

Parkinson's disease in Action

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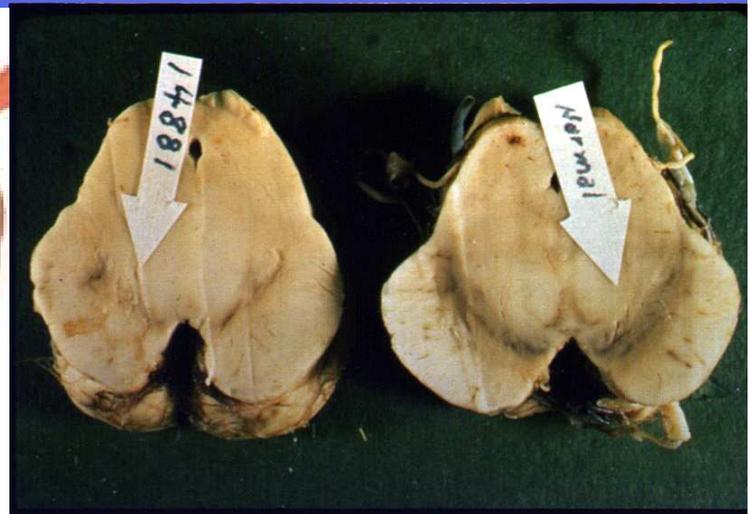
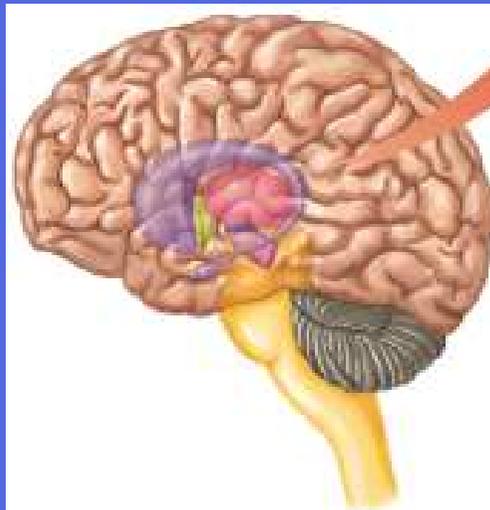


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Parkinson's Disease

- 1 in 100 over 65s
- Bradykinesia
- Rigidity
- Tremor
- Also cognitive problems



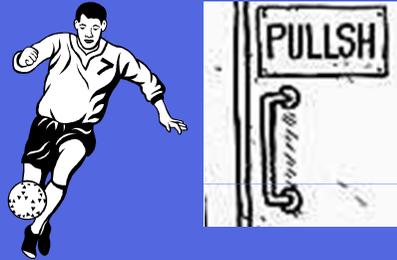
Moving and the Environment

- Internal v. external movements
- Detrimental - 'Freezing' – edges of doorway
- Beneficial - Paradoxical movement
- Schneider et al. (1987) described a patient *“who dangled a glasses case in front of himself on a string which reached the floor. He took a step with each forward swing of the glasses case, and this seemed to improve his gait. Without the device, he had enormous difficulty initiating a step.”*



Overview of talk today

1. Observing and evoking actions in Parkinson's
How does Parkinson's affect perception of actions?

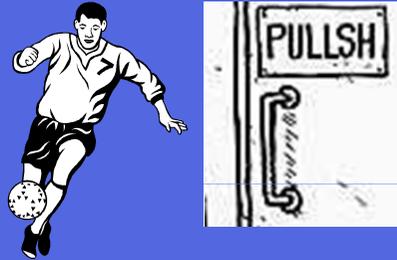


2. Gym training in Parkinson's
Can exercise improve symptoms of Parkinson's?



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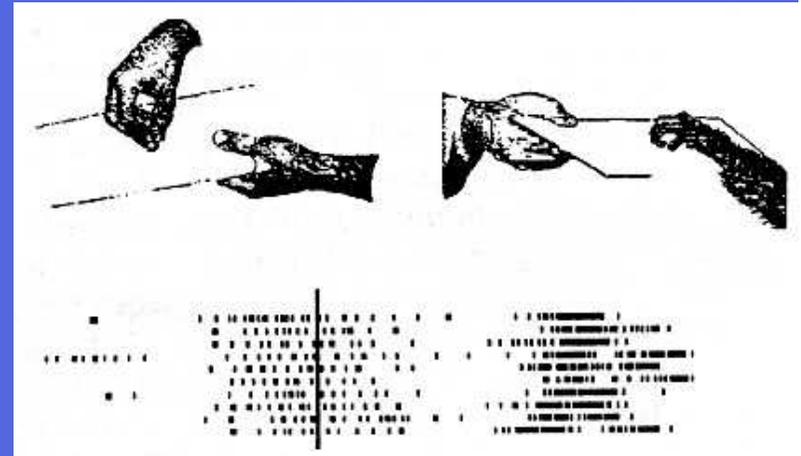


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Observing actions

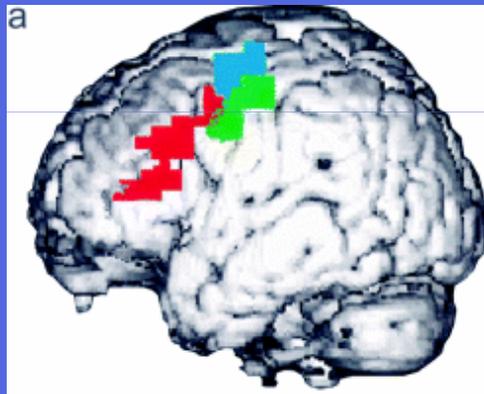
- Mirror Neurons observed in primates (Rizzolatti et al, 1996; Gallese et al, 1996)



Red = mouth

Green = hand

Blue = foot



- Neurophysiological: Somatotopic activation of pre-motor cortex (Buccino et al, 2001).

- Behavioural: Faster responses when observed and executed movements match (Brass et al, 2000, 2001).

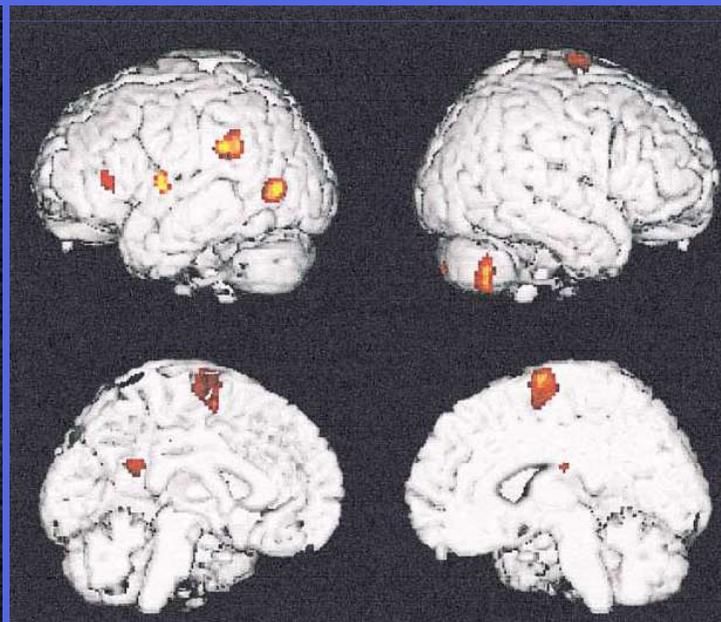


Action relevant objects – ‘Affordances’

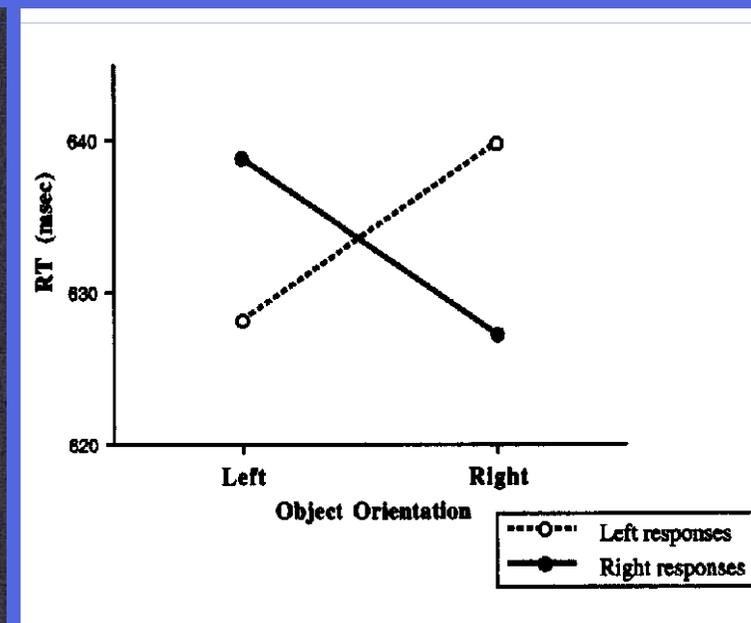


Viewing graspable objects

- activates sensorimotor brain areas
- Potentiates responses to the hand to which it is oriented



(Grezes & Decety, 2002)



(Tucker & Ellis, 1998)

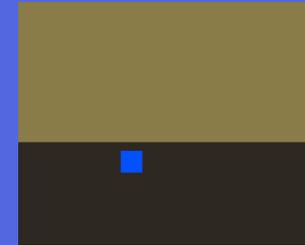
Our Study

Does Parkinson's disease affect how patients....

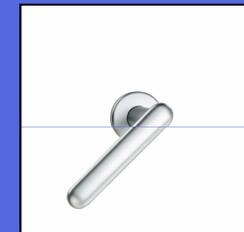
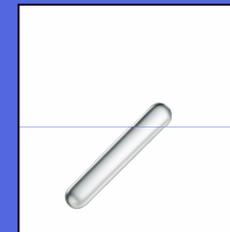
1. Observe the actions of others?

Control

Action-Relevant



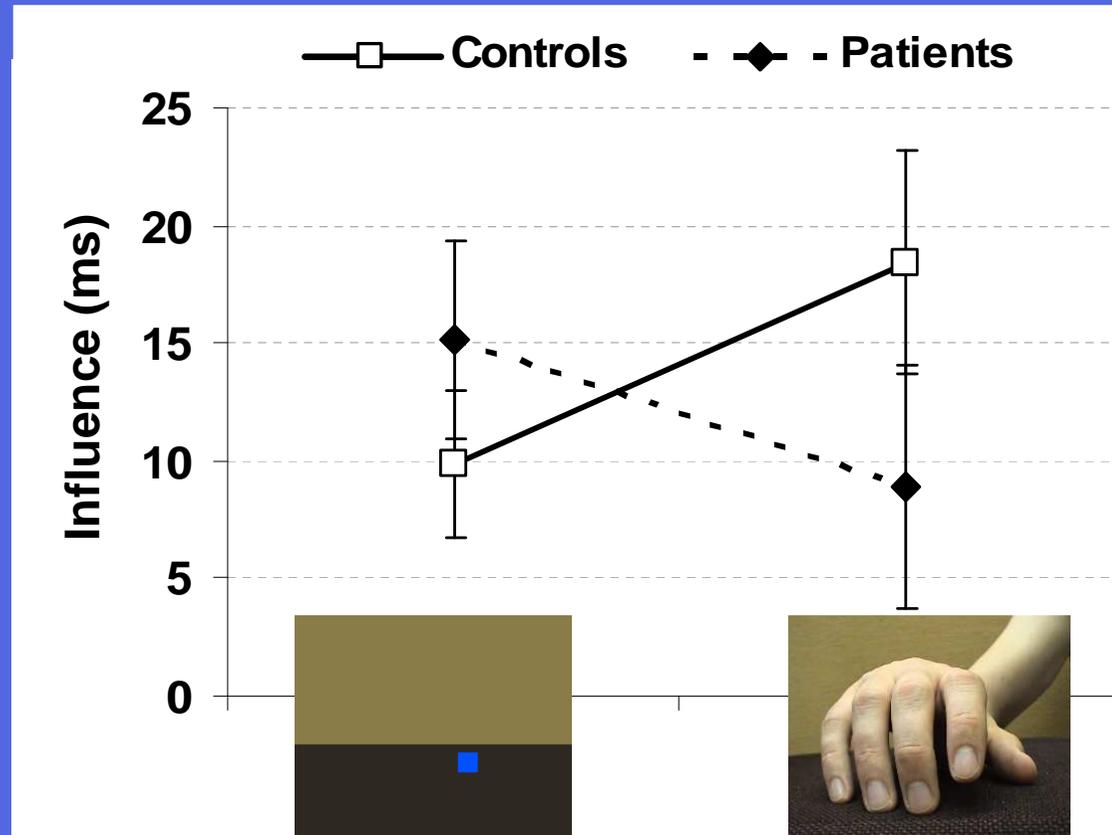
2. Respond to action-evoking objects in their environment?



Hypothesis: Due to their reliance on external cues, patients will show more effect of action-relevant stimuli.

Alt. hypothesis: Related to the slowness of motor systems, patients will show less effect of action-relevant stimuli.

Observing actions



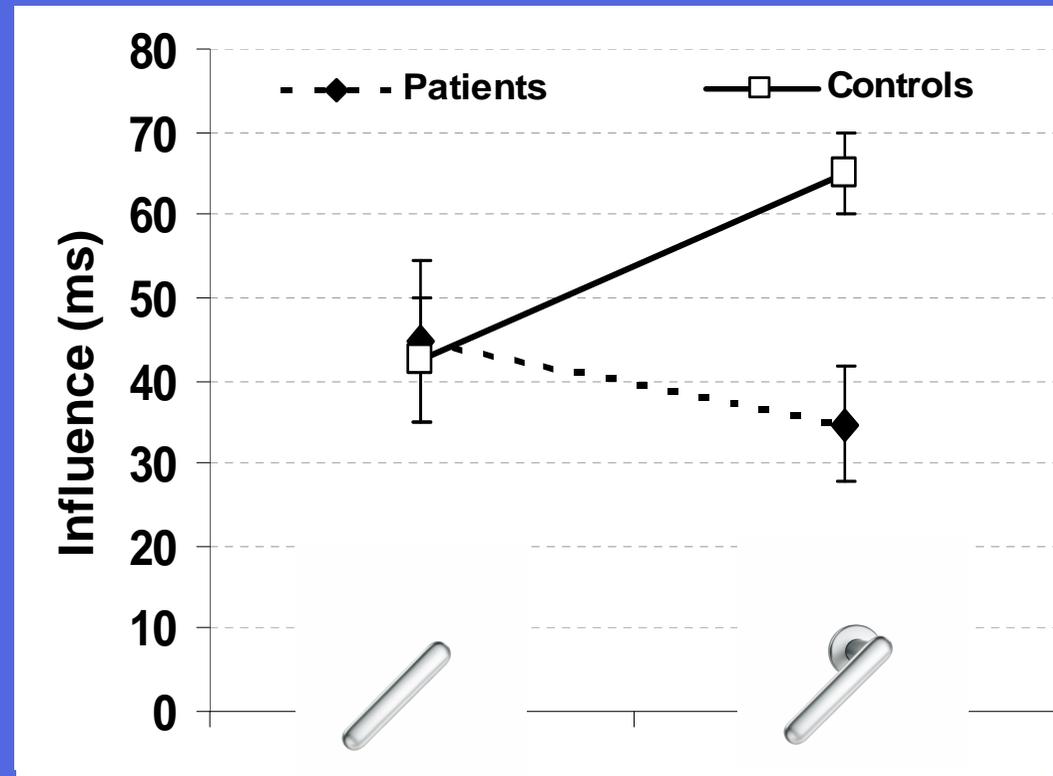
PD patients did not show a differential effect of observing a finger versus a moving object

Poliakoff et al. (2007) *NeuroReport*

Observing objects related to action

PD group – no differential effect of a handle versus a control object

Poliakoff et al. (2007)
NeuroReport



Follow up – PD group behaved as if the control object was also related to action

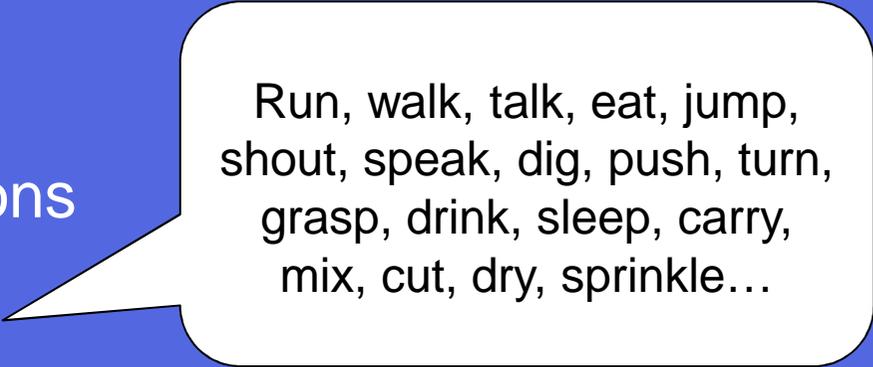
Galpin et al. (2011) *Cortex*

Discussion – Observing actions in PD

- Lack of specificity – respond to all types of stimuli
- Implications for cueing/intervention

Current/follow-up work

- Other representation of actions
 - Language
 - Gesture (Cleary et al., 2011)
- Effect of graspable stimuli on reaching movements



Run, walk, talk, eat, jump,
shout, speak, dig, push, turn,
grasp, drink, sleep, carry,
mix, cut, dry, sprinkle...

Thanks to

- Dr Adam Galpin
- Professor Steven Tipper
- Dr Judith Holler
- Ms Rebecca Cleary

- Dr Jeremy Dick
- Dr Peter Moore

- Wellcome Trust Clinical Research Facility

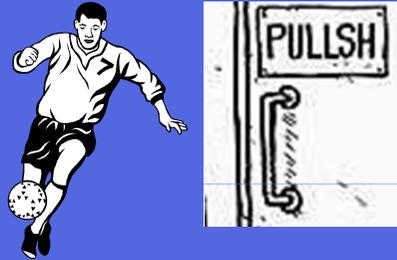


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2. Gym training in Parkinson's

Can exercise improve symptoms of Parkinson's?



Gym training – Our Study

- Can people with PD benefit from exercise in a community setting?
- Bolton Parkinson's Disease Society teamed up with Bolton Arena to deliver a gym training programme for PD patients
- Patients themselves suggested that effects of programme should be formally assessed
- Parkinson's UK funded this pilot study

The Design of the Study

	February	March	April	May	June		
Gym Group	T1	10 weeks Gym training		T2	10 weeks Gym training		T3
Control Group	T1	No intervention		T2	10 weeks Gym training		T3

- Clinical diagnosis of PD, mild to moderate (Hoehn & Yahr, II-III)
- Randomisation stratified by UPDRS score

The Gym Programme

- Designed and supervised by staff at Bolton Arena
- Biweekly, 60 minute sessions

1. Studio – circuit training

- Free movement, movement strategies

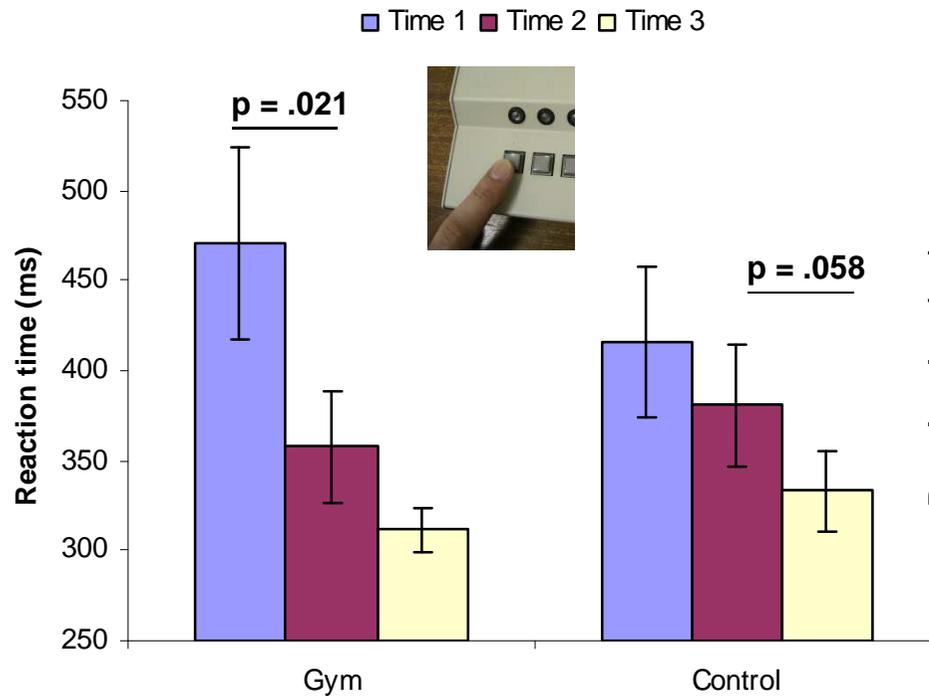
2. Gym equipment

- Cycles, treadmills, weights machines

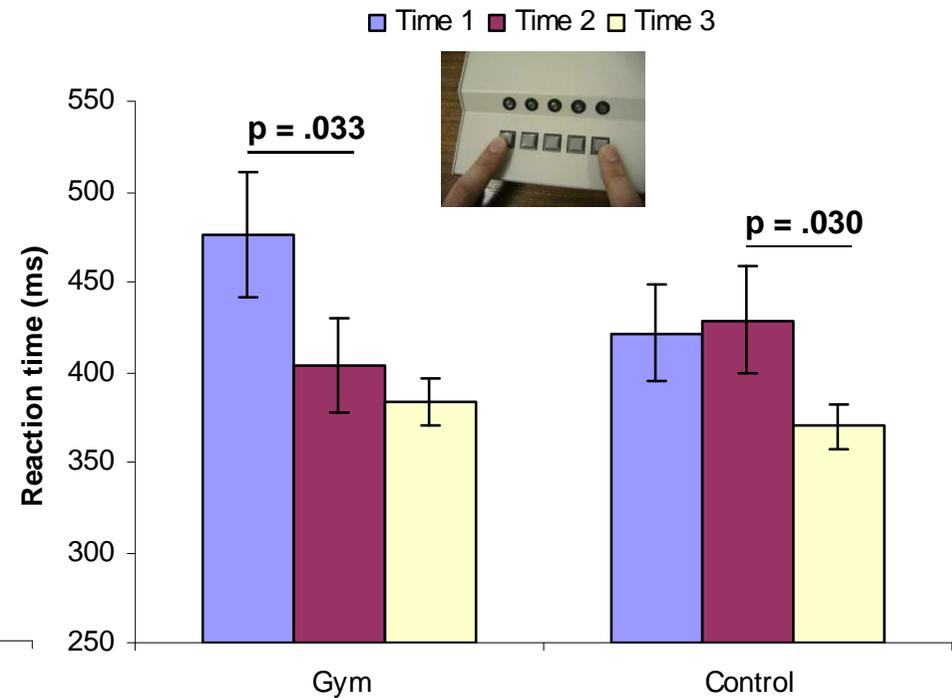


Reaction Times

Simple Reaction Time



Choice Reaction Time



Improvement over period of commencing gym training in both groups
Similar findings for chair test, but no change in walking or UPDRS



Self reports/focus-group



- No significant change in quality of life (PDQ-39) or illness perception (BIPQ) subscales.
- Slight worsening? – Awareness of limitations or social comparison?
- Written comments (15/26) were positive
- Improved confidence, fun, enjoyment were common themes
- Valued non-medicalised setting for gym programme

“When I was diagnosed with PD... I was waiting for the morning when I couldn’t get up – then I came here and I’ve seen people who had PD 17 years, walking through the door with a smile on her face, and I thought she can do it, so can I.”

Discussion – Gym training

- Benefits suggested by focus group and reaction time findings
- No effect on questionnaire and UPDRS measures
- Feasibility of community exercise programme
- Importance of other factors - social support
 - increased confidence
 - non-medical setting

The Gym and Me and PD (extract)

*So I joined the course
And now I'm on week eighteen
I've pedalled a bike
Rowed a rowing machine
I've stretched and I've pulled
And I feel a bit sore, but guess what?
I don't want to stop... I want more!*

*I wish I could remember
All the names of the friends, no longer strangers
We have become more than that,
We share a common enemy
Which has drawn us together*

Thanks to

Research Team

- Dr Adam Galpin
- Dr Kathryn McDonald
- Dr Alison Wearden

Neurologists

- Dr Jeremy Dick
- Dr Mark Kellett

And the participants

Volunteers

- Vera Azarova
- Caroline Cox
- Laura Kehoe
- Rebecca Cleary
- Lee Mulligan
- Tom Simpson

Bolton Arena

- Sue Hayes
- Rob Street
- Katie Ingram



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Conclusions of talk today

1. Observing and evoking actions in Parkinson's

- do not distinguish between stimuli related to actions and basic stimuli.
- implications for understanding the cueing of movement and representation of actions



2. Gym training in Parkinson's

- Exercise can improve some symptoms of PD
- group setting provides social support and motivation.



Other related research topics

Parkinson's disease

- Measuring everyday cognitive problems
- Potential benefits of cognitive training

Ageing

- Multisensory processing

