

## Notes on NSF Final Report from Drs Flegal and McGeown.

The researchers have explored techniques for **memory** training with a view to applying them to help patients who have had a stroke or head injury. These patients are offered physiotherapy, but often cognitive problems are a limiting factor in recovery. Two of the techniques used are:

### 1. Keep track:

At the foot of a computer screen you see categories such as

Animals; Food; Sports....

Items appear one at a time in the centre of the screen

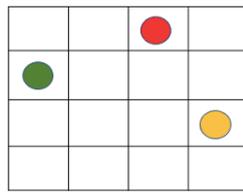
– Horse – Golf – Hat (a confounder) – Pie – Tennis - Dog ...

After a set time this stops, and you have to name the most recent item in each category.

The categories change each time the task is completed.

### Matrix updating:

At the start you are shown a matrix with coloured balls.



Then coloured arrows appear sequentially: e.g.



At the end you will be asked to point to the new location of a randomly chosen coloured ball.

There are two ways of doing this type of challenge – adaptive training [AT], where the difficulty increases as the subjects progress, or fixed difficulty where there is no change.

One problem is that most research into the use of these techniques has been conducted in young people. Stroke patients are generally much older. For this study, the researchers recruited a total of 54 subjects with a mean age of around 72, and they all took part in 10 one-hour ‘therapy’ sessions.

One encouraging finding was that AT training led to a substantial improvement in performance, but interestingly there was a large difference in this improvement between subjects. Those who had better cognitive scores to start with, showed most improvement. This is a concern as stroke and head injury patients would be starting from a low baseline, but most will experience a degree of recovery in brain function.

An issue that arises with many rehab techniques is whether they just make you better at the task, or whether they result in improvements in daily life. If you respond well to the Keep Track challenge, do you just get better at this, or does your memory

improve in daily life. There is a questionnaire that assesses this – the Everyday Memory Questionnaire. Encouragingly, the researchers found that self-reported everyday memory performance did relate to improvements on the AT training task.

In medicine in general, patients do not all respond to treatment to the same degree. Genes, environment, lifestyles, all lead to differences in recovery from illness and in response to treatment. Identifying what is best for individual patients is the focus of what's called precision medicine. One benefit from having conducted this pilot study is that it has shown that this type of memory training will not be equally effective in all patients. Already one factor has been identified. Those who start better will do better. However, there could be many other determinants. Brain scans might indicate which brain regions have been most badly affected by a stroke and to what extent brain tissue in these regions is likely to recover. Patient selection will be crucial to maximise the effectiveness of this therapy.

This project was an excellent example of rigorous analysis of data. It was good science and should help to advance this encouraging area of treatment. It will also help to guide Katerina's studentship.