and mild cognitive impairment](#)



使用眼動追蹤評估缺陷與損傷






範例 – 閱讀障礙



Source: [Dyslexia and eye tracking - \(vdocuments.mx\)](#), [Screening for Dyslexia Using Eye Tracking during Reading](#)

Tobii Pro 產品解決方案



Services		<p><i>Tobii Pro Insight Research Consultancy Training & Education Services Support Services and Tobii Pro Connect Research Funding Support</i></p>		
Software	<p><i>Tobii Pro Lab</i></p> 	<p><i>Sticky by Tobii Pro</i></p> 		
Hardware	 <p><i>Tobii Pro Nano</i></p>	 <p><i>Tobii Pro Fusion</i></p>	 <p><i>Tobii Pro Spectrum</i></p>	 <p><i>Tobii Pro Glasses 3</i></p>

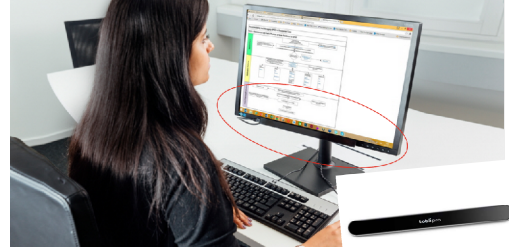


符合不同場景的眼動設備



Tobii Pro Glasses 3

- 坊間最自然、最輕巧的穿戴式眼動追蹤系統，專為真實情境的眼動研究而設計。
- 是市面上重量最輕、最自然的穿戴式眼動追蹤系統，眼鏡重量只有 77 克，記錄器 312 克。嚴謹的設計與超輕的材質讓受測者在任何場景中舒適配戴，獲得最自然的行為數據。



Tobii Pro Nano/Fusion-120(250)

- 市面上體積最小用途最廣泛的眼動追蹤系統。
- Tobii Pro Nano系列眼動儀輕巧的設計使其成為移動端設備測試的最佳選擇。
- 眼動儀獨一無二的超大頭動範圍和其穩定的追蹤準確度確保研究結果的有效性和可靠性。

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为真实世界环境而生

Tobii Pro Glasses 3 让您的研究范围得到极大拓展。场景摄像机提供了宽广的视野范围，与镜片高度集成的眼动追踪技术为佩戴者创造了非侵入的视觉环境。这些特征使眼动仪能够追踪更广阔的追踪视野，提供更加全面的视觉注意力数据。




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未來趨勢....



40M VR headsets
per year by 2021

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Thank you!