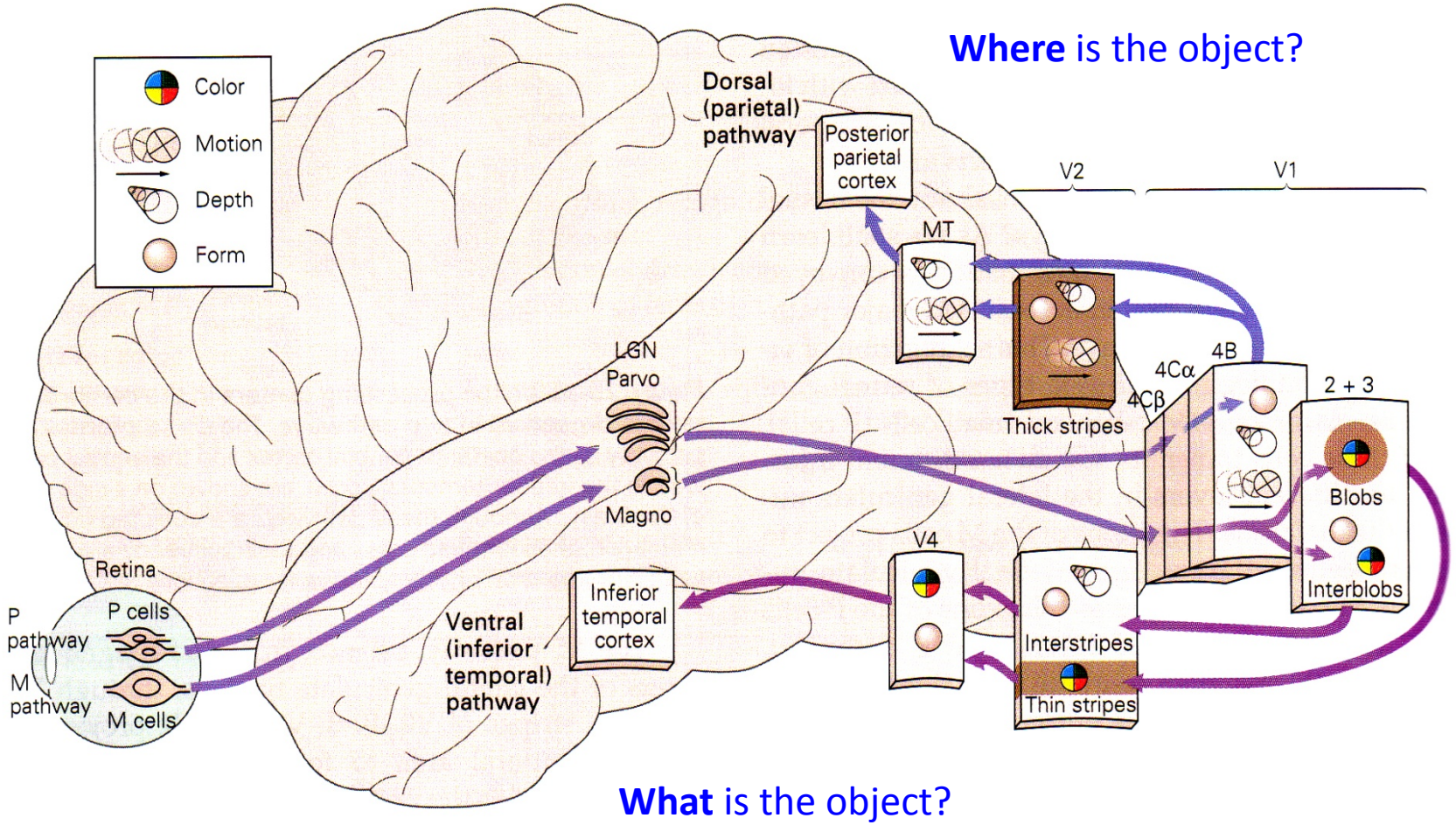
感覺&知覺 II

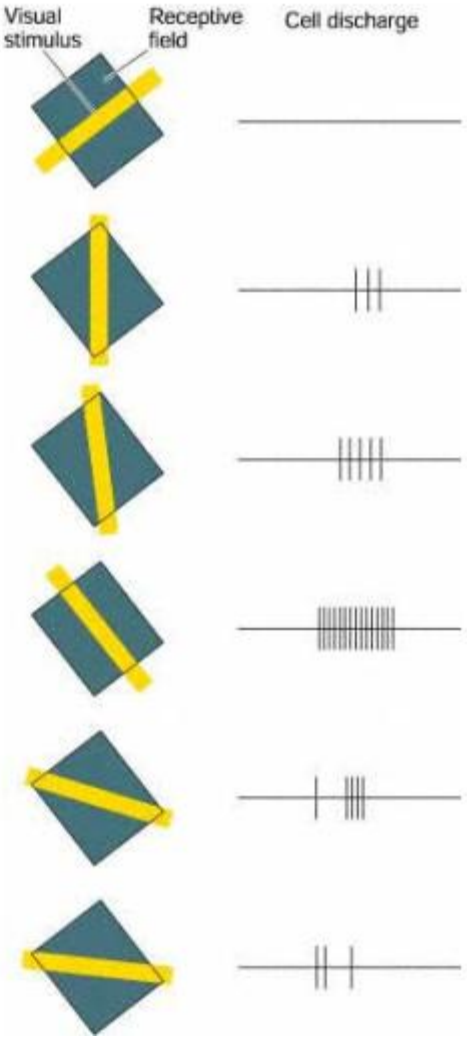
頂葉與顳葉處理不同的視覺訊息



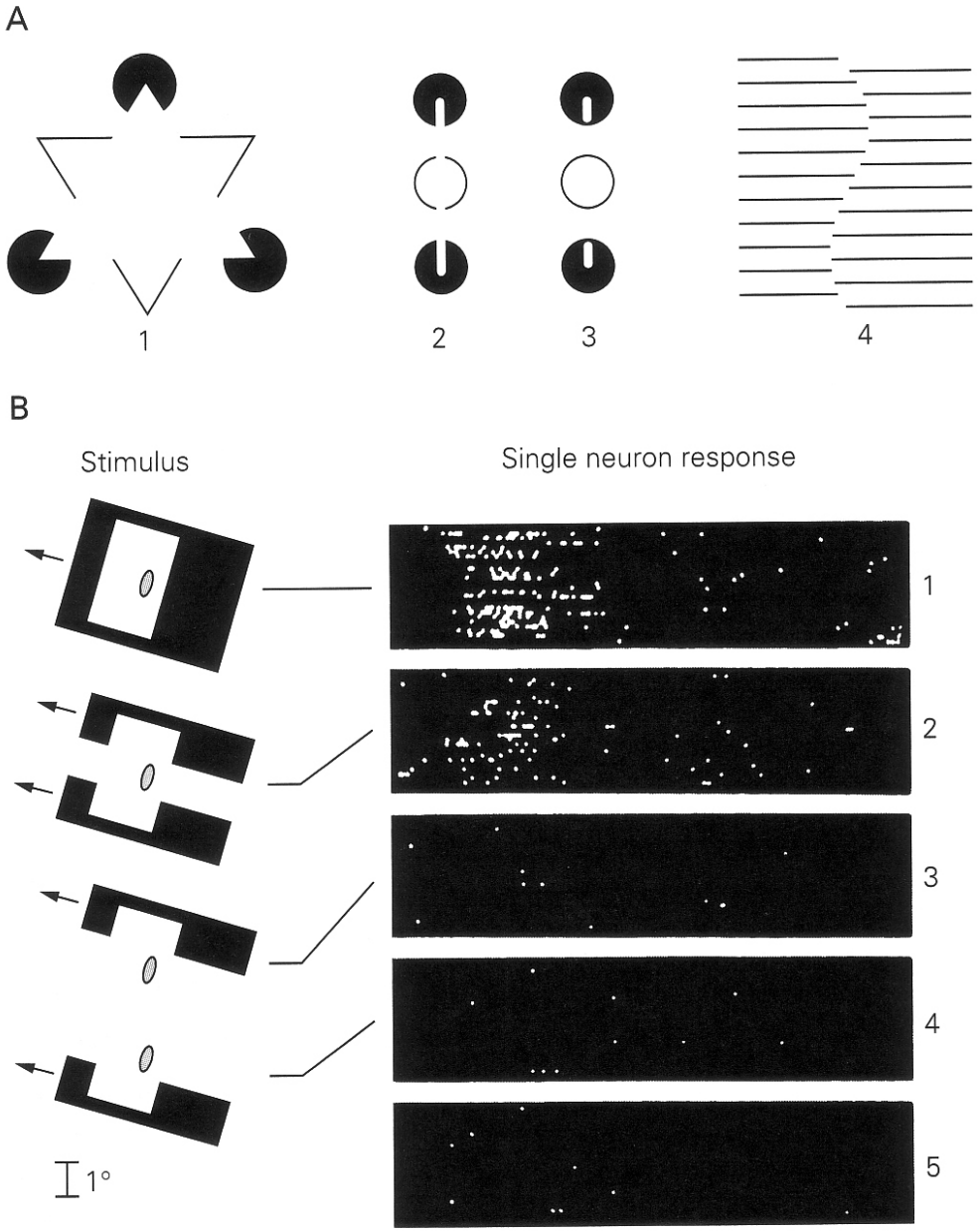
The P and M pathways feed into 2 processing pathways in extrastriate cortex (Ungerleider and Mishkin, 1982)

大腦初級視覺皮質的神經細胞（V1 cells）只對特定的線段方向有反應

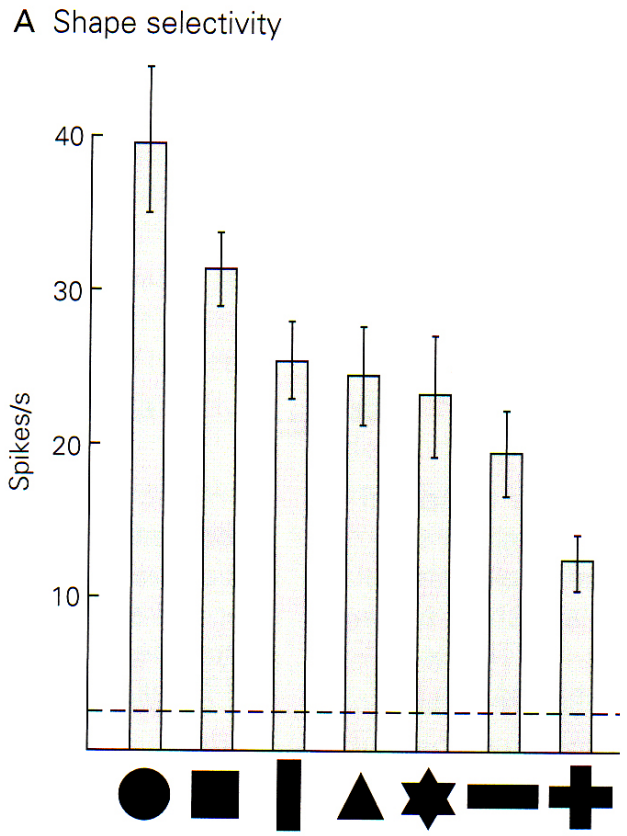
Simple cell in visual cortex



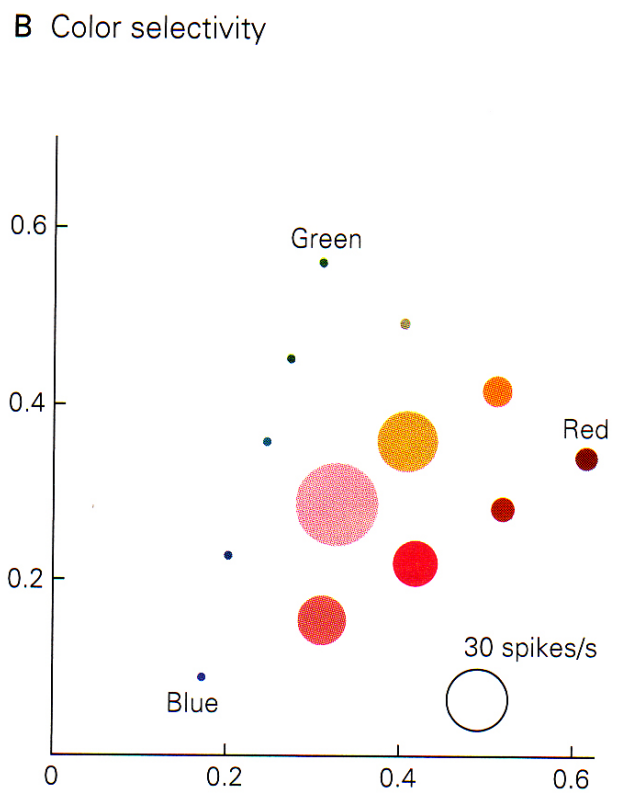
V2 cells 對錯覺邊緣（illusory contours）有反應



V4 cells 對形狀及顏色有特定反應

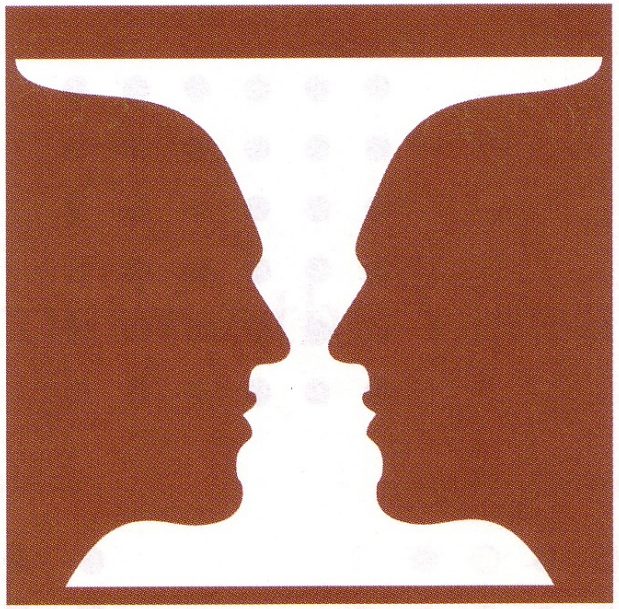


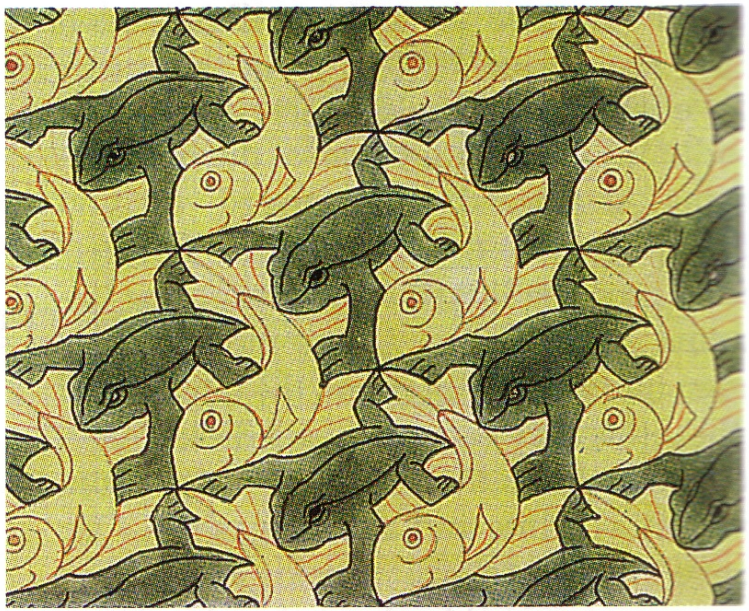
A “Circle” selective cell



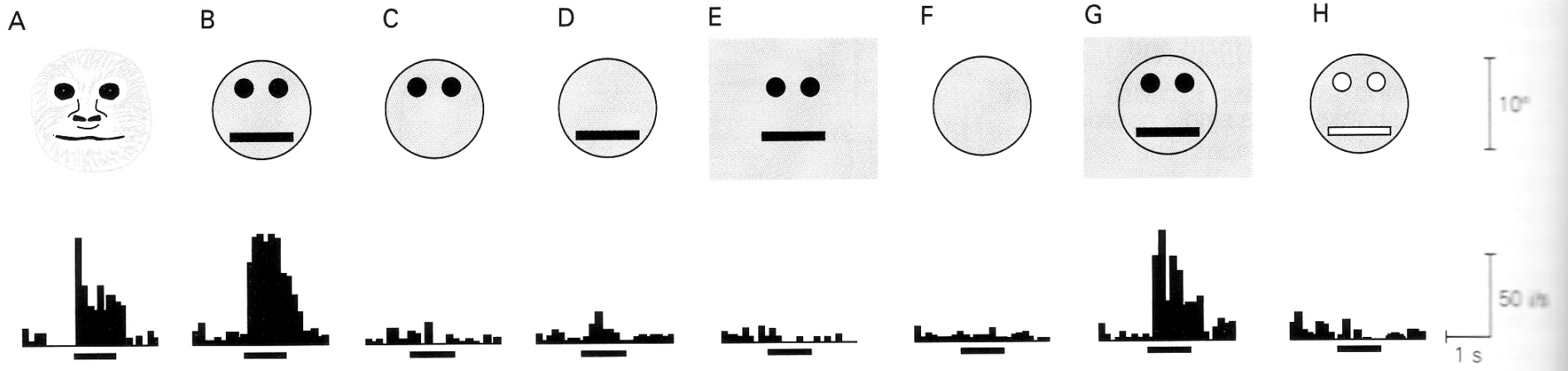
A “pink” color selective cell

V4 cells 適合偵測前景與背景
（figure-ground recognition）





下顳葉細胞（IT cells）對臉及複雜圖案才有反應



A “face” selective cell

不同選擇性的下顳葉細胞（IT cells）有特定的排列方式

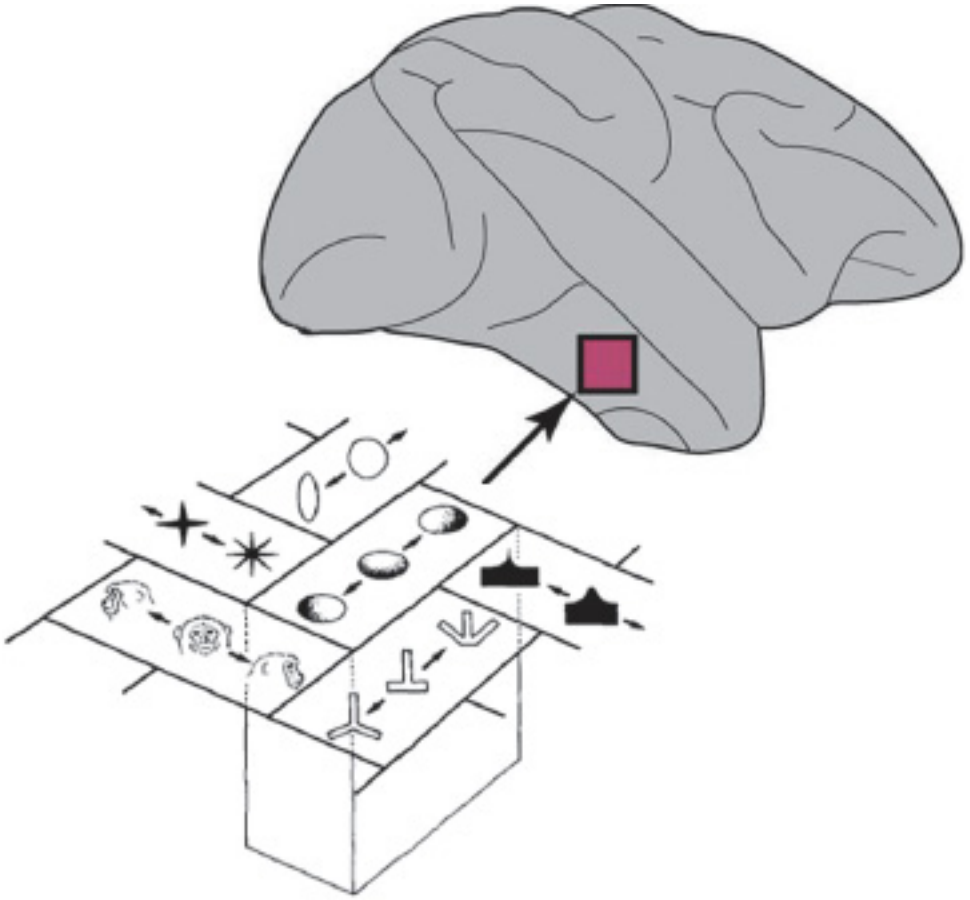


FIGURE 46.4 Schematic diagram illustrating the columnar organization in area TE of the monkey. Cells with similar but slightly different selectivity tend to cluster in elongated vertical columns perpendicular to the cortical surface. Stimuli shown are examples of the critical features for the activation of single cells in TE. Most cells, as shown, require moderately complex features for their activation, although some can be driven by simpler stimuli, such as color, orientation, and texture. Adapted from Tanaka (1996).

The Jennifer Aniston neuron

http://www.youtube.com/watch?v=Y7BZlDfVR6k

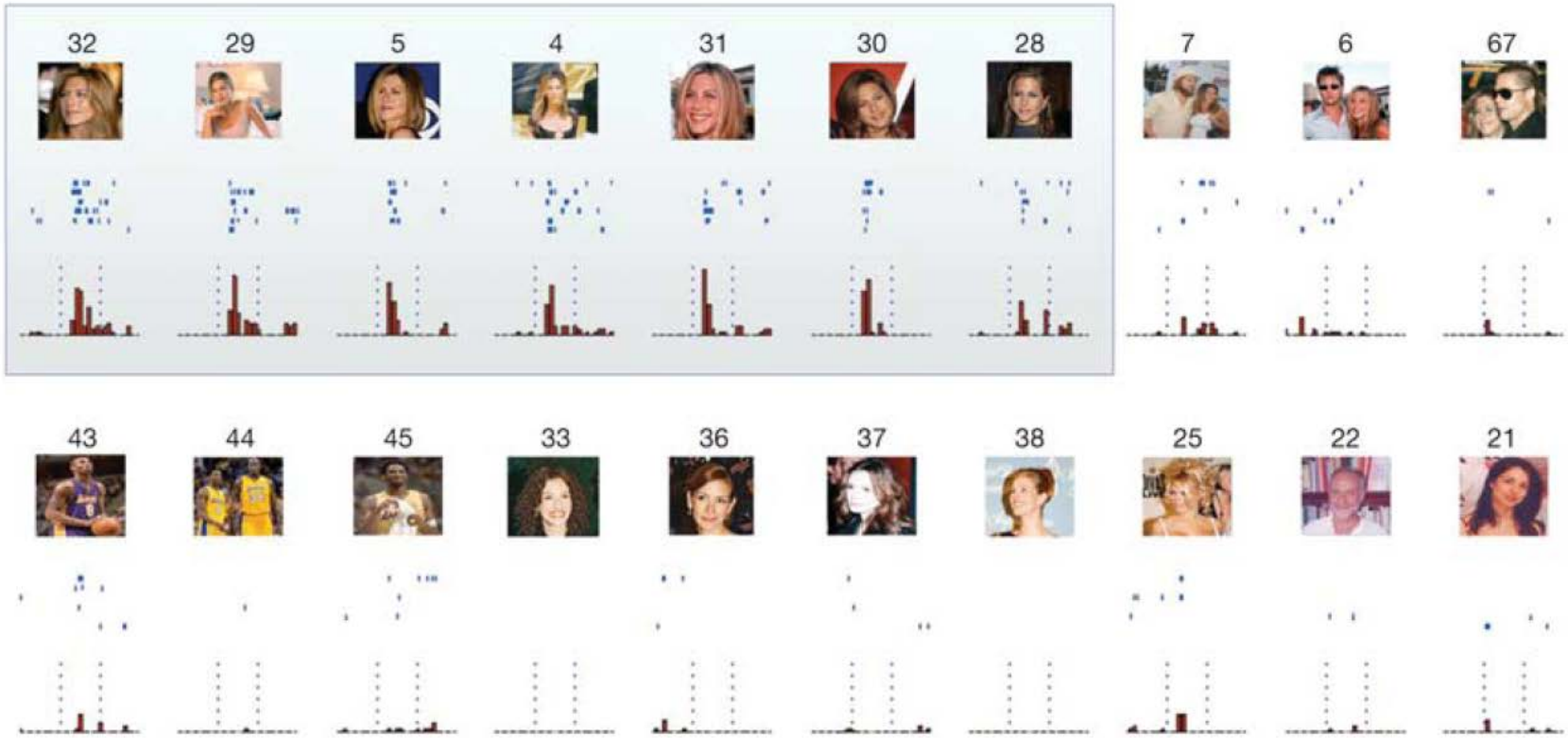
Most of us have a Jennifer Aniston neuron in our brains--this is no joke. John Medina, author of "Brain Rules," shows us how researchers made the discovery. Get more at http://www.brainrules.net/

nature Vol 435|23 June 2005|doi:10.1038/nature03687

LETTERS

Invariant visual representation by single neurons in the human brain

R. Quian Quiroga[1,2]†, L. Reddy[1], G. Kreiman[3], C. Koch[1] & I. Fried[2,4]

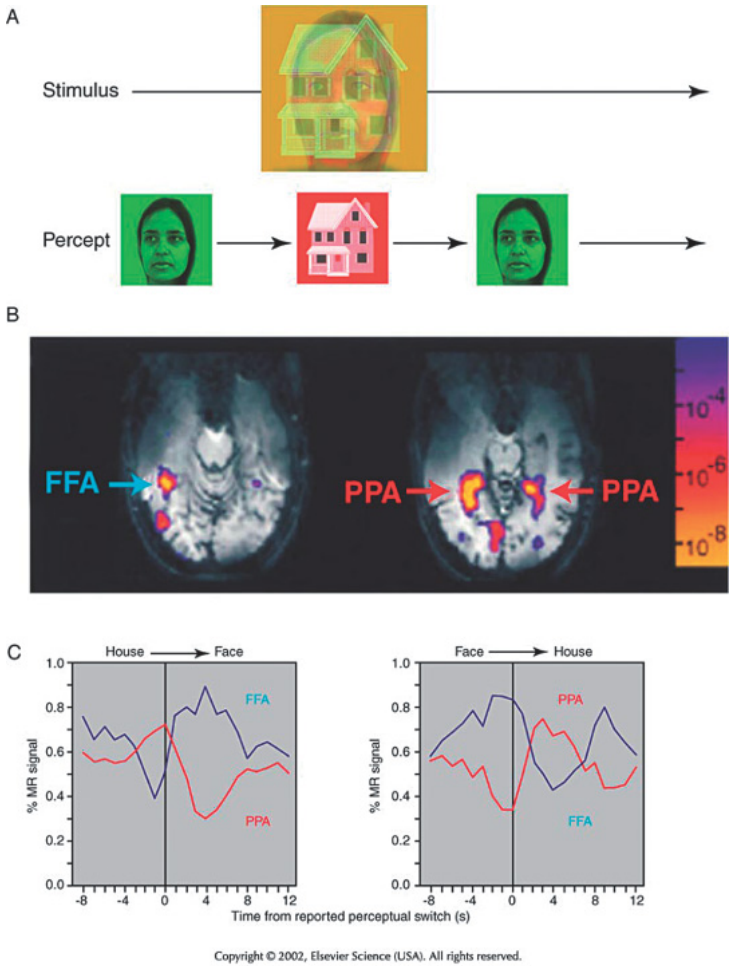


「臉盲」（BBC brain story）

「物盲」（BBC brain story）

臉辨識區與房子辨識區在腦的位置不同

臉辨識區



房子辨識區

FIGURE 46.11 Design and results from an fMRI experiment on binocular rivalry. **(A)** The top illustration shows the ambiguous face/house stimulus used to produce rivalry. When viewed through red and green filter glasses, only the face could be seen through one eye and only the house through the other eye. This arrangement led to binocular rivalry, with a face percept alternating with a house percept every few seconds. **(B)** Two adjacent axial slices through the brain of a single subject showing, in the left slice, the area on the fusiform gyrus that responded more to faces than houses (FFA) and, in the right slice, the area on the parahippocampal gyrus that responded more to houses than to faces (PPA). In the slices shown, *left* is the *right* hemisphere and right is the left hemisphere. **(C)** fMRI time series showing FFA and PPA activity for a single subject illustrating that the activity in these two regions correlated with the subject's visual percept. PPA, parahippocampal place area. Adapted from Tong *et al.* (1998).

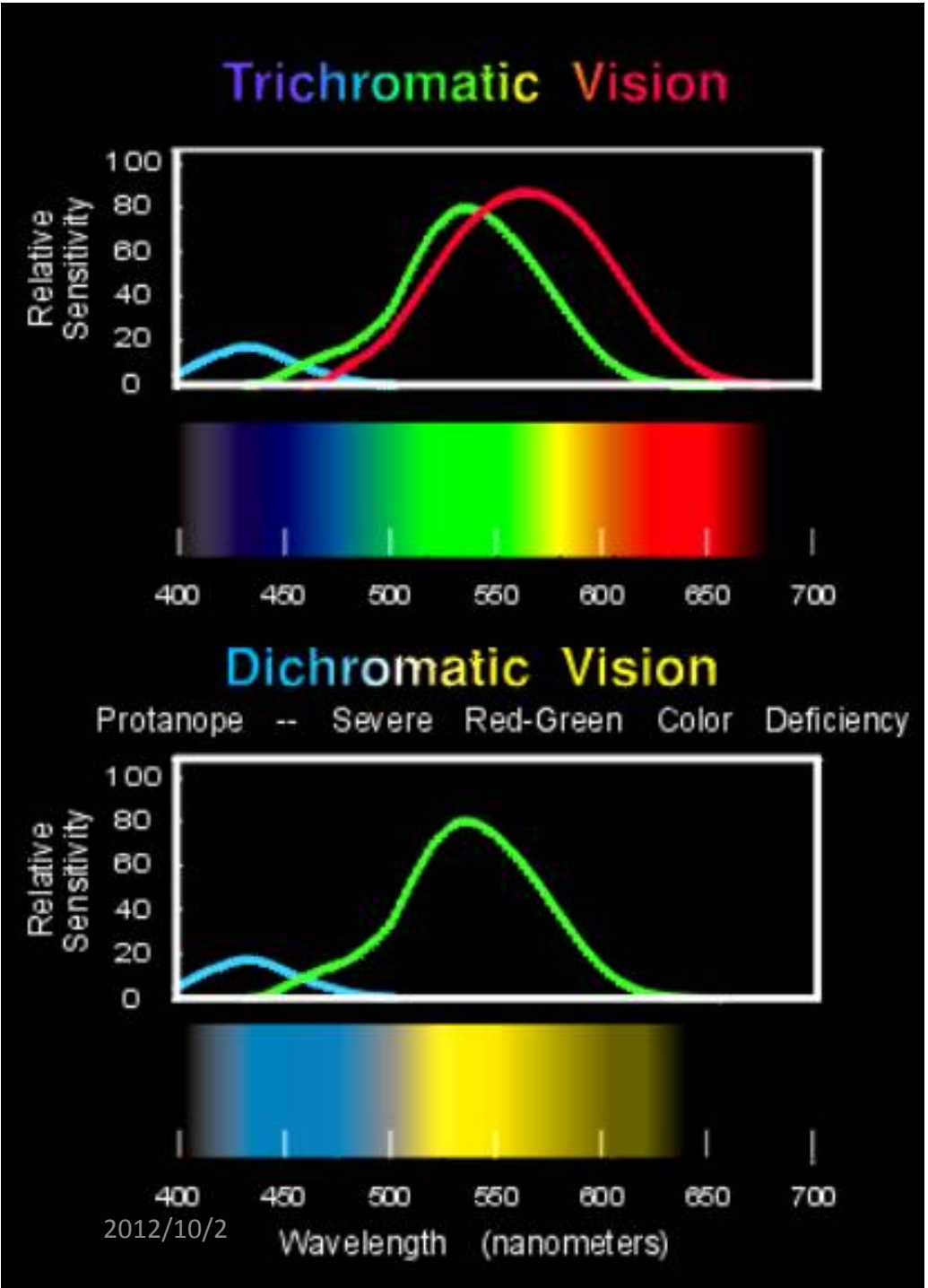
為何要有色彩視覺？

Nathans, 1999

A Full color image

B Black and white only

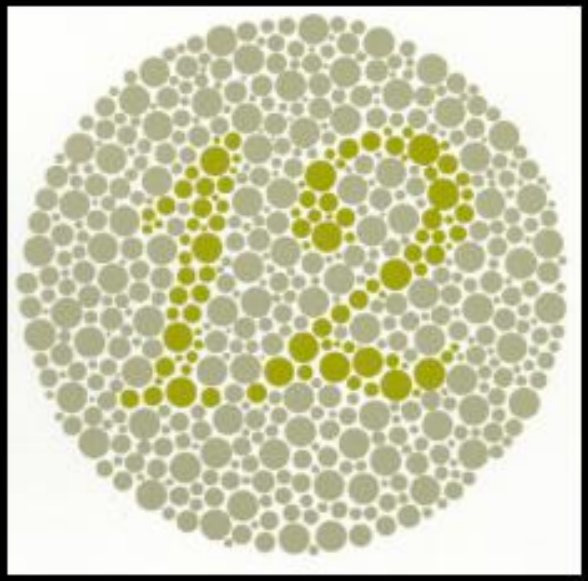
C Color only

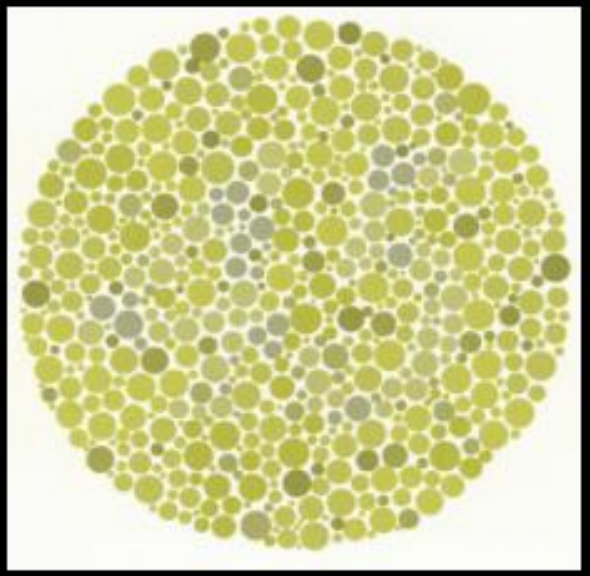


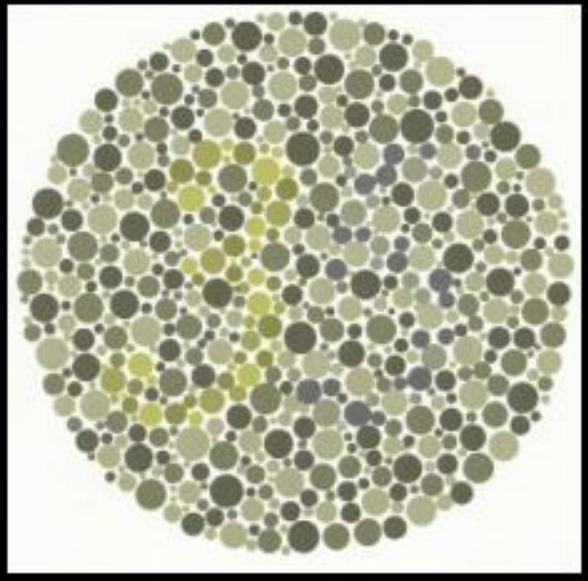
紅綠色盲人所看到的世界
與一般人有何不同？

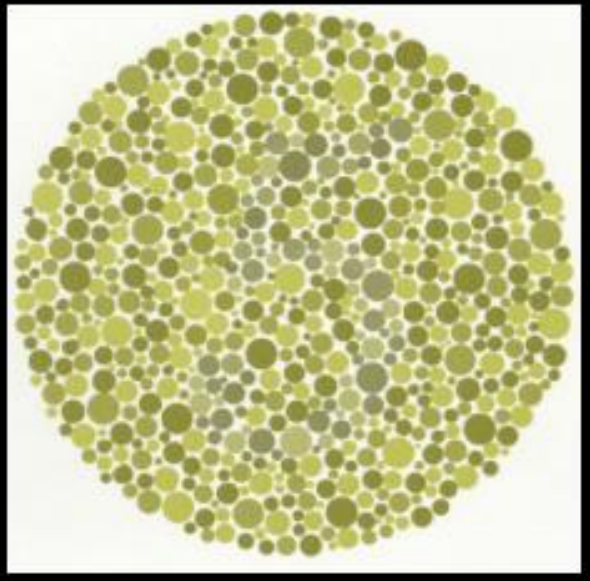

PYREX
PYREX

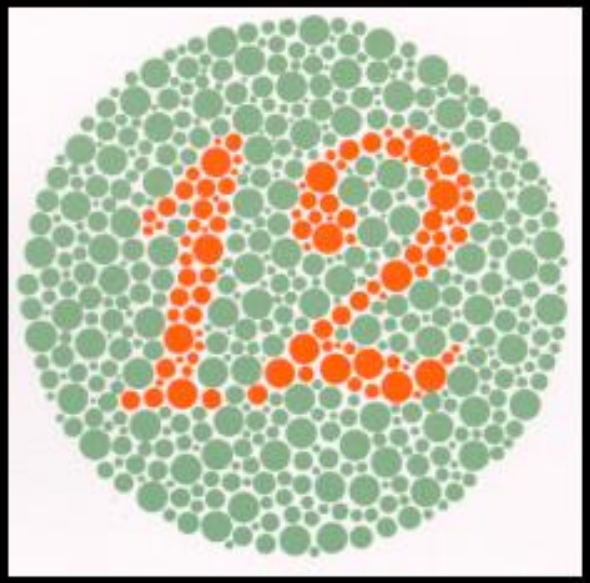

PYREX

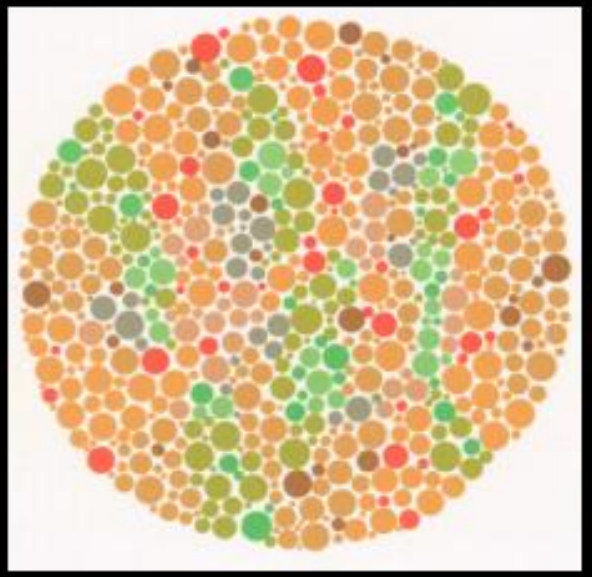


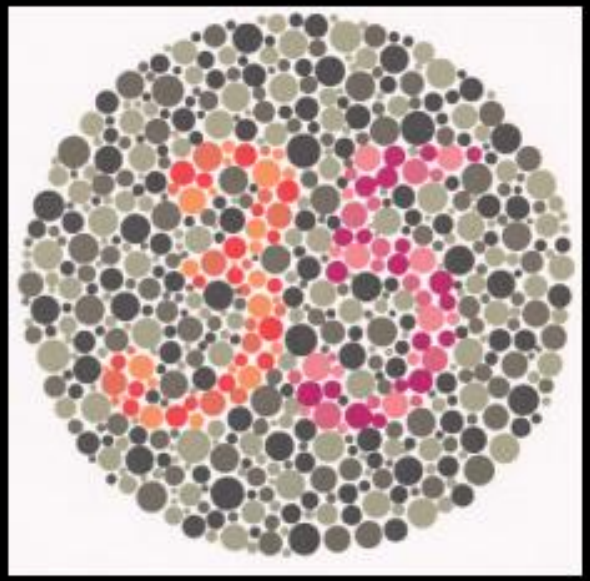


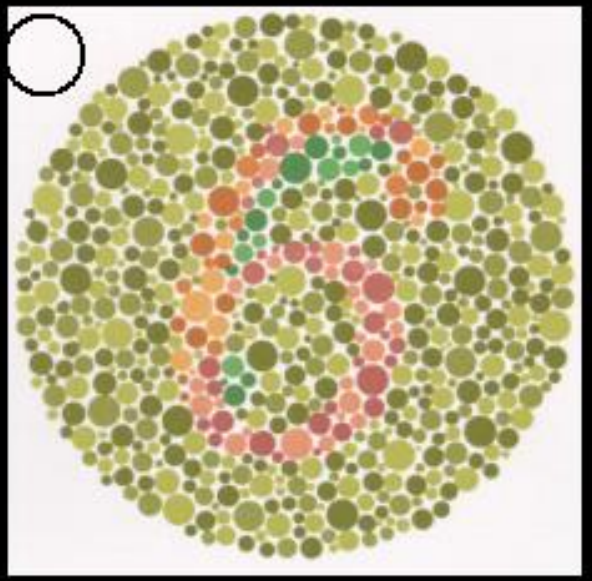





12



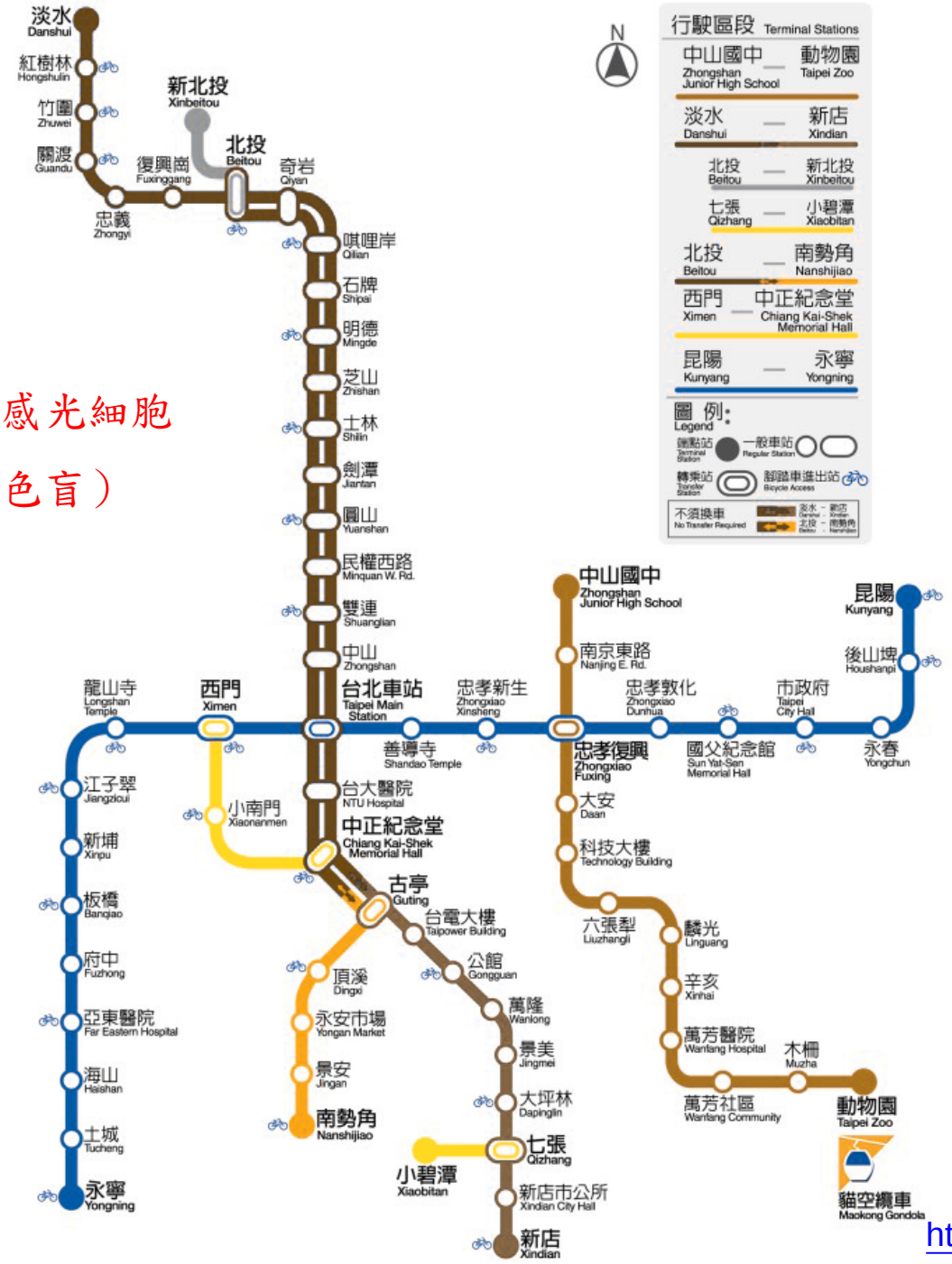





行駛區段 Terminal Stations
中山國中 Zhongshan Junior High School — 動物園 Taipei Zoo
淡水 Danshui — 新店 Xindian
北投 Beitou — 新北投 Xinbeitou
七張 Qizhang — 小碧潭 Xiaobitan
北投 Beitou — 南勢角 Nanshijiao
西門 Ximen — 中正紀念堂 Chiang Kai-Shek Memorial Hall
昆陽 Kunyang — 永寧 Yongning
圖例: Legend
端點站 Terminal Station
一般車站 Regular Station
轉乘站 Transfer Station
腳踏車進出站 Bicycle Access
不須換車 No Transfer Required
淡水 - 新店 Danshui - Xindian
北投 - 南勢角 Beitou - Nanshijiao
N
淡水 Danshui
紅樹林 Hongshulin
竹圍 Zhuwei
關渡 Guandu
忠義 Zhongyi
復興崗 Fuxinggang
新北投 Xinbeitou
北投 Beitou
奇岩 Qiyan
唭哩岸 Qilian
石牌 Shipai
明德 Mingde
芝山 Zhishan
士林 Shilin
劍潭 Jiantan
圓山 Yuanshan
民權西路 Minquan W. Rd.
雙連 Shuanglian
中山 Zhongshan
中山國中 Zhongshan Junior High School
南京東路 Nanjing E. Rd.
忠孝復興 Zhongxiao Fuxing
大安 Daan
科技大樓 Technology Building
六張犁 Liuzhangli
麟光 Linguang
辛亥 Xinhai
萬芳醫院 Wanfang Hospital
萬芳社區 Wanfang Community
木柵 Muzha
動物園 Taipei Zoo
貓空纜車 Maokong Gondola
忠孝敦化 Zhongxiao Dunhua
國父紀念館 Sun Yat-Sen Memorial Hall
市政府 Taipei City Hall
昆陽 Kunyang
後山埤 Houshanpi
永春 Yongchun
忠孝新生 Zhongxiao Xinsheng
善導寺 Shandao Temple
台北車站 Taipei Main Station
龍山寺 Longshan Temple
西門 Ximen
小南門 Xiaonanmen
台大醫院 NTU Hospital
中正紀念堂 Chiang Kai-Shek Memorial Hall
古亭 Guting
台電大樓 Taipower Building
公館 Gongguan
萬隆 Wanlong
景美 Jingmei
大坪林 Dapinglin
七張 Qizhang
新店市公所 Xindian City Hall
新店 Xindian
小碧潭 Xiaobitan
頂溪 Dingxi
永安市場 Yongan Market
景安 Jingan
南勢角 Nanshijiao
江子翠 Jiangzicui
新埔 Xinpu
板橋 Banqiao
府中 Fuzhong
亞東醫院 Far Eastern Hospital
海山 Haishan
土城 Tucheng
永寧 Yongning

缺少紅色感光細胞

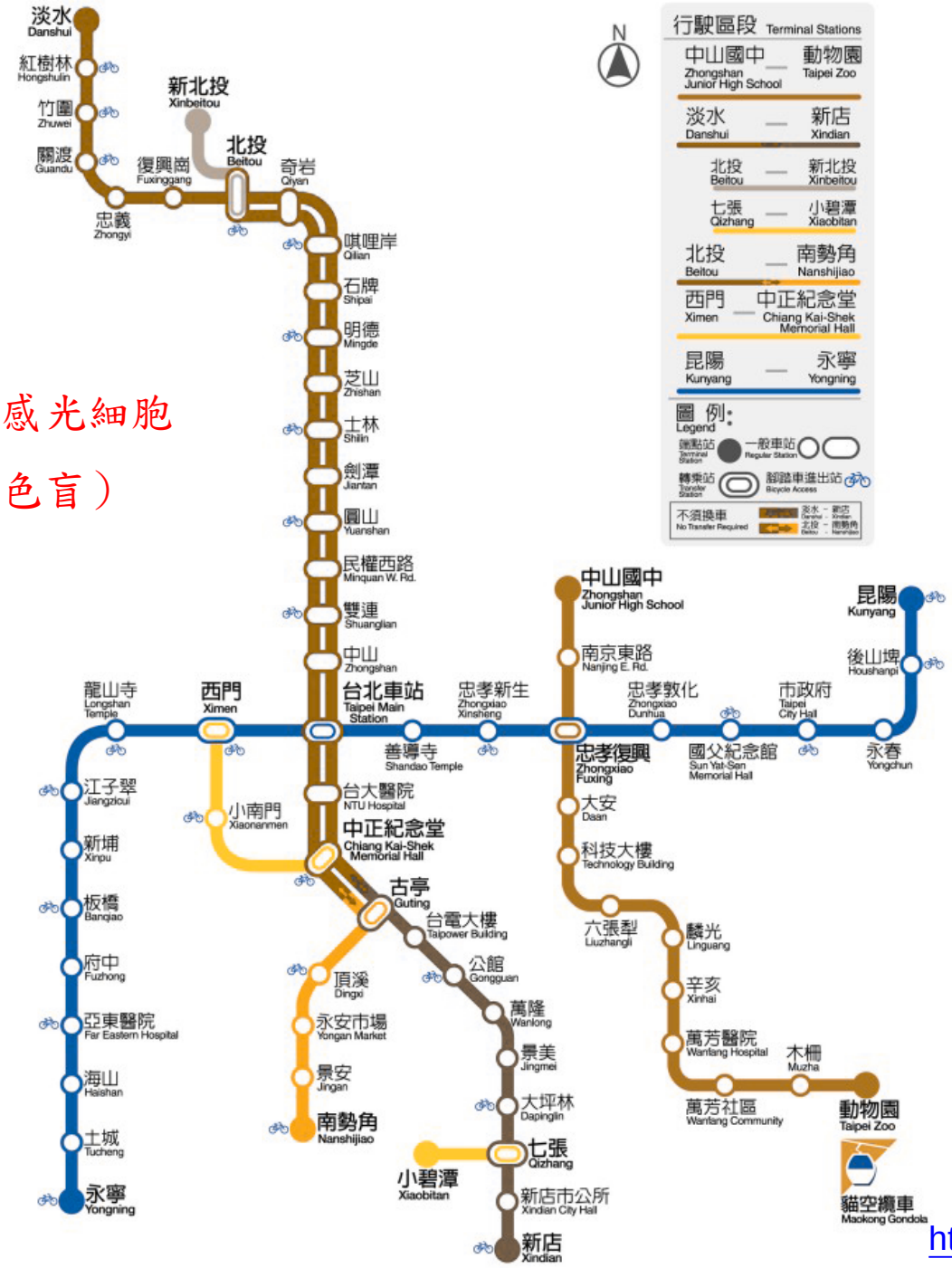
（紅綠色盲）



http://www.vischeck.com/

缺少綠色感光細胞

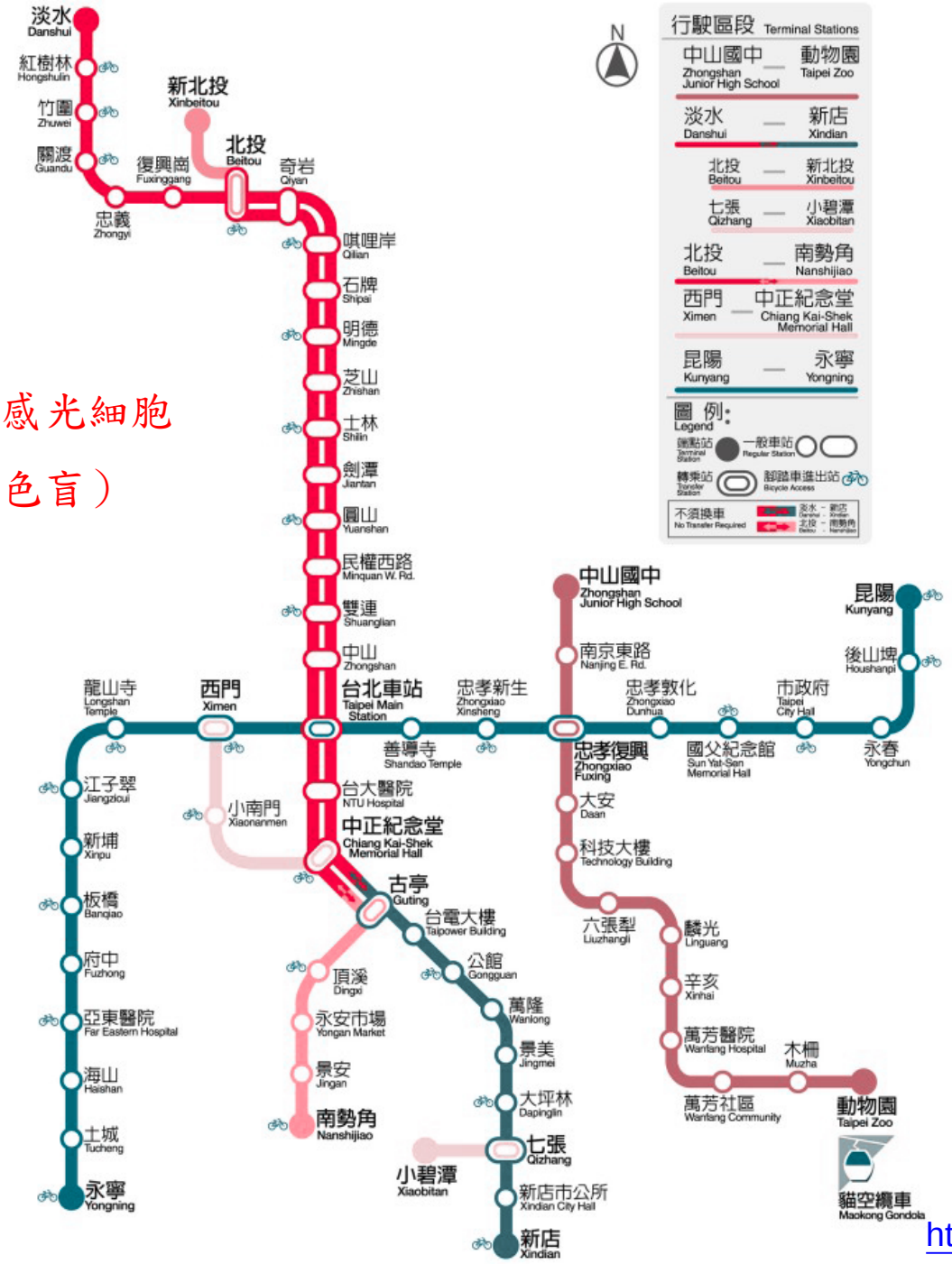
（紅綠色盲）



http://www.vischeck.com/

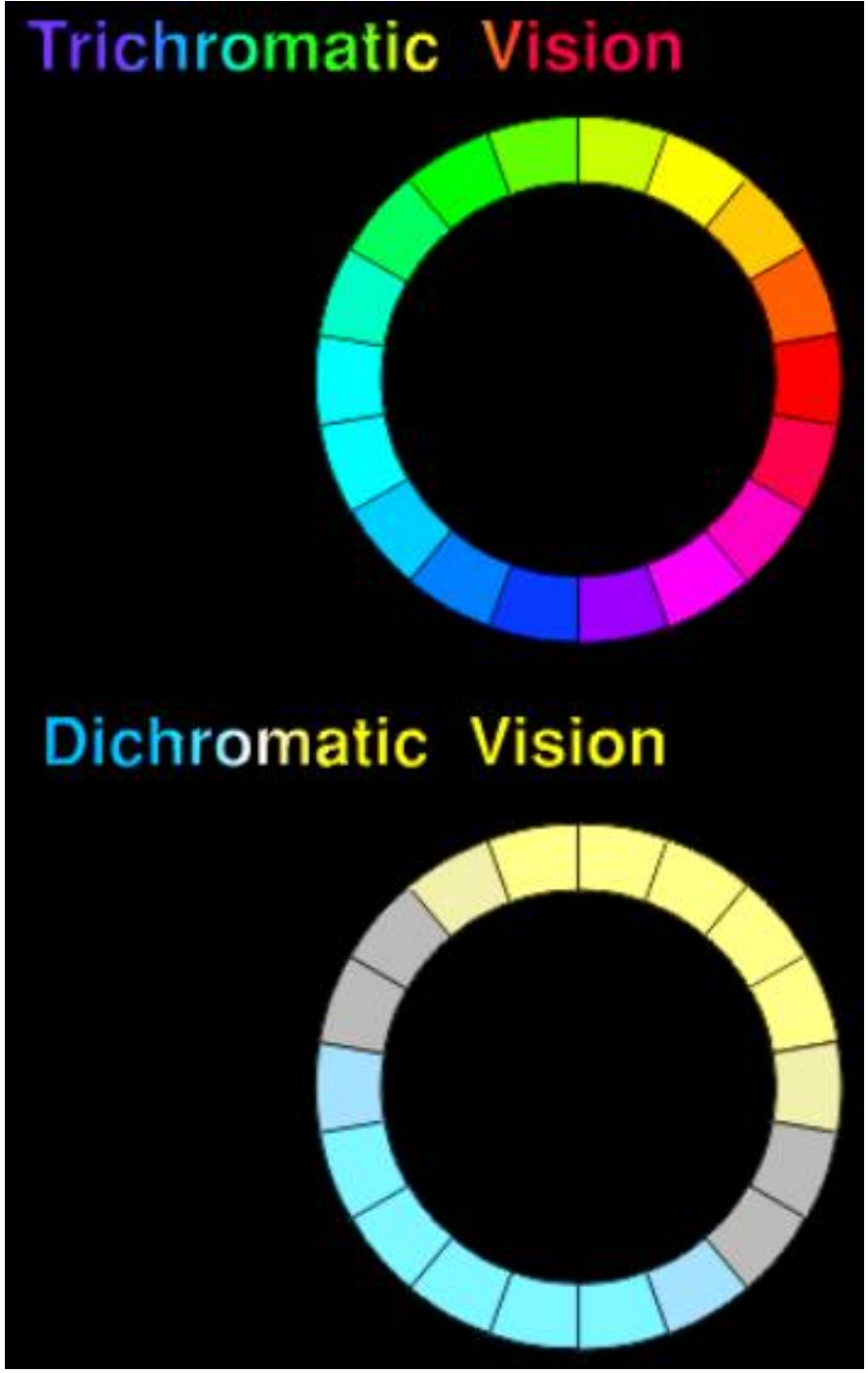
缺少藍色感光細胞

（黃藍色盲）

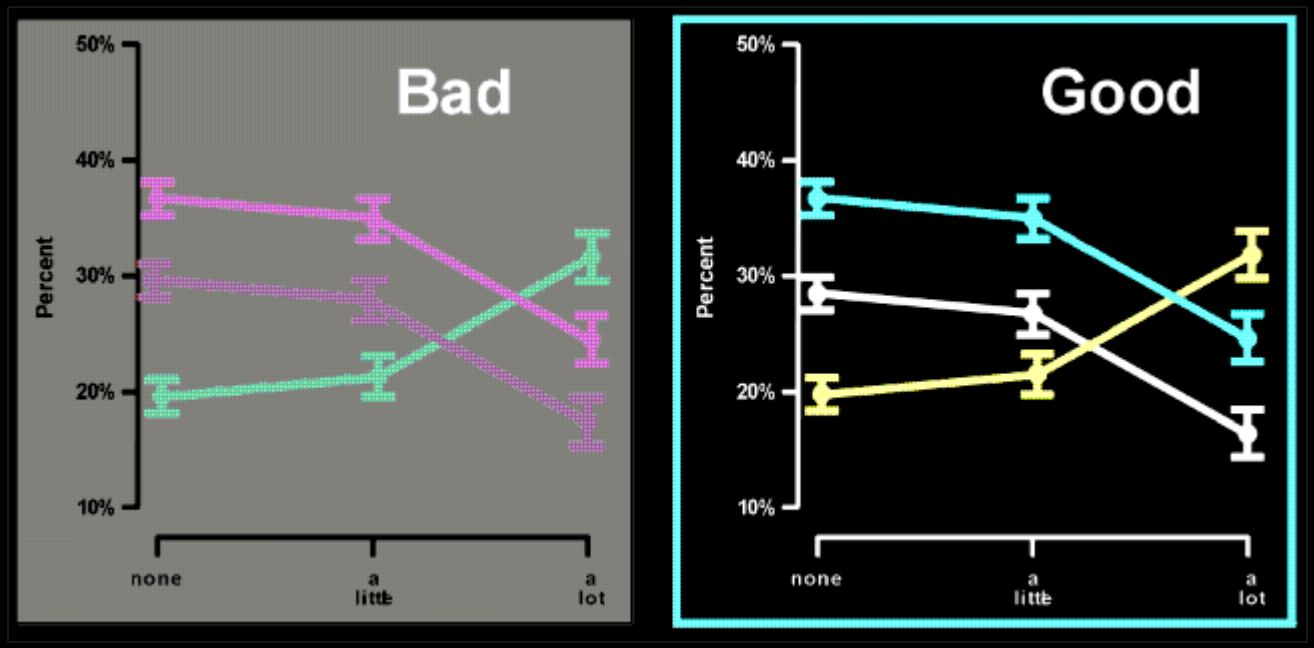


http://www.vischeck.com/

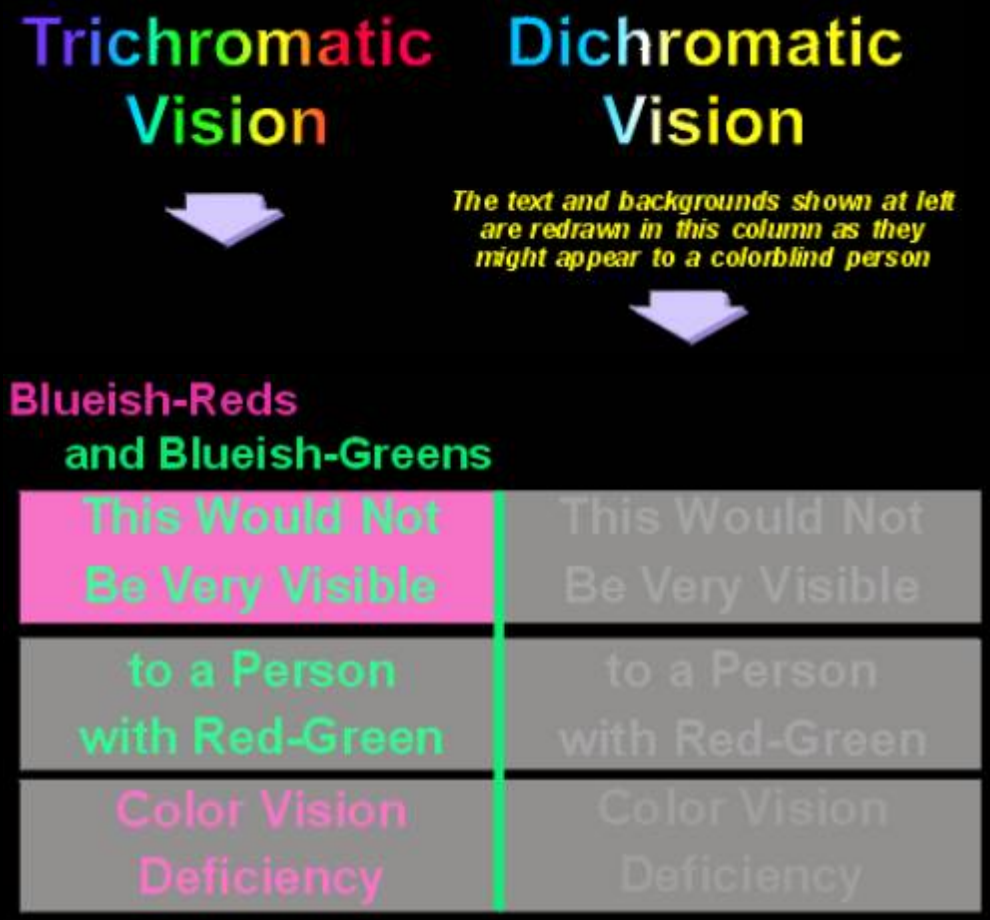
如何讓你的PPT檔也能讓紅綠色盲人看清楚？



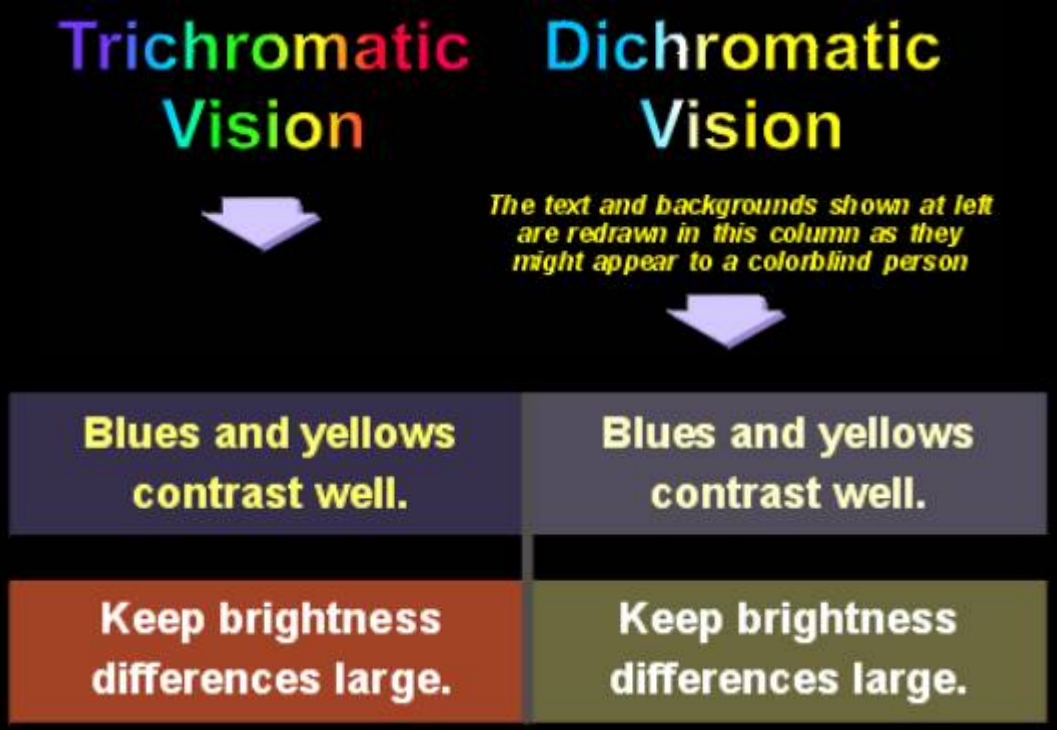
Clear graphics are very important and often the source of the most difficulty; here are two examples showing the difference between good and bad use of color. The Trick is to keep brightness differences large and to avoid color combinations that do not contrast well.

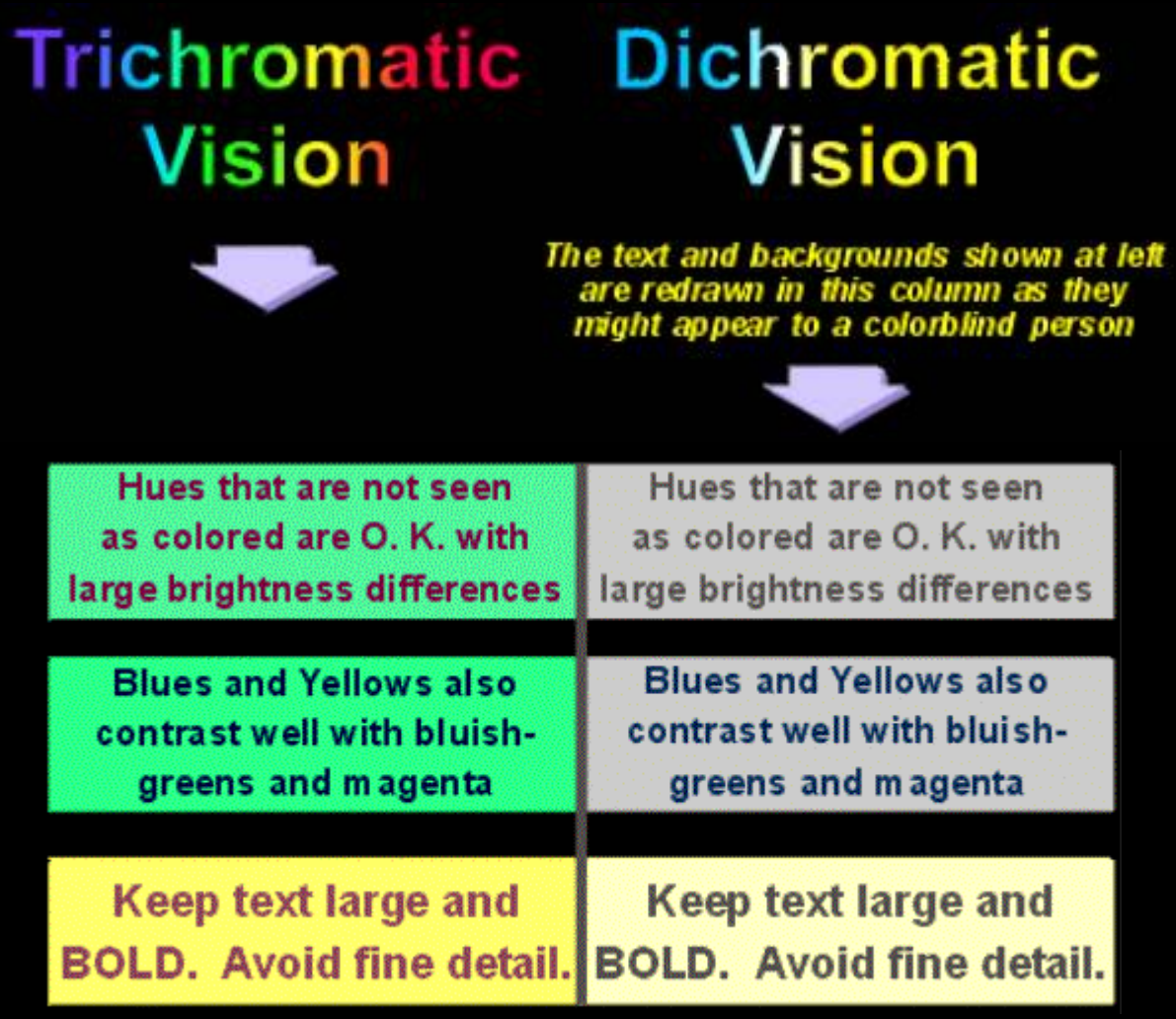


A comparison of the two color wheels shows which color combinations would be difficult to see. Graphics cause the most problems, but the colors can be economically illustrated as text examples, below. The right-hand column illustrates how the left hand column might look to a color blind person.

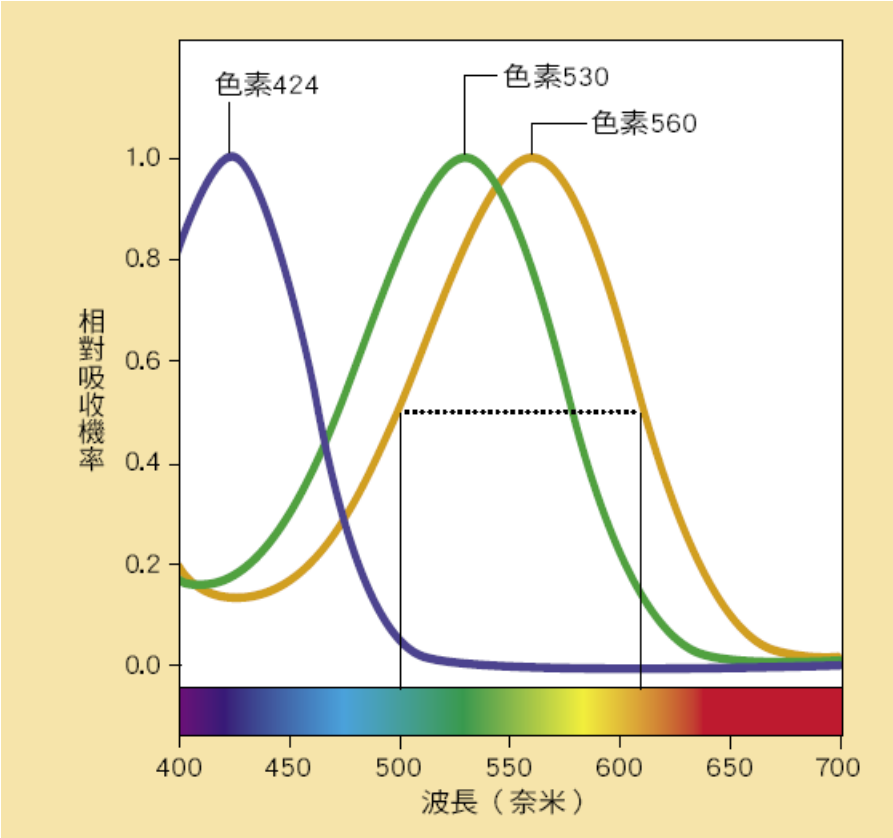


Some examples of color combinations that are easily seen by a color blind person are shown below. These are illustrated as text examples but these principles are most important to keep in mind when preparing drawings, graphs, and figures.




Trichromatic Vision
Dichromatic Vision
The text and backgrounds shown at left are redrawn in this column as they might appear to a colorblind person
Hues that are not seen as colored are O. K. with large brightness differences
Hues that are not seen as colored are O. K. with large brightness differences
Blues and Yellows also contrast well with bluish-greens and magenta
Blues and Yellows also contrast well with bluish-greens and magenta
Keep text large and BOLD. Avoid fine detail.
Keep text large and BOLD. Avoid fine detail.

三種錐色素是如何演化而來的？



其他動物也是利用三種錐色素來看顏色嗎？

錐細胞的演化故事

脊椎動物的色覺仰賴視網膜裡的錐細胞。我們現在知道，鳥類、蜥蜴、龜以及許多魚類都有四種錐細胞，但大多數的哺乳動物則只有兩種。

哺乳動物祖先的四種錐細胞一應俱全，但演化過程中的某個階段，牠們大都成了夜行性動物，因此色覺不再是生存所必須，於是就喪失了兩種錐細胞。

某些舊世界靈長類的祖先，包括人類的祖先，從剩下的兩種錐細胞，透過突變而得到了第三種錐細胞。

不過，大多數的哺乳動物依然只有兩種錐細胞。因此，就算將人類及其近親算在內，哺乳動物的色覺就是比鳥類差得多。

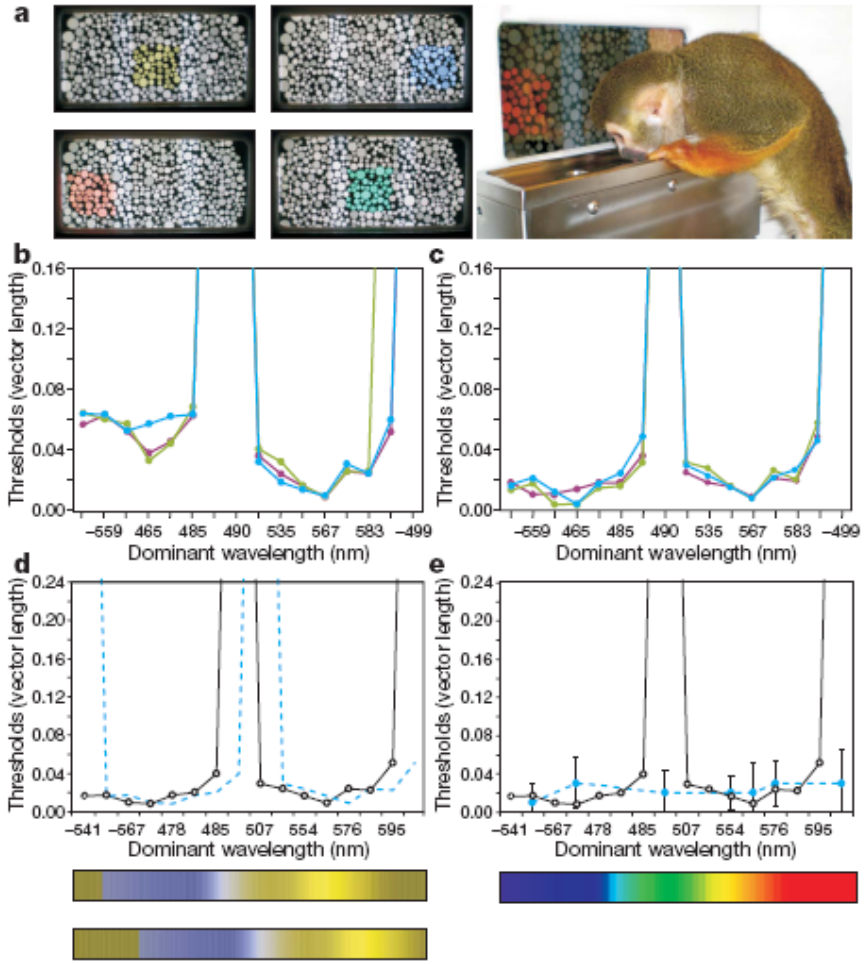
鳥類的優勢

nature Vol 461|8 October 2009|doi:10.1038/nature08401

LETTERS

Gene therapy for red–green colour blindness in adult primates

Katherine Mancuso[1], William W. Hauswirth[2], Qiuhong Li[2], Thomas B. Connor[3], James A. Kuchenbecker[1], Matthew C. Mauck[3], Jay Neitz[1] & Maureen Neitz[1]



顏色讓你錯覺了

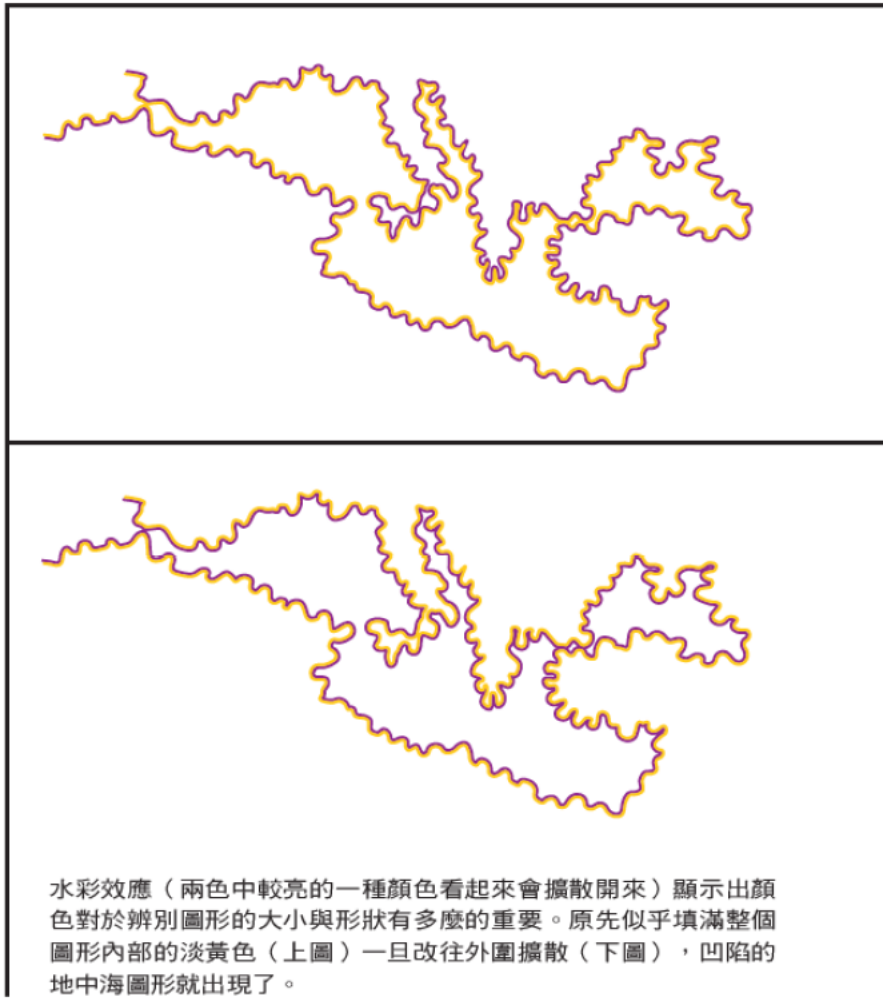
顏色所引發的錯覺，比線條錯覺更令人迷惑。最新的錯覺研究更發現，顏色與形狀、深度的知覺密不可分。

撰文 沃納（John S. Werner）、平納（Baingio Pinna）、斯皮爾曼（Lothar Spillmann）
翻譯 黃榮棋

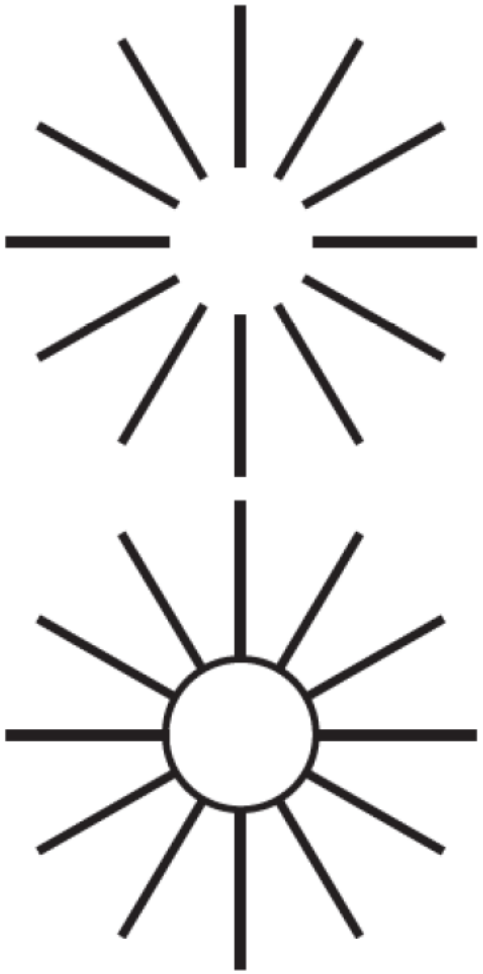
顏色與深度

泉水裡的秋葉與倒影，景象一旦變成黑白，許多深度與細節就不見了，凸顯出顏色對視覺的影響。

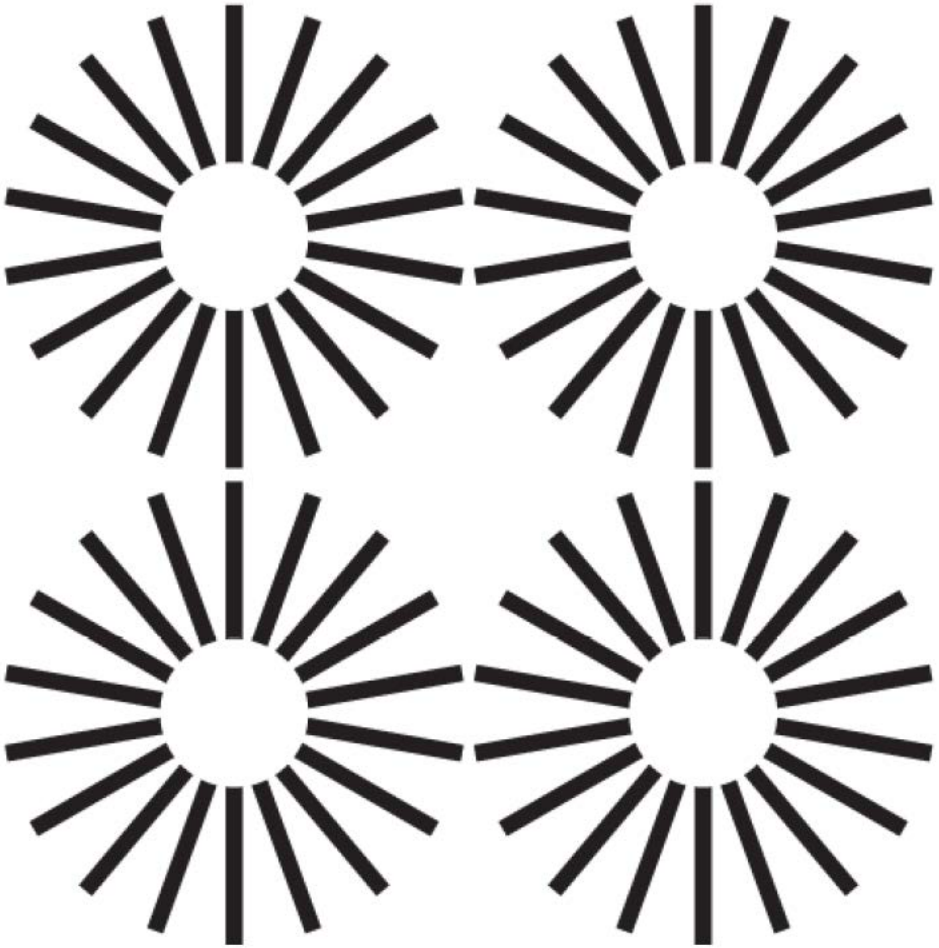
顏色與形狀



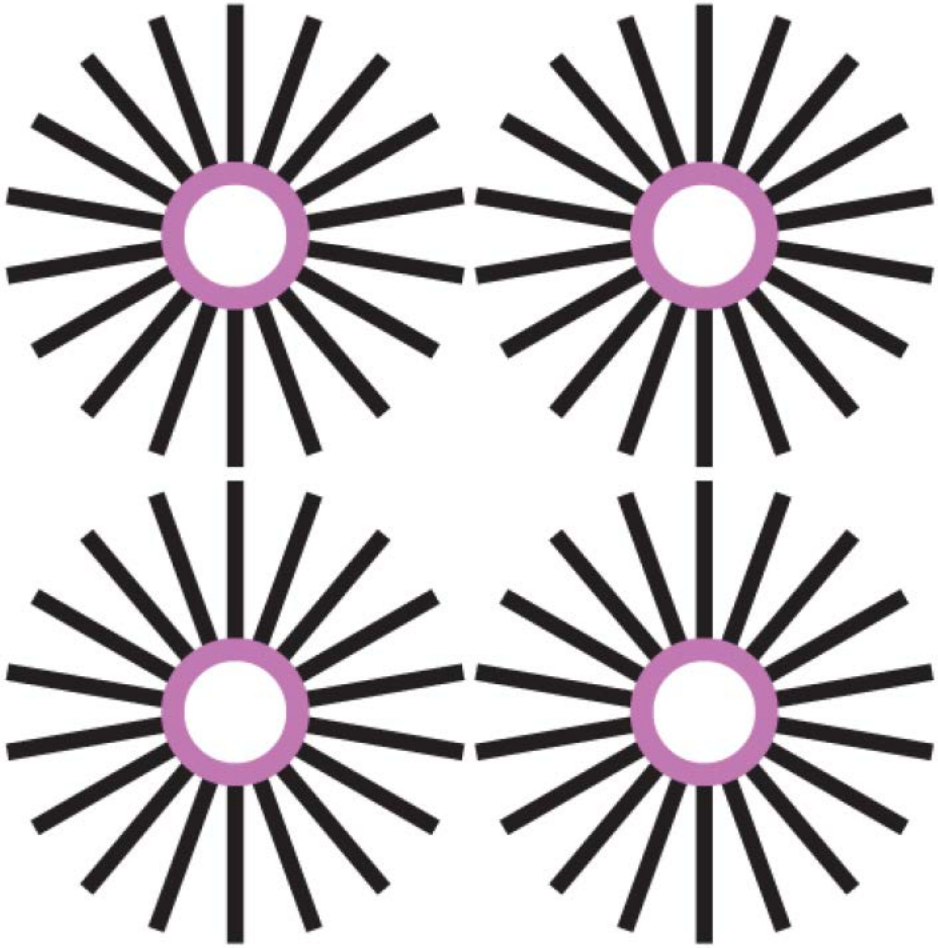
水彩效應（兩色中較亮的一種顏色看起來會擴散開來）顯示出顏色對於辨別圖形的大小與形狀有多麼的重要。原先似乎填滿整個圖形內部的淡黃色（上圖）一旦改往外圍擴散（下圖），凹陷的地中海圖形就出現了。



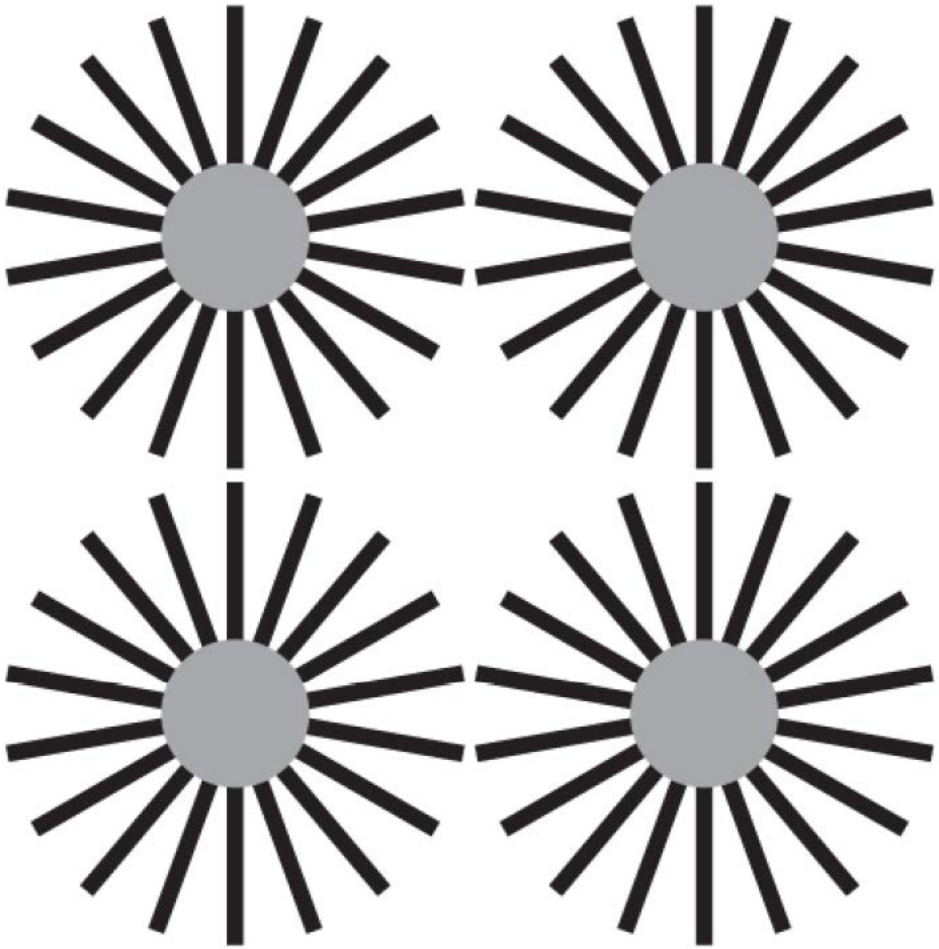
1941年德國心理學家耶蘭史坦所發現的「耶蘭史坦圖形」，為後來的錯覺研究提供了基礎。畫上圓圈（上圖下）之後，中央的明亮圓形錯覺就消失了。



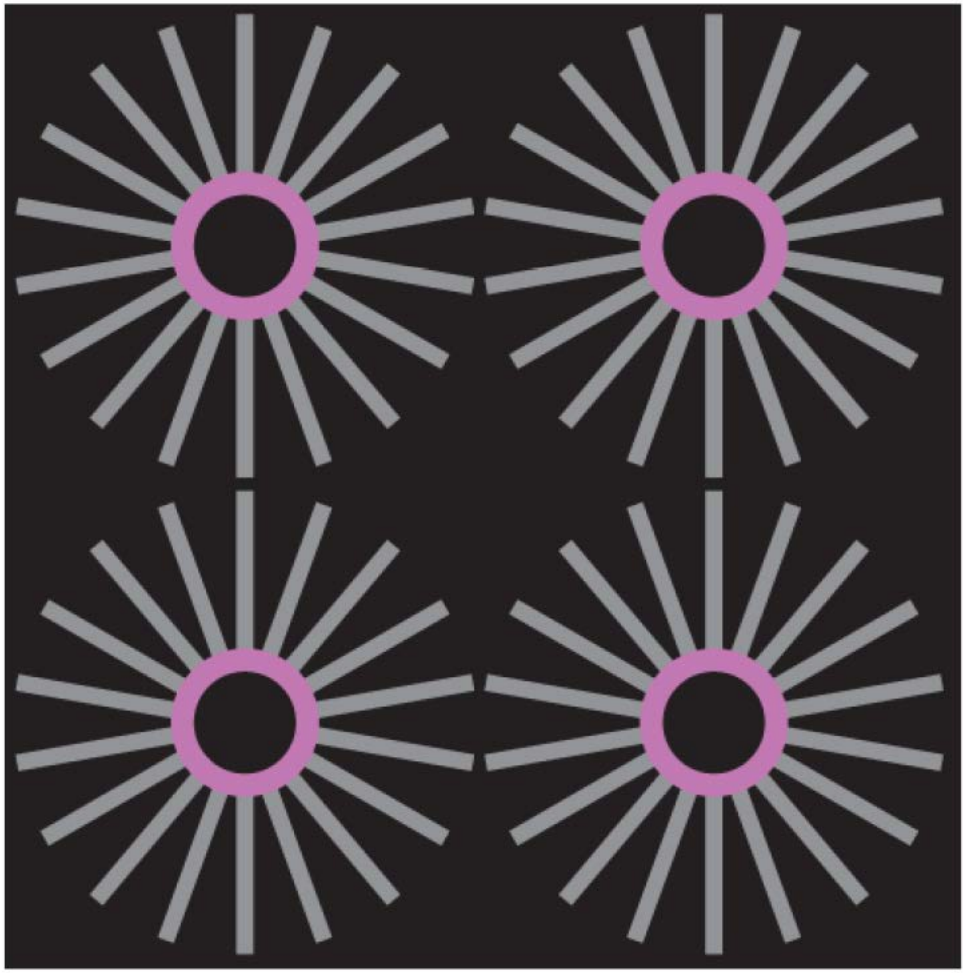
❶ 修改版的耶蘭史坦圖形，產生的錯覺更加強烈，中央的缺口會形成一個亮圓盤。



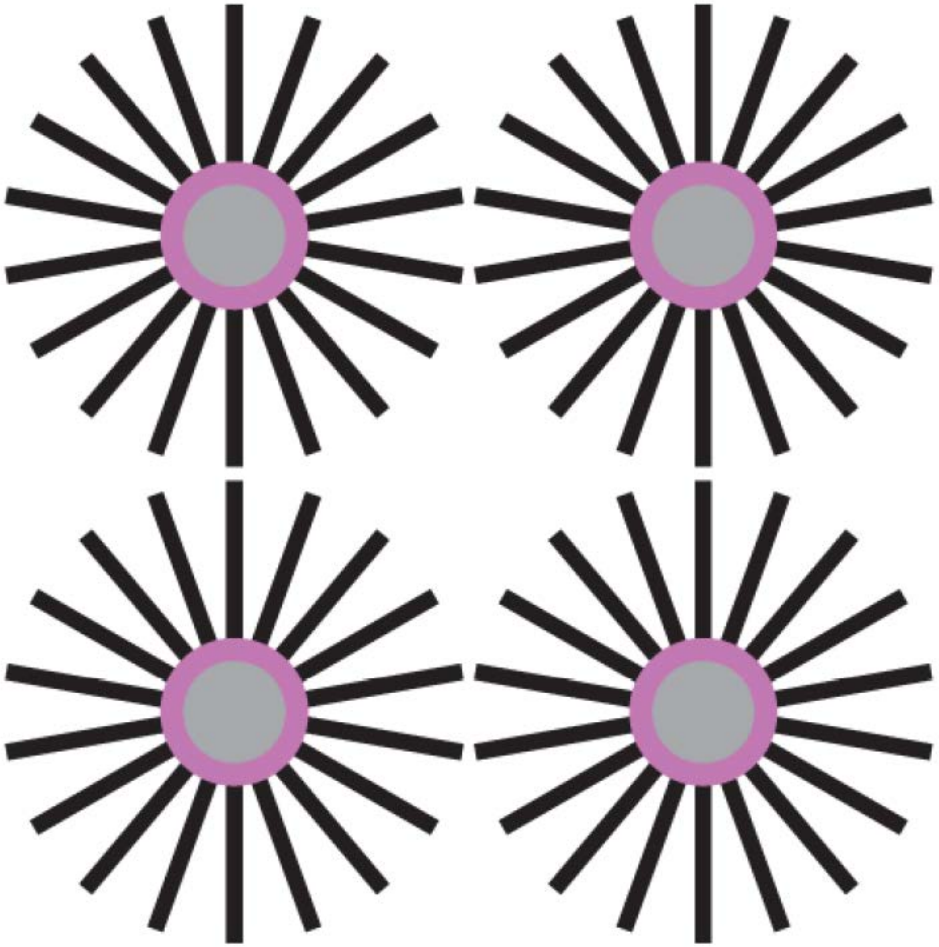
❷ 異常明亮誘覺：加入彩色圓環後，錯覺圓塊看來更為明亮。



❸ 閃爍光澤：填入灰色後，中央缺口的圓盤會微微閃爍。



❹ 異常黑暗誘覺：彩色環內的黑盤，看起來會比一樣黑的背景要黑得多。



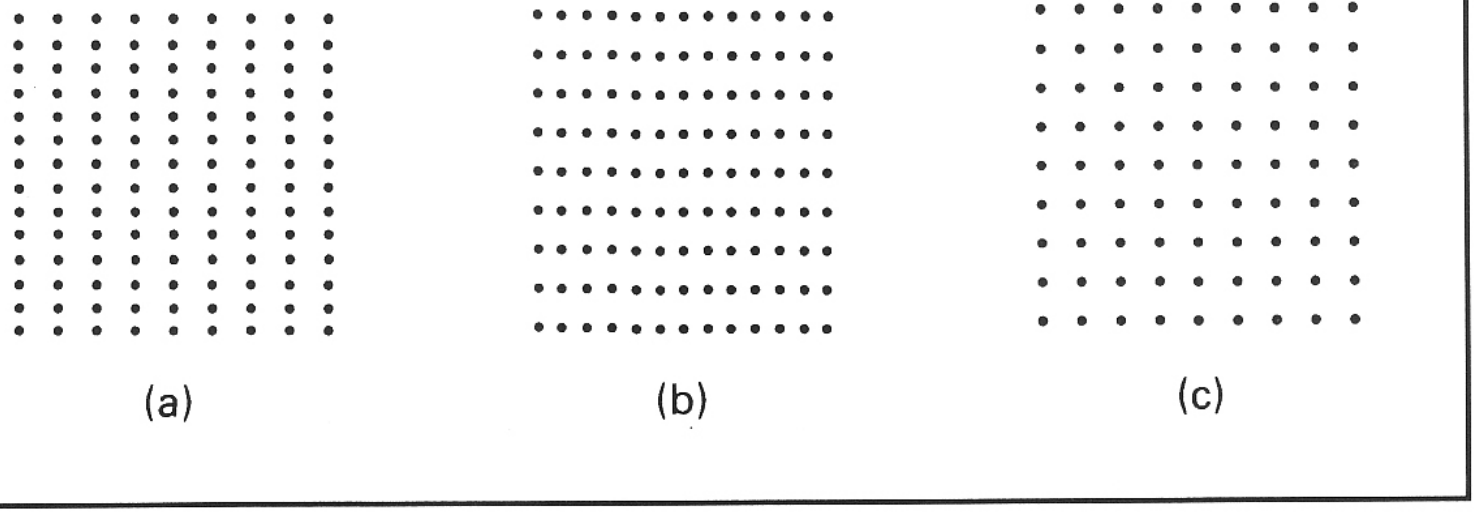
❺ 閃爍異常顏色對比：前後移動圖樣或眼睛時，紫色環內的灰盤看起來像是綠黃色的閃光燈。

視知覺的形成

Gestalt laws of organization

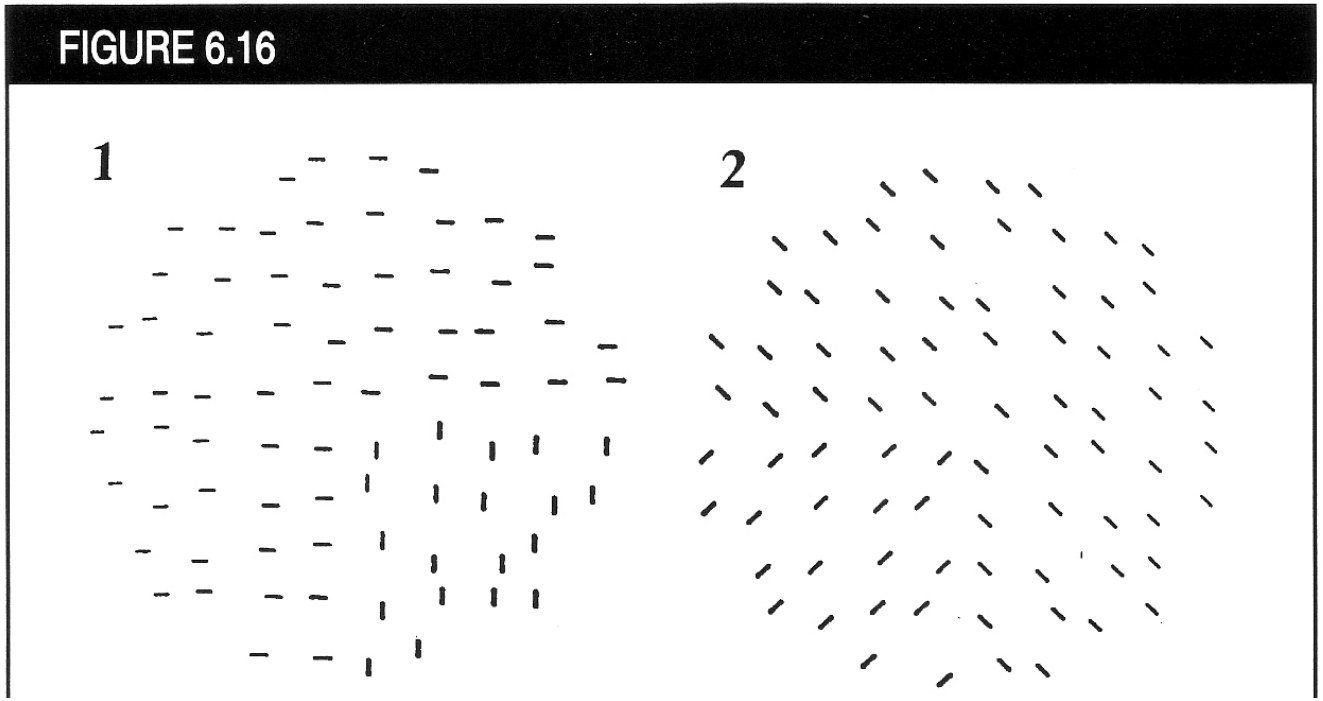
Proximity

FIGURE 6.8



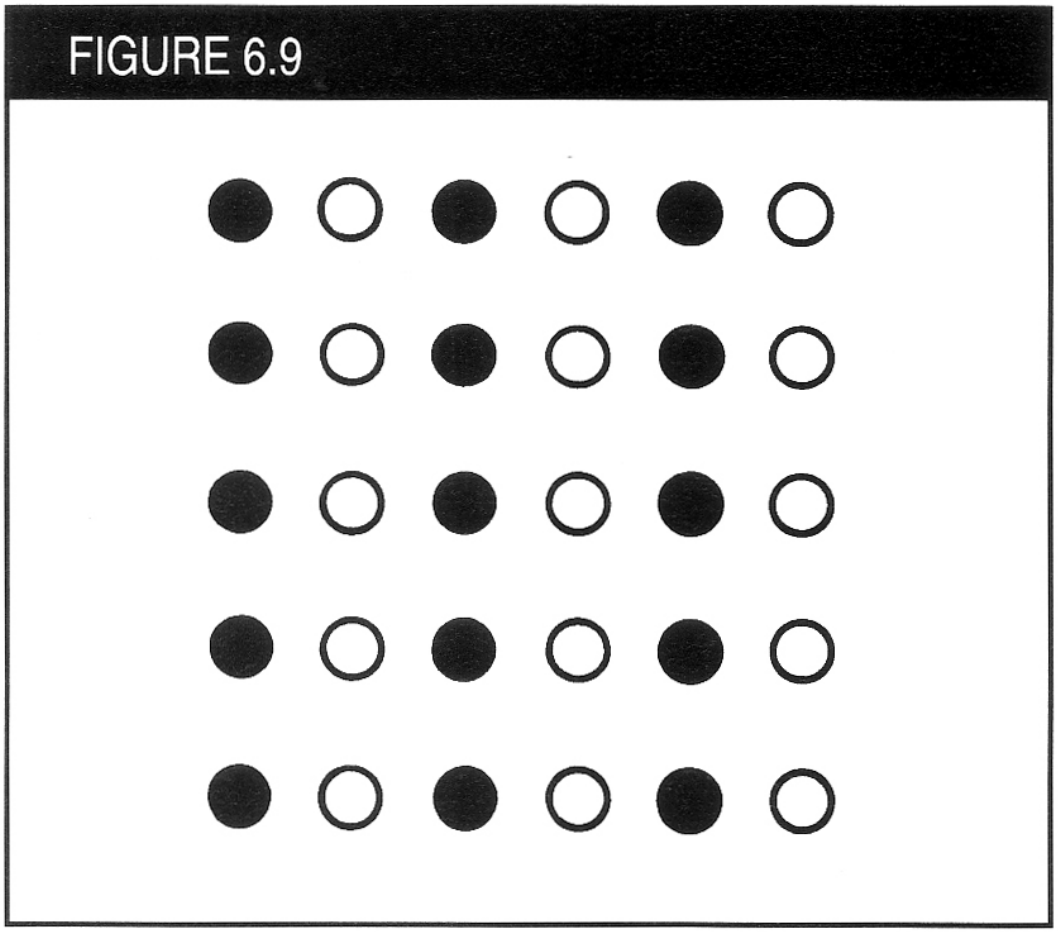
Gestalt laws of organization

Similarity



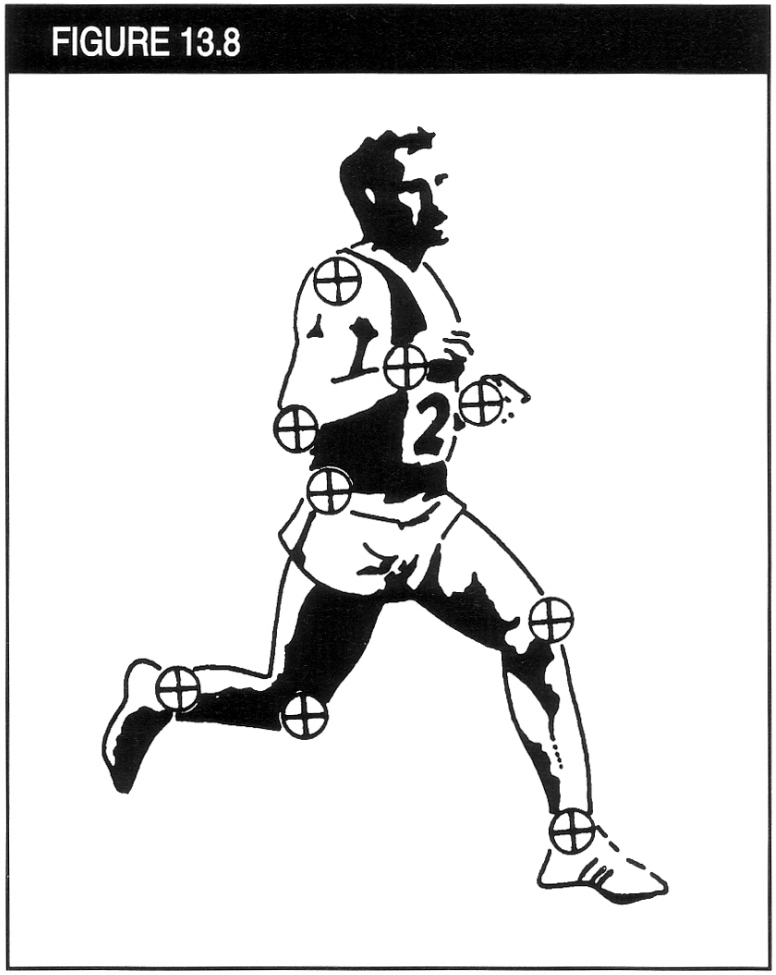
Gestalt laws of organization

Similarity override Proximity



Gestalt laws of organization

Common fate

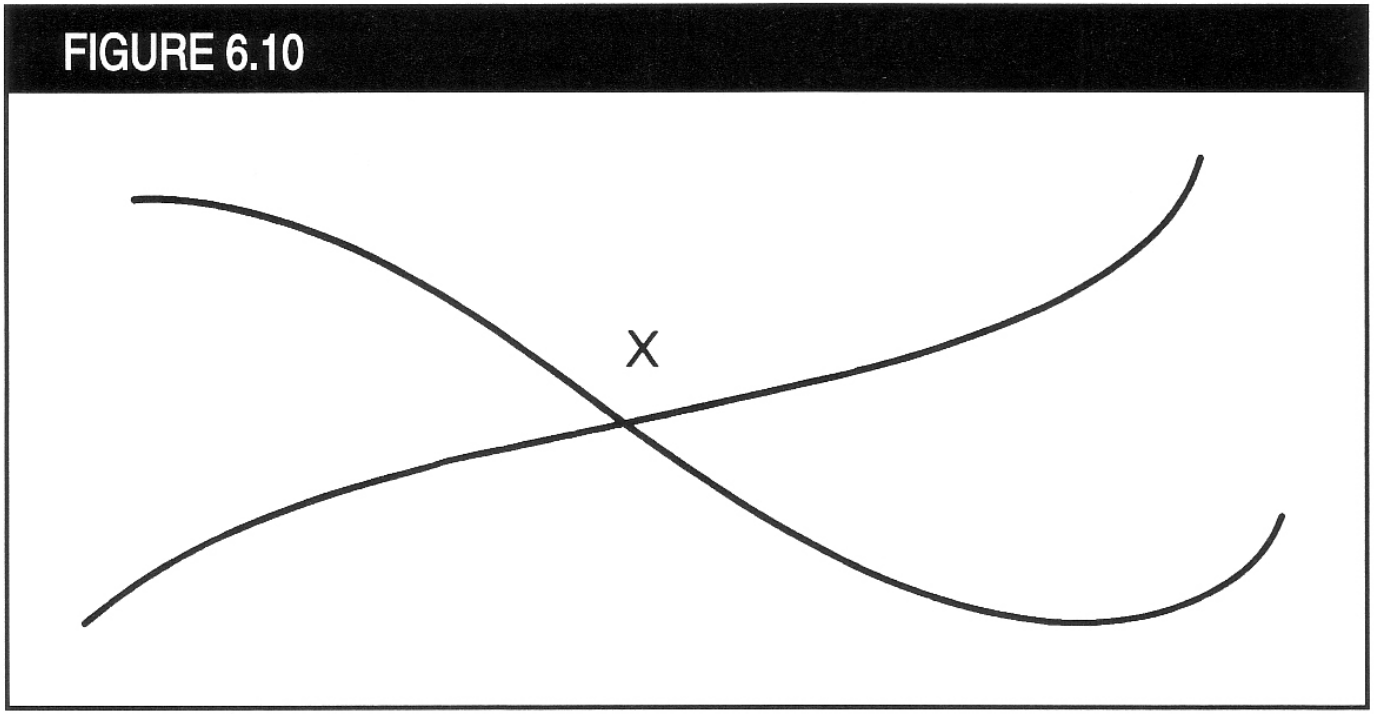


Walk

Move together,
group together

Gestalt laws of organization

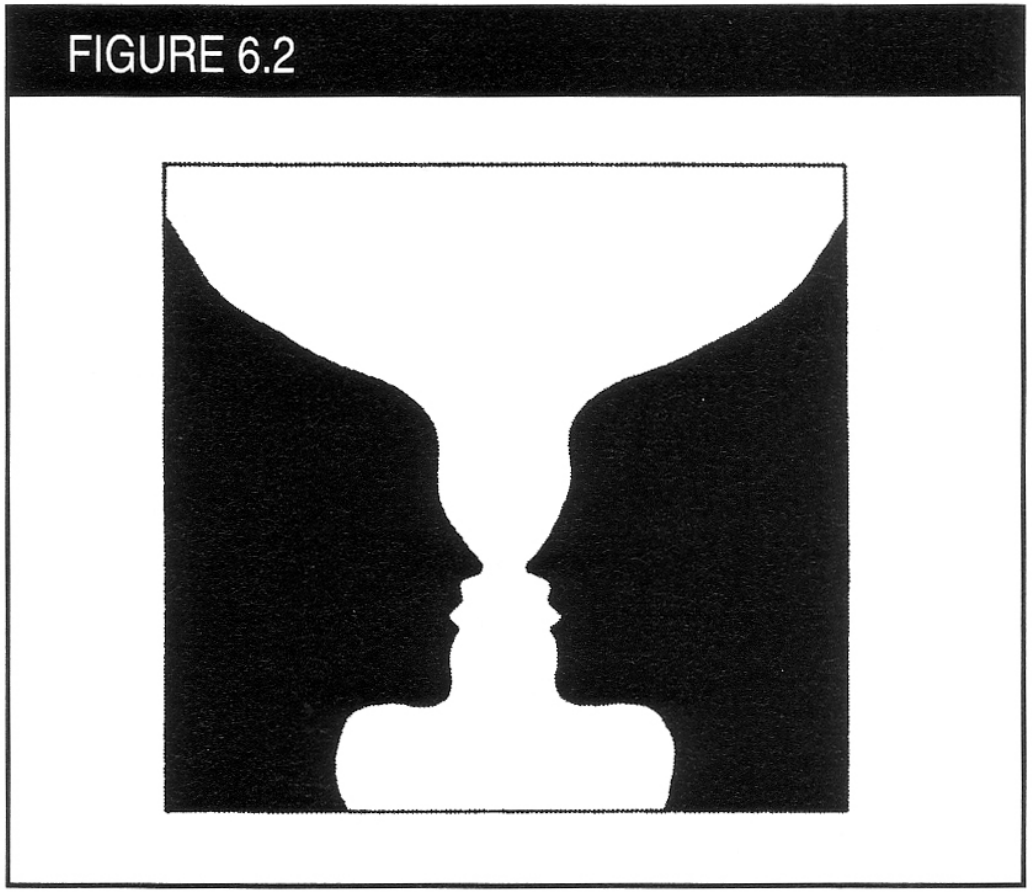
Good continuation



Tend to preserve smooth continuity rather than yielding abrupt changes

Gestalt laws of organization

Relative size, surroundedness, orientation, and symmetry

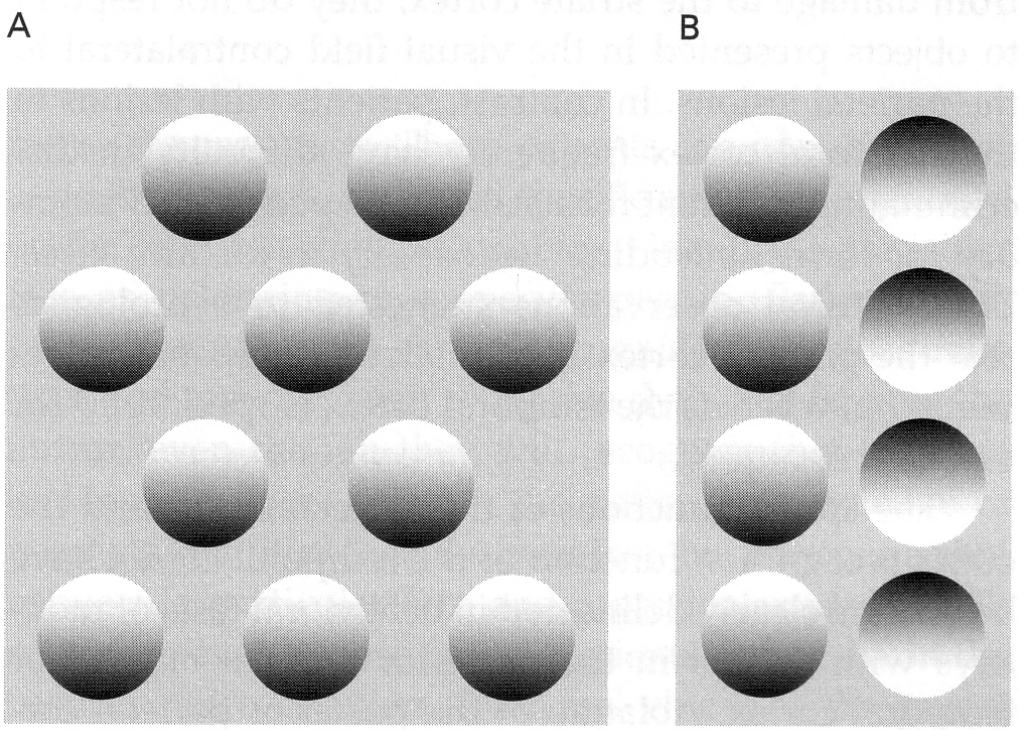


Ambiguous

一張照片兩種穩定知覺

Young lady & old lady

視知覺由大腦預設的前提決定



視知覺由情境決定

The same shape may be seen as an H in one context and an A in another (Selfridge, 1959)

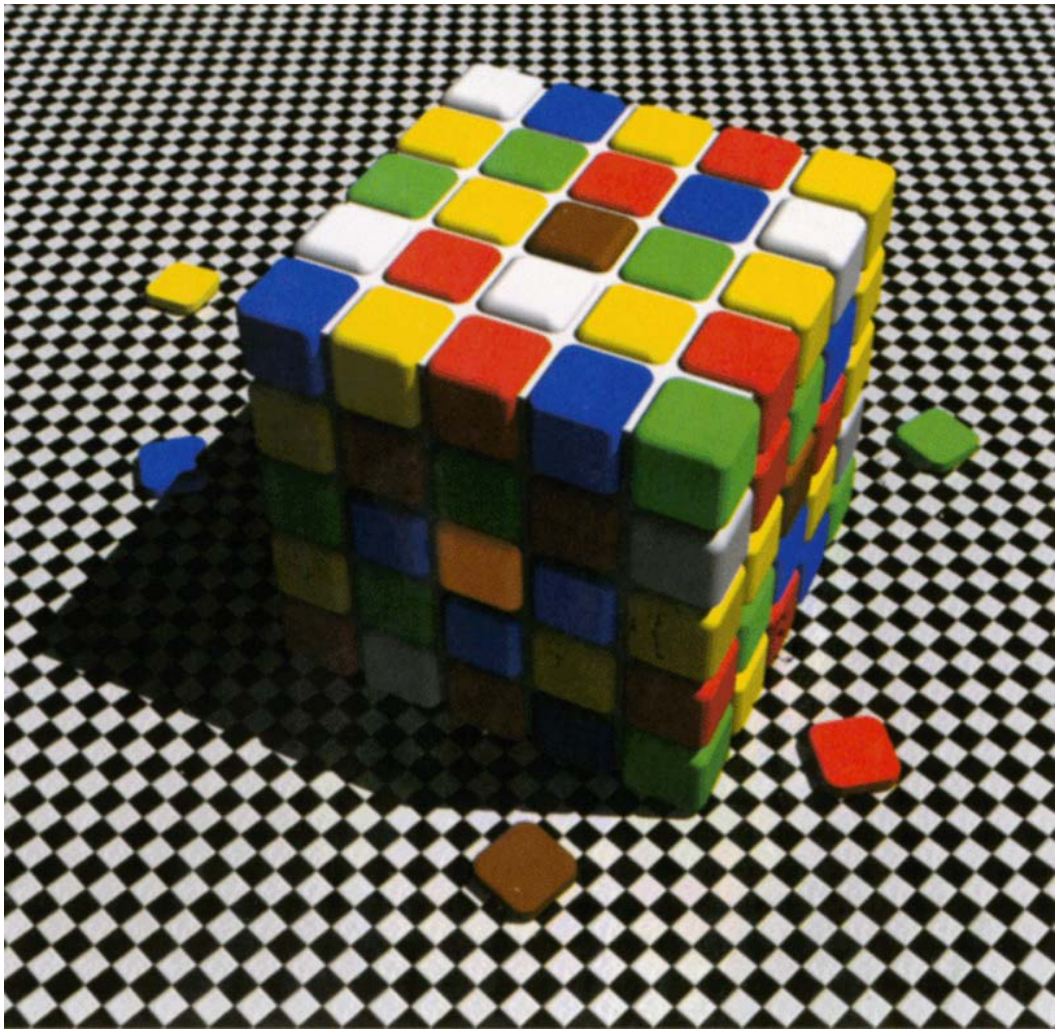
大小的恒常性

顏色的恆常性

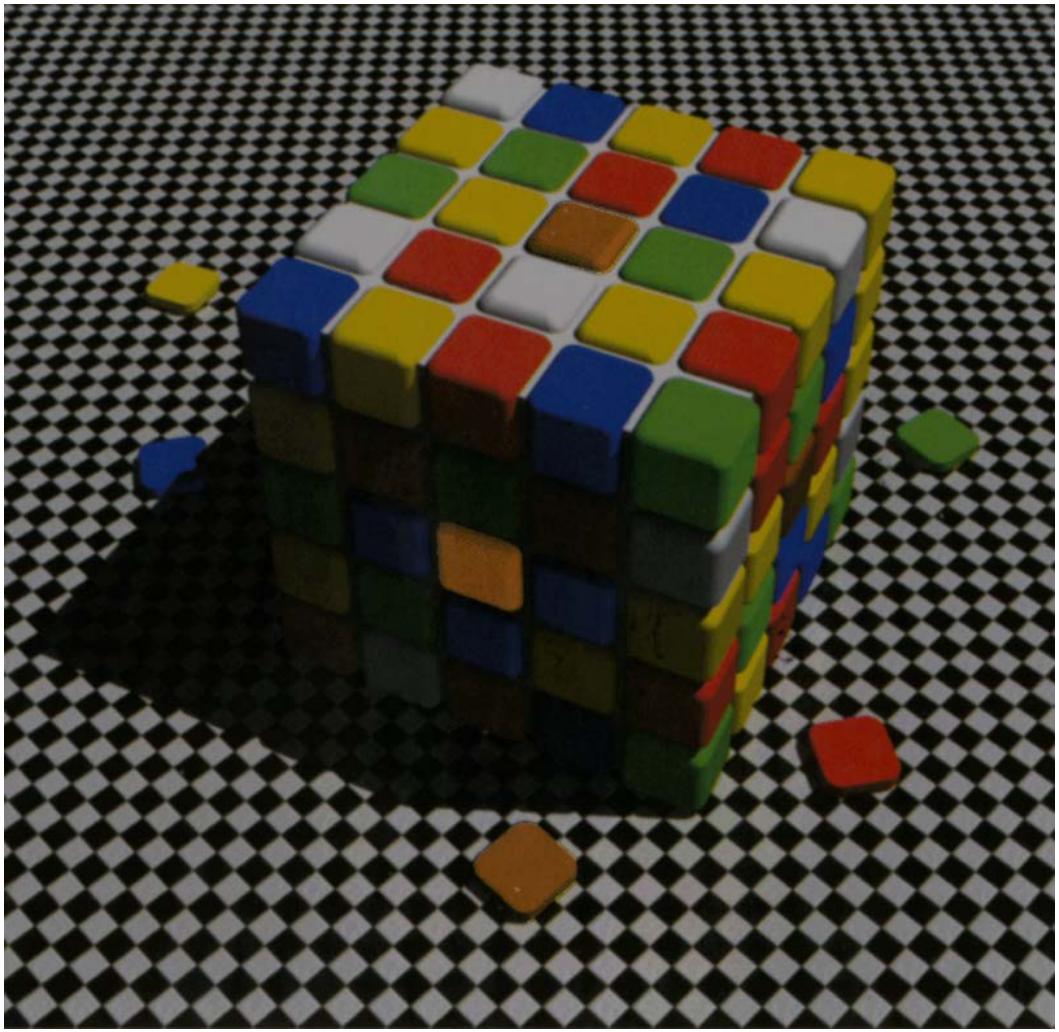
顏色的恆常性

顏色的恆常性

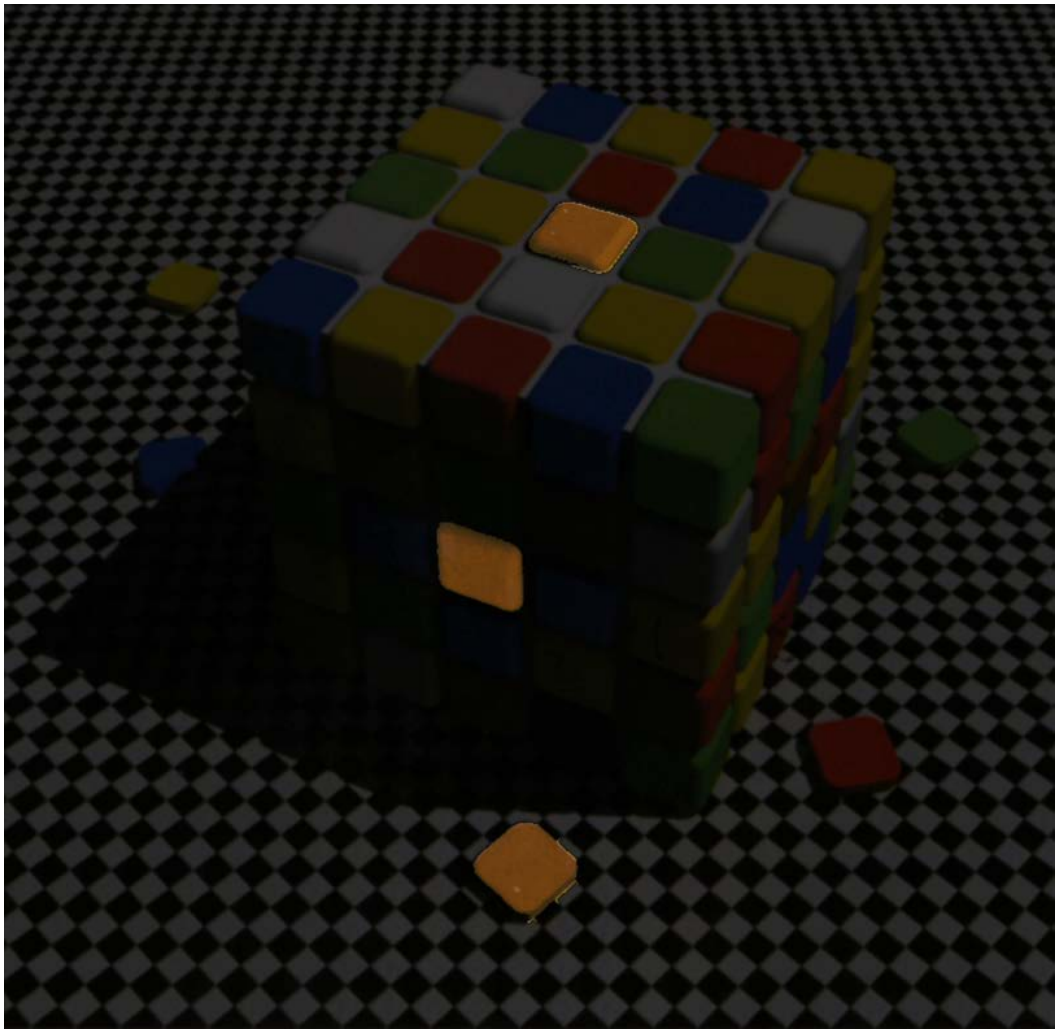
顏色由情境決定



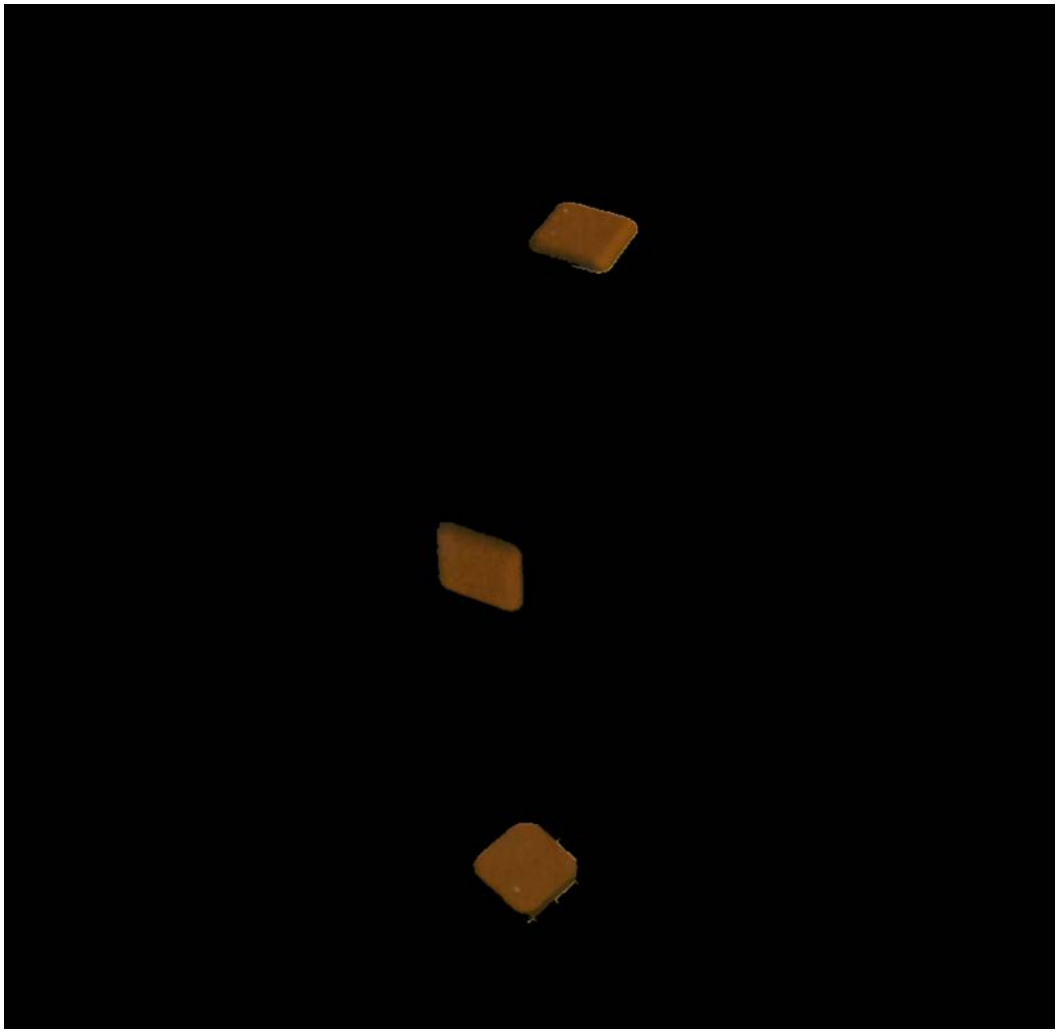
顏色由情境決定



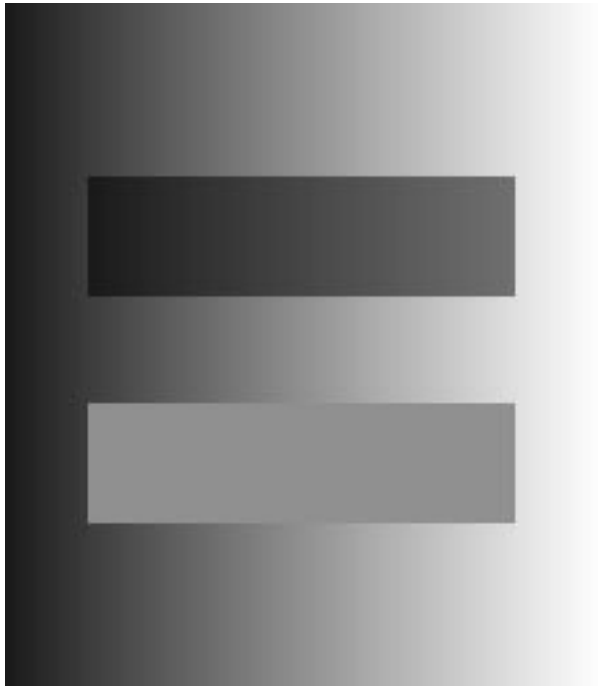
顏色由情境決定



顏色由情境決定

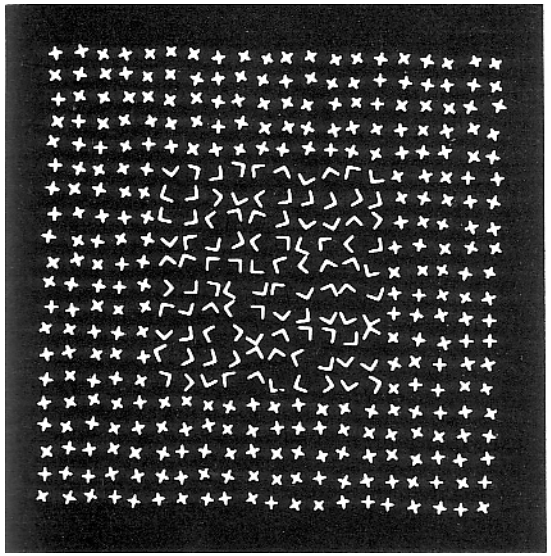


亮度由情境決定

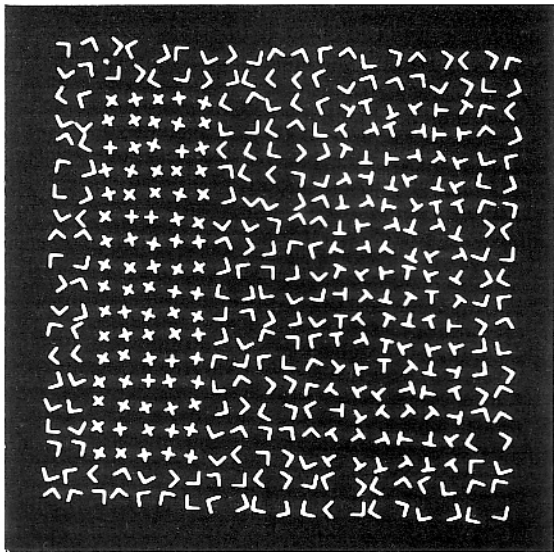


圖形分辨可依有無注意力參與分為兩種

Texture segregation



Preattentive



Attention based

注視（looking）與看到（seeing）不同
「改變視盲」

Change blindness I (Airplane)

Change blindness II (Market)

Change blindness III (Corner)

「改變視盲」（BBC brain story）

你是否注意到換人？

「不注意視盲」（BBC human senses）

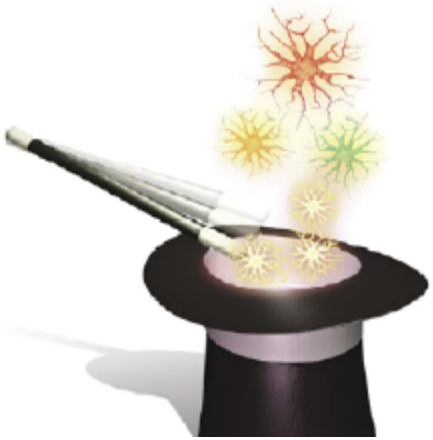
你是否看到黑猩猩？

「不注意視盲」

colour changing card trick

http://www.youtube.com/watch?v=voAntzB7EwE

魔術與大腦



數百年來，魔術師一直在測試並探索人類認知與注意力的極限，而神經科學家才正要開始。

撰文／馬蒂內茲－康德（Susana Martinez-Conde）、邁克尼克（Stephen L. Macknik）
翻譯／林雅玲

選擇視盲

請解釋「你的選擇」

在實驗中，科學家將兩兩一組的照片展示給受試者觀看（a），並要他們選出比較有吸引力的照片（b）。在每一次選擇之後，實驗者把照片蓋上（c），同時運用手法將某些被選擇的照片和被淘汰的調換。接著將這些照片翻開，要求受試者解釋為何如此偏好。即使這些選擇事實上是被淘汰的（d），很多受試者還是說得出為何做這些選擇。對於誤認為是自己所做的選擇，人們有一種合理化的衝動，會排擠他們對於真正選擇的記憶。

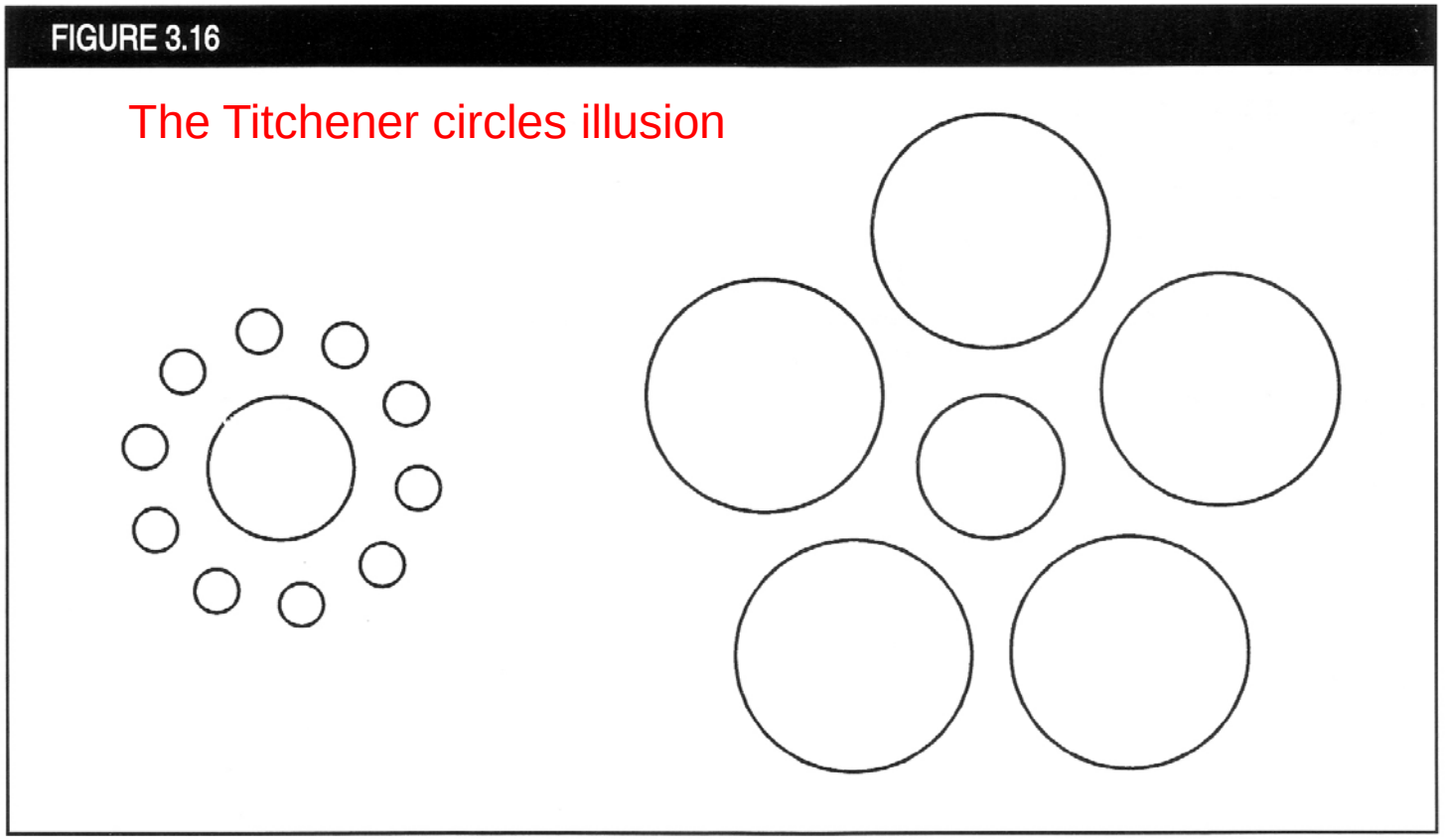
錯覺相關

大腦如何處理「不可能」？

在給實驗受試者觀看的魔術影片中，展示了不可能的因果關係，例如讓一顆球消失（上排圖），同時科學家利用功能性磁共振造影觀察受試者的大腦；對照組則是觀看一段極為相似的影片，但沒有呈現魔術手法（下排圖）。腦造影圖標示了彩色的地方（右側圖），是實驗組觀看魔術影片時額外引發的神經系統活動。

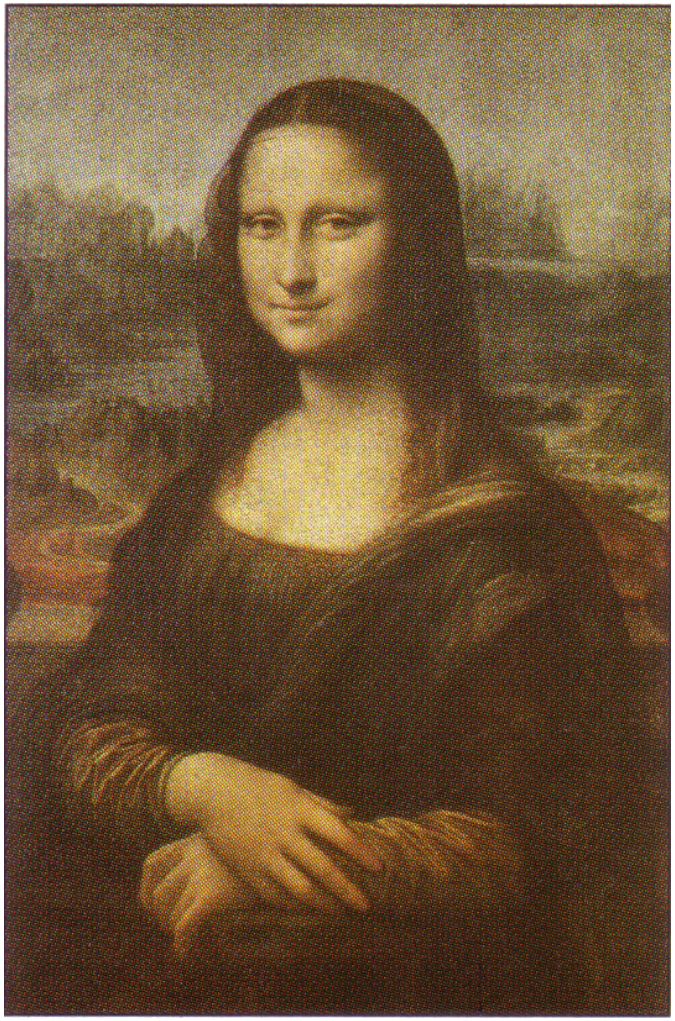
Two separate systems

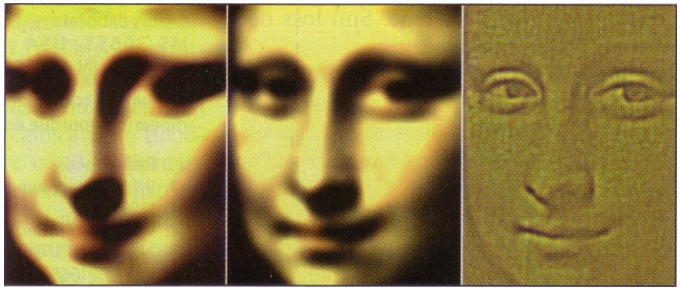
Visuomotor control vs. conscious visual awareness

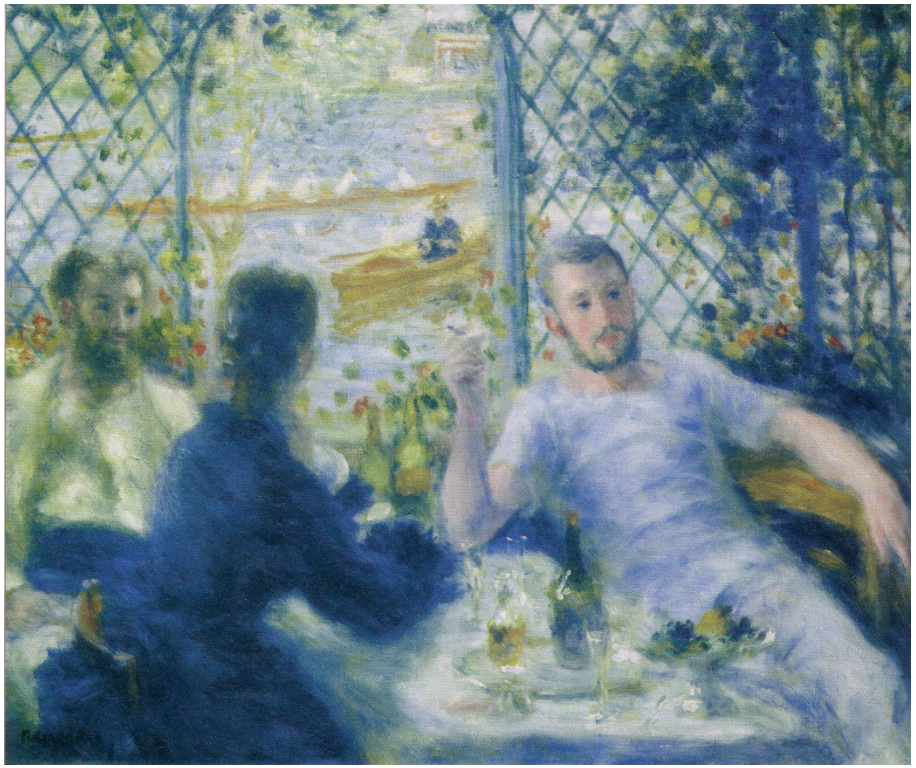


Grip aperture is less influenced by illusion

視覺與藝術







好書分享

色盲島 The island of the colorblind

作者：奧立佛・薩克斯

原文作者：Oliver Sacks

譯者：黃秀如

出版社：時報出版

出版日期：1999年04月26日

在南太平洋中有一個島嶼，那裏的原住島民
多半為先天性色盲，在他們單調的視覺下，
還發展出另一套看待世界、辨別事物的方法

腦內藝術館:探索大腦的審美功能 Inner vision : an exploration of art and the brain

作者：塞莫・薩基

原文作者：Semir Zeki

譯者：潘恩典

出版社：商周出版

出版日期：2001年07月12日

視覺對於人類來說，究竟有什麼意義呢？作者在本書中提出一個解釋：視覺的演化是基於人類對於物體本質的探索。但是這對人類的藝術又造成了什麼樣的影響？藝術的存在也是人類對於本質探索的產物，在藝術創造的過程中，人類得以保留事物原有的本質，供以後的人一眼就可以辨認出藝術家所要表達的主題及特色。