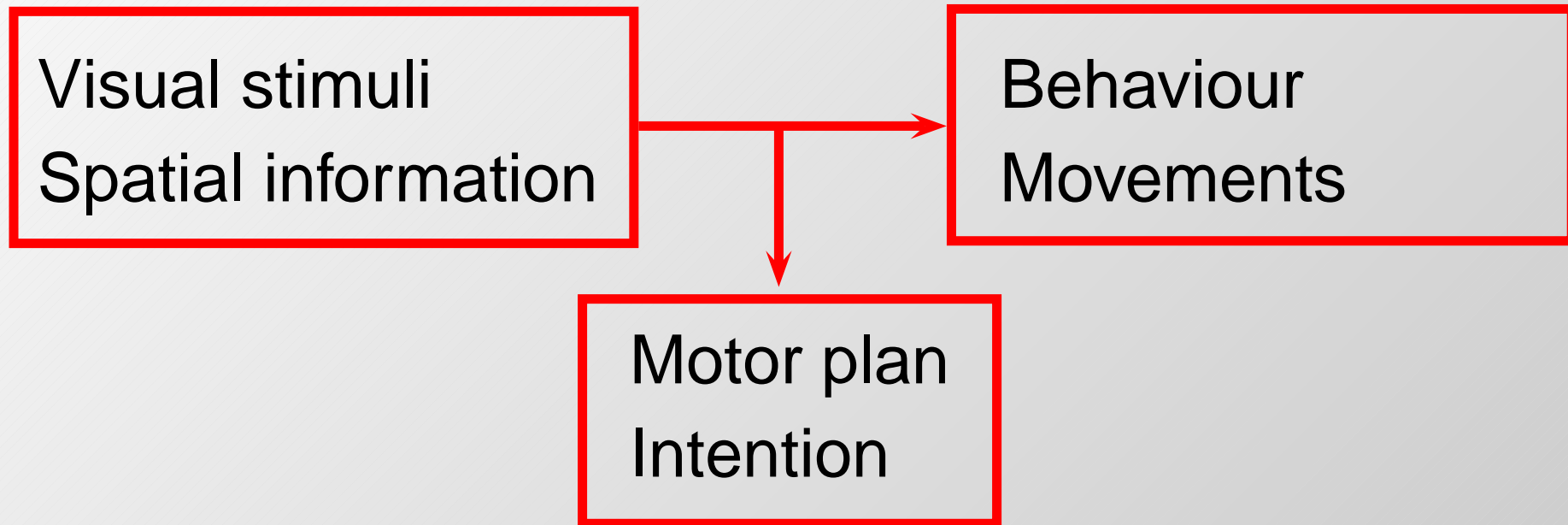

Coding of intention in the posterior parietal cortex

L.H. Snyder, A.P. Baptista, R.A. Andersen

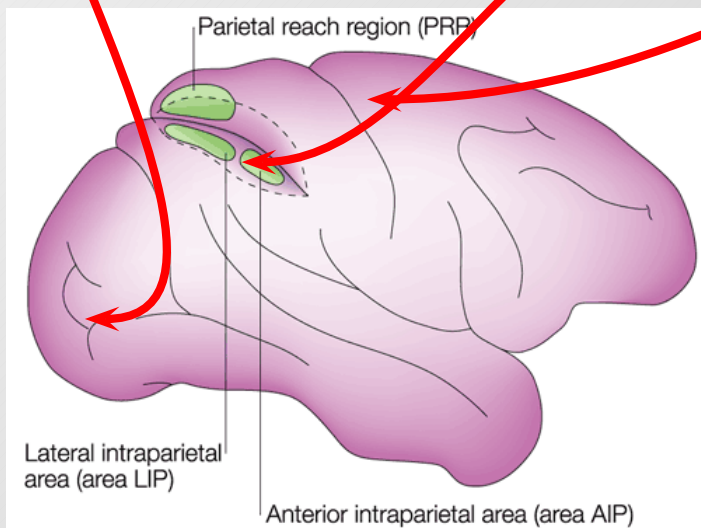
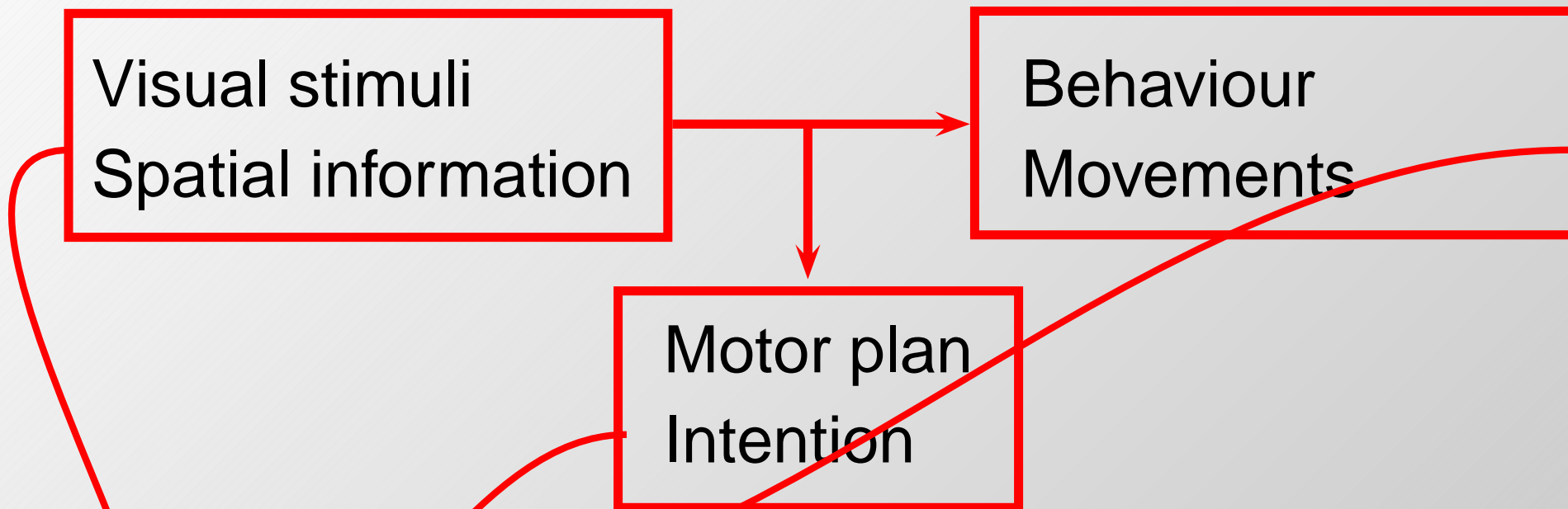
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Visual attention or intention of making movements?

Experiment 1: 'Interleaved delay-saccades and delay reach trials'

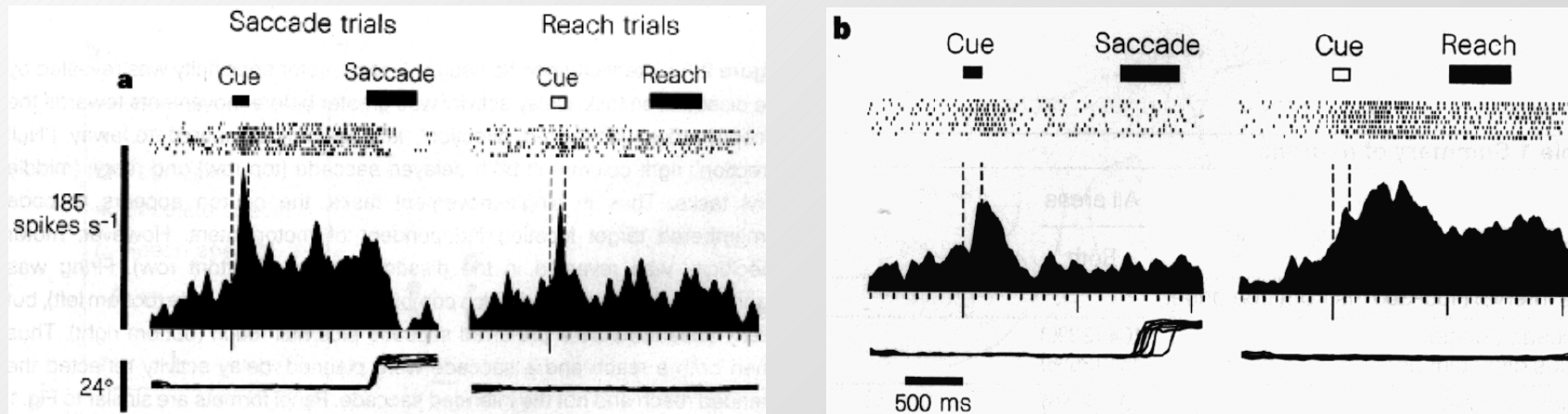
- 2 adult macaque monkeys, 3 hemispheres (652 neurons)
- array of 9 buttons (8 directions) containing one green LED and one red LED

red => saccade

green => reach

- 8 trials in each of eight directions
- starting point: fixation and depression of the illuminated central button
- after 750 ms: illumination of a peripheral LED (150 ms)
- after 1-1.6 s delay: central LED extinguished **saccade or reach**

Experiment 1: 'Results'



- **Delay activity:** 68% motor-intention specific
 - 21% modulated before eye but not arm movements
 - 47% modulated before arm but not eye movements
- **Cue interval:** 44% intention specific => activity for movements without delay

Dissociation task

32% of cells don't show specificity for saccades compared to reaching movements

Delayed or even entirely unexecuted plans for movements may influence firing in the Lateral Intraparietal (LIP) area

Dissociation task

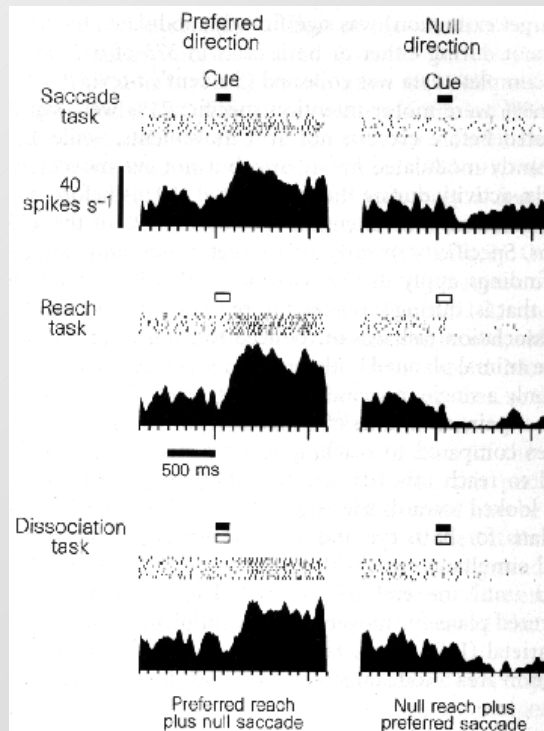
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Dissociation task:

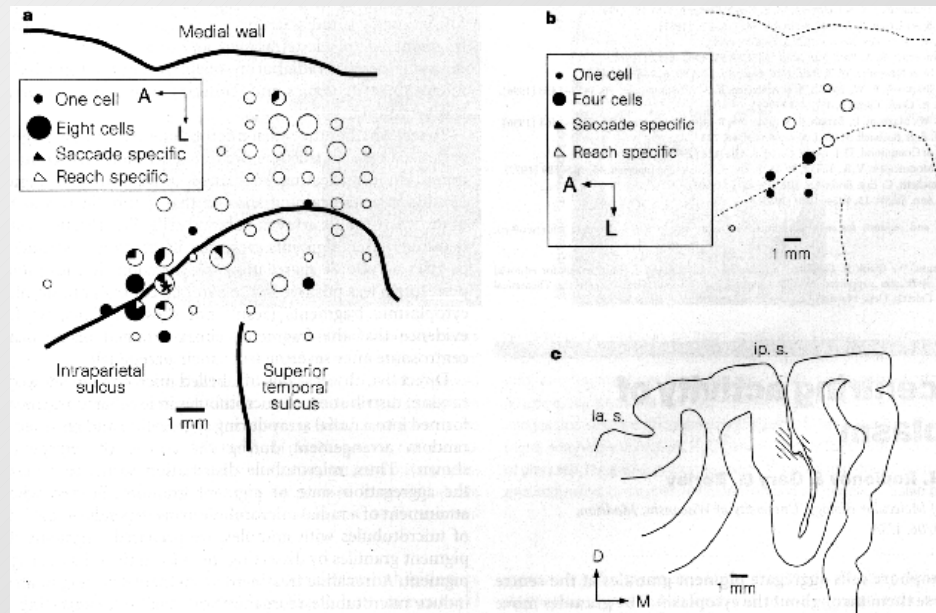
eliminates plans for movements that will not be executed by explicitly instructing eye and arm movements in opposite direction

Experiment 2: 'Results'



- **Delay activity:** 84% motor-intention specific
 - 23% modulated before eye but not arm movements
 - 61% modulated before arm but not eye movements
- **Cue interval:** 63% intention specific

Anatomical segregation



- *Middle third of the longitudinal extent of the intraparietal sulcus:* intended-**eye**-movement cells » intended-**arm**-movement cells (5:1)
- *Area medial and posterior to LIP:* intended-**arm**-movement cells » intended-**eye**-movement cells (9:1)

Conclusions

Separated intended-reach intended-saccade pathways in the PPC

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PPC firing reflects the decision of the animal regarding what to do with the stimulus

What about attention?

Attention can be encoded:

- by the small number of cells that are not specific for one type of movement
- in the non specific cue responses of the cells that are movement specific in the delay period
- in the weak response of some specific neurons before their non preferred movement

Final remarks

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1. Non specific neurons may reflect plans for moving body parts other than eyes or arms
2. Coupling of saccade and reach activity: these movements are often coupled, there could be defaults plans erased by the task
3. These experiments are consistent with previous experiments in area LIP...

... Delayed double saccade

The animal memorized two flashed locations and then, after a delay, saccaded to them sequentially

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Predictive behaviour

- Sensory remapping of a remembered stimulus
- Motor-planning hypothesis for LIP