

# Science in Classics

## 经典中的科学

### Tutorial 06: Kandel



# Today

- Discussion (Part 1: on the text)
- Videos
  - Neglect
  - Face recognition
- Your brain fools you
  - Blind spot
  - Peripheral vision
- Discussion (Part 2)

# 大腦 松果體超感應 激活訓練



Second last in the class

全班尾二

入大學醫科

Medicine



Third last

全級尾三

入大學法律

Law

黃子超 文職工作，一小時看完300頁的書本 伍文龍 學生，只得八歲全級考第一

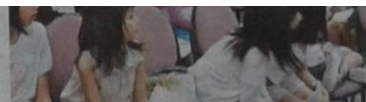
重點是：他們通過間腦松果體理解能力、創造力、想像力、集中

Read 300 pages / hour

能力、溫

Only 8 years old, ranked 1<sup>st</sup> in the whole form.

大腦 松果體超感應 訓練是以間腦潛能開發為目的，和坊間的記憶法和右腦將間腦的松果體激活後，令左腦、右腦和間腦同步進行，高速地互通訊息，在學習和生活上可達致左腦運行的效果。右腦的潛能比左腦大5倍，間腦的潛能比右腦大20倍，其實間腦的潛能比左腦大100倍，我們的頭腦只是用了2%，有98%未有開發，如果開發少少也聰明很多了。



## 免費 松果體超感應 激活訓練

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登記請聯絡：何先生 電話：9559 3195

e-mail address: esp\_joinsmart@yahoo.com.hk

請選擇  
其中一日

11/10 (六) 時間：下午 3:00 進場 下午3:30開始 -- 下午5:30

周六  
下午場

11/10 (六) 時間：晚上 7:00 進場 晚上7:30開始 -- 晚上9:30

14/10 (二) 時間：晚上 7:00 進場 晚上7:30開始 -- 晚上9:30

15/10 (三) 時間：晚上 7:00 進場 晚上7:30開始 -- 晚上9:30

(資料由客戶提供)

# Discussion (10 minutes)

Going through the text, mainly  
Chapter 28.

## Definitions

### **Two states of consciousness (Ch. 28, Para.10-11)**

1. Searle and Nagel ascribe **unity** and **subjectivity** to the conscious state.
2. **Subjectivity** is more difficult to explain.

**Unity:** various sensible modalities are melded into a **single**, coherent and conscious experience.

**Subjectivity:** how neurotic electrical activity **gives rise** to the meaning we ascribe to that experience.

## Hard problem

### **Reductionism (Ch. 28, Para.16)**

1. Consciousness is about subjective **experience**.
2. Science is a reductionist view of complicated **events**.



1+2 gives rise to two problems (Ch. 28, Para.17-18):

- a. What are the **elements** of subjective experience?
- b. How do objective events give rise to subjective experience?

*Impasse* (Ch. 28, Para.16-18):

Consciousness is irreducibly subjective. We have not yet found the **elements** of subjective consciousness.



16 As yet, we do not know how the firing of specific neurons leads to the subjective component of conscious perception, even in the simplest case. In fact, according to Searle and Nagel, we lack an adequate theory of how an objective phenomenon, such as electrical signals in the brain, can cause a subjective experience, such as pain. And because science as we currently practice it is a reductionist, analytical view of complicated events, while consciousness is irreducibly subjective, such a theory lies beyond our reach for now.

17 According to Nagel, science cannot take on consciousness without a significant change in methodology, a change that would enable scientists to identify and analyze the elements of subjective experience. Those elements are likely to be basic components of brain function, much as atoms and molecules

1. Consciousness is about subjective experience.
  2. Science is a reductionist view of events.
- ⇒ Two issues:
1. Basic units of experience?
  2. Connection between experience and events?

are basic components of matter, but to exist in a form we cannot yet imagine. The reductions performed routinely in science are not problematic, Nagel holds. Biological science can readily explain how the properties of a particular type of matter arise from the objective properties of the molecules of which it is made. What science lacks are rules for explaining how subjective properties (consciousness) arise from the properties of objects (interconnected nerve cells).

Nagel argues that our complete lack of insight into the elements of subjective experience should not prevent us from discovering the neural correlates of consciousness and the rules that relate conscious phenomena to cellular processes in the brain. In fact, it is only by accumulating such information that we will be in a position to think about the reduction of something subjective to something physical and objective. But to arrive at a theory that supports this reduction, we will first have to discover the elements of subjective consciousness. This discovery, says Nagel, will be enormous in its magnitude and its implications, requiring a revolution in biology and most likely a complete transformation of scientific thought. 18

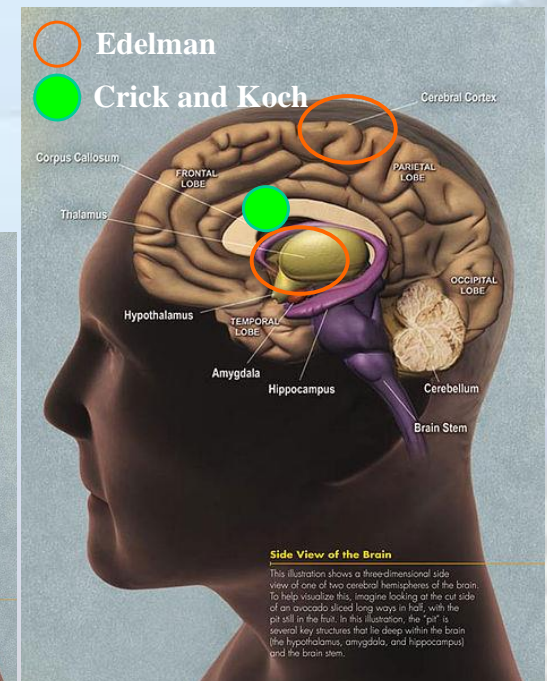
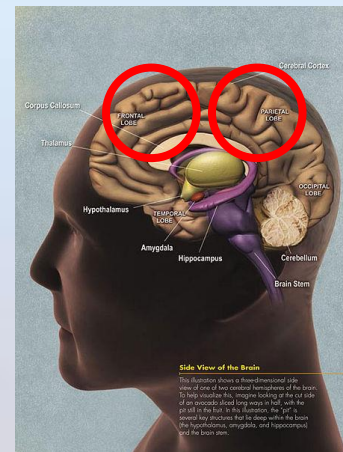
## Easy problem (Ch. 28, Para.20-28)

Which theory is correct?

1. **Edelman**: **unlikely** to find consciousness through a simple set of neural correlates because the machinery is widely distributed throughout the cortex and **thalamus**.
2. **Crick** and Koch: there are direct neural correlates which are probably in **claustrum**, which is below the cerebral cortex.

Binocular rivalry experiment:

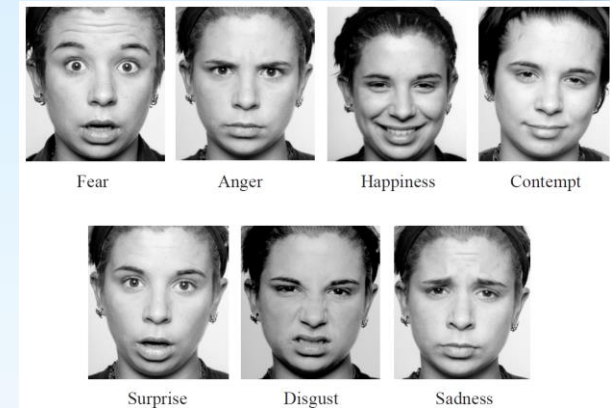
1. Each eye sees a different image, for example, vertical and horizontal strips.
2. Using **MRI**.
3. Result: The **frontal** and **parietal** areas of the **cortex** are active when conscious attention switches between images.





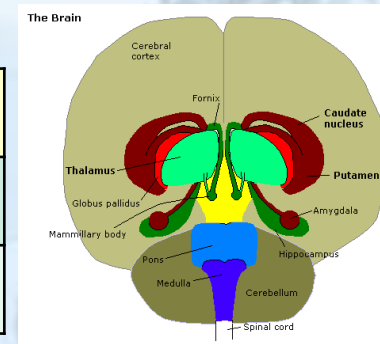
## Kandel's contribution (Para. 29-37)

1. Background information: **seven** universal facial expression.
2. Objective: To explore conscious and unconscious response to neutral expression or **fearful** faces.
3. Facial expression chosen by Kandel is **fear**.
4. Different perceptions:
  - Conscious: faces are presented for a **long** period.
  - Unconscious: faces are presented for a **short** period.

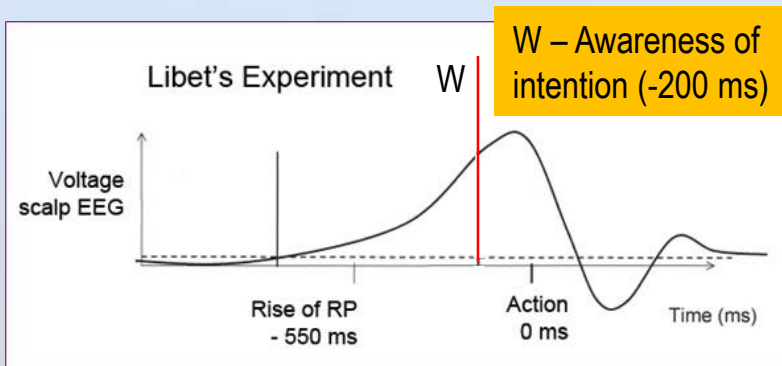


Found by Peter Ekman

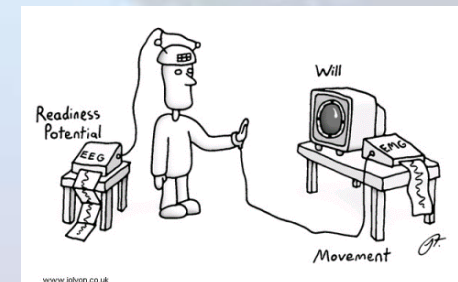
Perception	Regions of the <b>amygdala</b> affected	Background anxiety
Conscious	Dorsal region	No relation
Unconscious	Basolateral nucleus	<b>Proportional</b> to



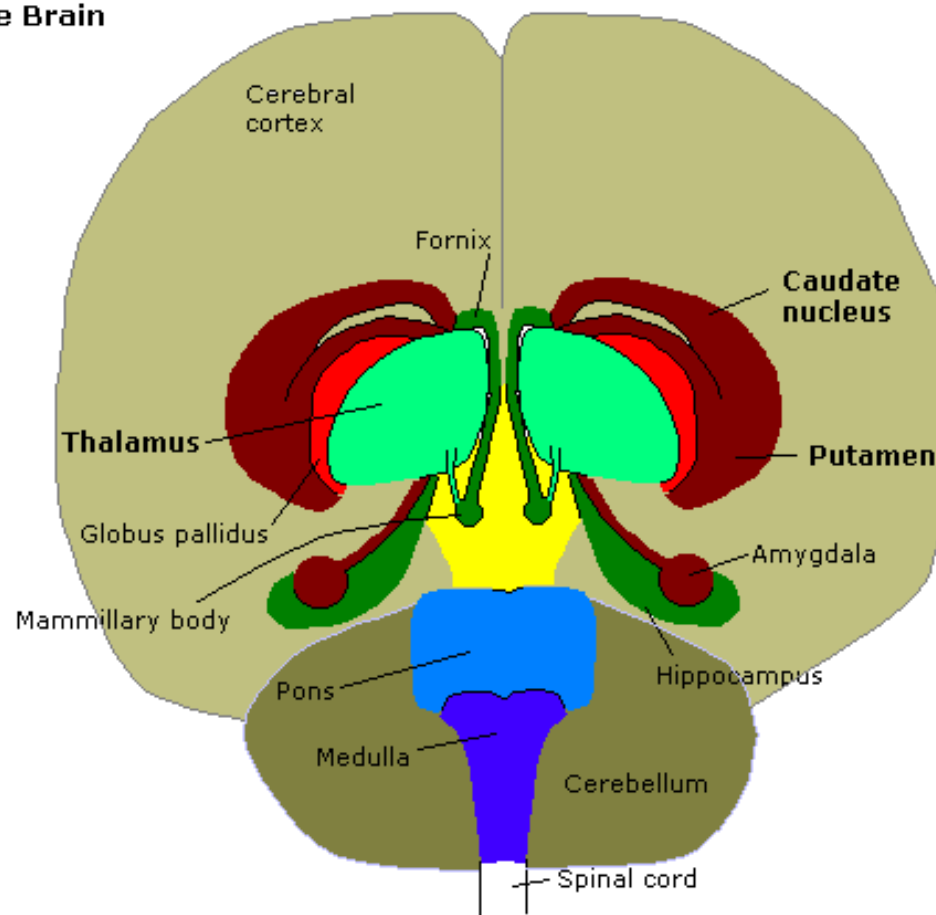
## Libet's experiment (Para. 39-44)



1. Ramachandran: our mind has free **won't**.
2. Gazzaniga: brains are automatic, but people are **free**.

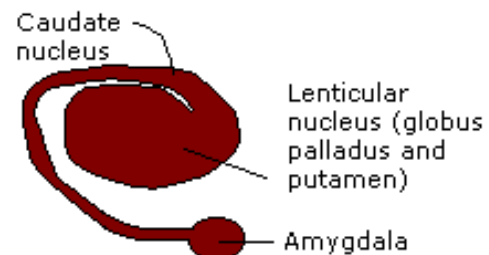


## The Brain



The brain as viewed from the underside and front. The thalamus and Corpus Striatum (Putamen, caudate and amygdala) have been splayed out to show detail.

## Corpus Striatum



<http://en.wikipedia.org/wiki/Amygdala>

Without being aware of it and without being rigorously systematic about it, we **exclude the Subject of Cognizance from the domain of nature** that we endeavour to understand. We step with our own person back into the part of an onlooker who does not belong to the world, which by this very procedure becomes an objective world. [...] Yet I would say that **a rapid withdrawal from the position held for over 2,000 years is dangerous**. We may lose everything without gaining more than some freedom in a special – though very important – domain.

Erwin Schrödinger, *What is Life? with Mind and Matter and Autobiographical Sketches*. (Cambridge: Cambridge University Press, 1992), pp. 118-120.

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# Why is he a genius but I am not?



Odd no.				Even no.		
3	4	5		4	3	5
5	12	13		6	8	10
7	24	25		8	15	17
9	40	41		10	24	26
11	60	61		12	35	37
13	84	85		14	48	50
15	112	113		16	63	65
17	144	145		18	80	82
19	180	181		20	99	101
21	220	221		22	120	122
23	264	265		24	143	145
25	312	313		26	168	170
27	364	365		28	195	197
29	420	421		30	224	226
31	480	481		32	255	257
33	544	545		34	288	290
35	612	613		36	323	325

# Neglect

From BBC's *Brain Story*.







# Genius and us

- Neglect patient
  - Cannot see one side until being told by a normal person.
- Normal people
  - Cannot see some theories until being told by a genius.
- Genius: greater awareness?

# Face Recognition





# Blind spot

- On the retina, there is a spot on which there is no light sensing cell.
- But we do not see a hole.
- Our brain cheats us!!!






Left eye

Peripheral vision is whacked. x

imgur.com/opNnoOx

imgur sign in register

Peripheral vision is whacked.



6,561 points · stats

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706 comments sorted by best expand all

↑ hakunamatatas 2711 points : a year ago reply  
WHAT IS HAPPENING TO THEIR FACES?!

↑ wongo 1185 points : a year ago reply  
I had to watch this three times. Looking at the cross, looking at the left, looking at the

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This is no mere doughnut...  
334 points

Bless this child  
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Love these commercials.  
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A pastor teaching about relationships...  
5,497 points

President Obama leaving his second inauguration.  
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God Bless America

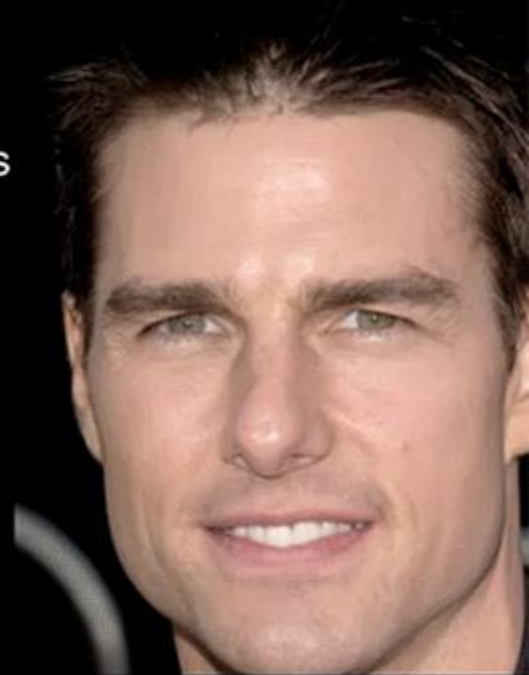
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Keep your eyes  
on the cross





Common hill myna 鷓鴣





Prof. Kao suffered from Alzheimer's disease from early 2004. In 2016, he lost the ability to maintain his balance. At the end-stage of his dementia he was cared for by his wife and intended not to be kept alive with life support or have CPR performed on him. He died at Bradbury Hospice in Hong Kong on 23 September 2018 at the age of 84. (*Wikipedia*)

Prof. Charles Kao, Nobel Laureate in Physics,  
the 3<sup>rd</sup> Vice-Chancellor of CUHK

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# Discussion (Part 2)

- **Groups 1/2 (Mind):** It is generally believed that the computer does not have a mind. How should a myna bird behave so that you would believe it is not a computer simulation?
- **Groups 3/4 (Dualism):** Prof. Kao suffered from Alzheimer's disease. There were unrecoverable damages in his brain. Even his personality and memory changed. Can we say that dualism is thus proved wrong?
- **Groups 5/6 (subjectivity):** Your good friend is sad and says, "You can never share my sadness because of the subjectivity of consciousness." How will you respond?

# Announcement

- Reflective Journal 2 (9pm, **Tue** ~~Sat~~, June **7** ~~4~~)

