

There are only two ways of reaching knowledge of a machine: one is that the master who made it should show us its construction; the other is to dismantle it down to its smallest springs and examine them separately and together.

The brain being a machine, we cannot hope to discover its construction in any other way than those by which we discover the construction of other machines. There is then nothing to do but what is done with all other machines: I mean, to dismantle piece by piece all its springs, and consider how they can act separately and together.

Nicolaus Steno *Discours sur l'anatomie du cerveau* 







Tatsuji Inouye (1880-1976)

Visual Disturbances Following Gunshot Wounds of the Cortical Visual Area

Based on observations of the wounded in the recent Japanese Wars

by Dr Tatsuji Inouye











Sincich, Adams & Horton (2003)















Sir David Ferrier

Lesions that caused blindness

David Hubel and Torsten Wiesel





Movshon and Newsome, 1996



Movshon, Adelson, Gizzi & Newsome, 1985









Gratings, plaids, and coherent motion







Movshon et al., 1985











Simoncelli & Heeger, 1998






















## South Korea I, Switzerland 0













Local and global motion signals



Local and global motion signals



Local and global motion signals



























Hubel & Wiesel, 1962





## South Korea 2, Switzerland 0











## Direction-interaction: Gratings Direction 2 Direction 1


## Direction-interaction: One common component



















## Gain control in V1: the untuned component

















## *MT functional model: the characterization stimulus*















Performance of the MT functional model







## Recovered elements of the MT functional model











Contributions of model components






























## Contribution of tuned normalization













## South Korea 3, Switzerland 0



## Lord Adrian of Cambridge (1889–1977).

Some of Adrian's first recordings from very small numbers of individual nerve fibres. Each spiky deflection is a single nerve impulse. These records were taken from the sensory nerves of a cat's toe. The toe was flexed slowly, more quickly and very rapidly to produce these three traces. The frequency of firing depends on the strength of the stimulus – Adrian's law.







Figure 6. The psychophysical effects of an ibotenic acid injection into MT in experiment w1. Solid line and error bars in A-D indicate the mean prelesion threshold and standard deviation for each condition tested; dashed line, postlesion thresholds obtained 24 hr after the MT injection. A, Motion thresholds for 5 different spatial intervals in the test (contralateral) hemifield. Again, the MT lesion caused striking elevations of motion thresholds in the test hemifield. B, Motion thresholds were within the normal range in the control (ipsilateral) hemifield. C, The MT injection had no effect on contrast thresholds in the test hemifield.









## Coherence controls visibility















![](_page_139_Figure_0.jpeg)

![](_page_140_Figure_0.jpeg)

![](_page_141_Figure_0.jpeg)

![](_page_142_Figure_0.jpeg)

![](_page_143_Figure_0.jpeg)






















COLUMNAR ORGANIZATION OF MT IN MACAQUE

Albright, 1984











Salzman, Murasugi, Britten and Newsome, 1992







































## Two choice stimuli, one easy and one difficult









Gold and Shadlen, 2000












## What MT doesn't do



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## Two neural correlates of consciousness

## Ned Block

Opinion

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- Activation of MT/V5 occurs during motion perception [10].
- Microstimulation to monkey MT while the monkey viewed moving dots influenced the monkey's motion judgements, depending on the directionality of the cortical column stimulated [11].
- Bilateral damage to a region that is likely to include MT/V5 in humans causes akinetopsia, the inability to perceive and to have visual experiences as of motion [12,13].
- The motion after-effect a moving afterimage occurs when subjects adapt to a moving pattern and then look at a stationary pattern. These moving afterimages also activate MT/V5 [14].
- Transcranial magnetic stimulation (TMS) applied to MT/V5 disrupts these moving afterimages [15].
- MT/V5 is activated even when subjects view 'implied motion' in still photographs, for example, of a discus thrower in mid-throw [16].
- TMS applied to visual cortex in the right circumstances causes phosphenes – briefflashes of light and color [17]. When TMS is applied to MT/V5, it causes

The core Phenomenal NCC for the visual experiential content as of motion:

subjects to experience moving phosphenes [18].

















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