



Guiding Principles of Neuropsychological Rehabilitation: Knowing What to Do and Why

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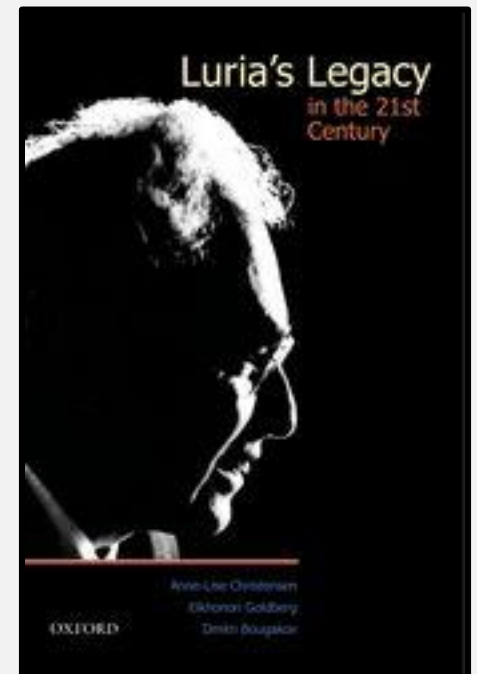
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Luria's Legacy

- Overarching themes of Luria's many contributions to neuropsychology
 - Applying rigorous scientific logic and methodology
 - Listening to people's own descriptions of their experiences
- In pursuit of a better understanding of:
 - How the brain supports cognition
 - The nature of cognitive deficits after brain injury
 - Clinical neuropsychological assessment and intervention



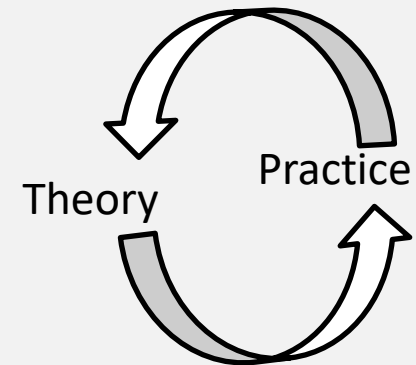
Luria's Link with the Oliver Zangwill Centre



- Luria sent this picture to Oliver Zangwill, the British neuropsychologist after whom our rehabilitation centre was named.
- Zangwill's widow, Shirley, passed the photograph on to our centre's founder, Professor Barbara Wilson

Introduction

- Clinical Neuropsychology has a strong tradition of linking theory and practice
- As practitioner-scientists we are required to:
 - Know which interventions are supported by research evidence
 - Be able to apply this knowledge in a tailored way with each person who attends our clinic
- So that we may help our patients to reach the best possible outcomes for them as individuals



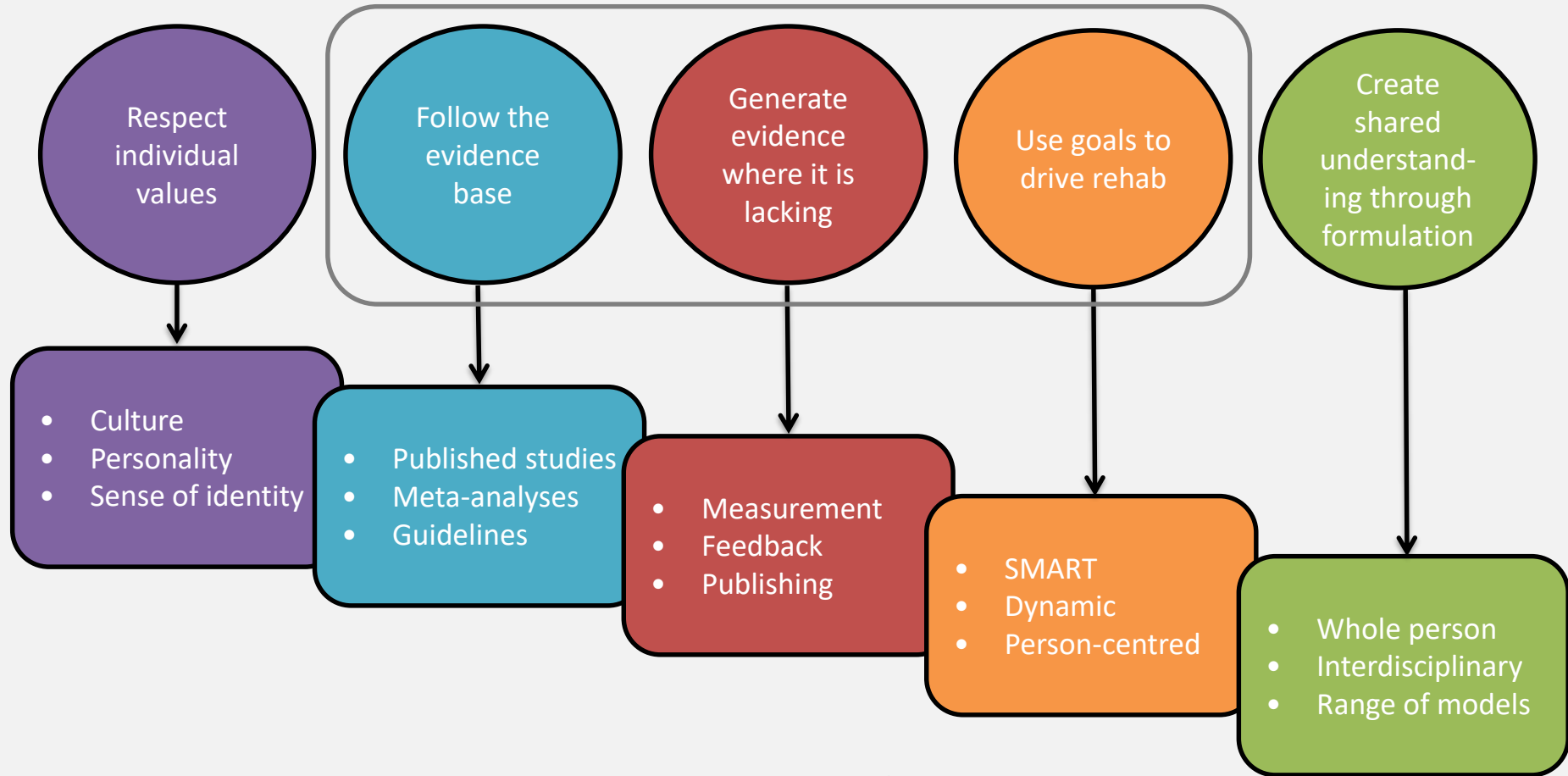
Aims

- This talk will illustrate some of the guiding principles that help us to integrate theory and practice in neuropsychological rehabilitation – those that help us make clinical decisions (knowing what to do), and on what basis (knowing why)
- I focus on research and theory, as Dr Jill Winegardner's talk will include a detailed clinical case



Guiding Principles in Clinical Neuropsychology

Influenced by Prigatano, Wilson, & Luria



Together, these principles help us do what is right for our patients

N.B. This is not an exhaustive list, and this talk focuses on the middle three

International Classification of Health Interventions

World Health Organization (in preparation)

Interventions on Body Systems and Functions: *Restoration*

Interventions on Activities and Participation Domains: *Compensation*

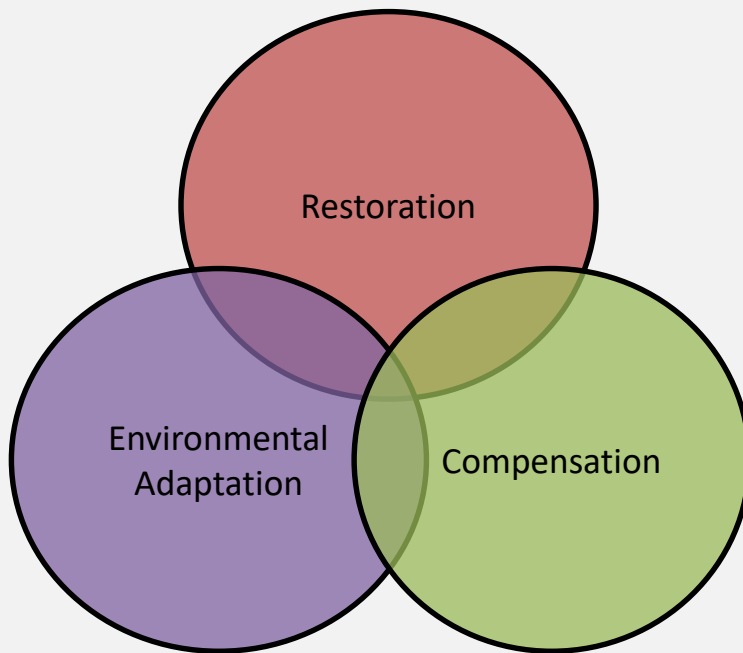
Interventions to Improve the Environment and Health-related Behaviour:
Environmental Adaptation

Are they really distinct categories?

<https://mitel.dimi.uniud.it/ichi/index.php>

Types of Rehabilitation Intervention

In reality, there is overlap between each approach



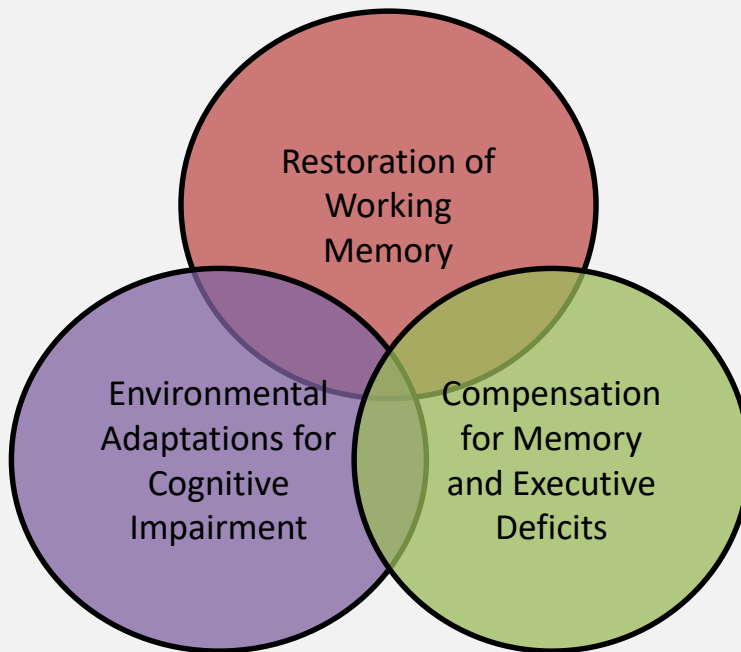
There is also a tension, with restoration often prized above compensation and adaptation

Improving Cognitive Ability

Improving Everyday Function

Changing the Context

Examples at Each Level



What is the evidence base?

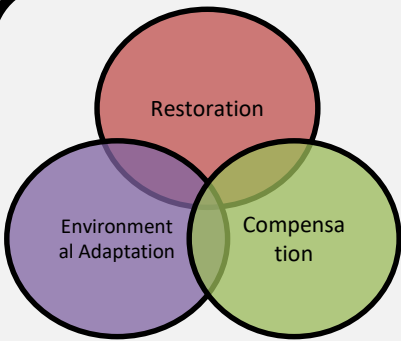
Do we know what we need to?

How does it impact on clients?

What Clients Say

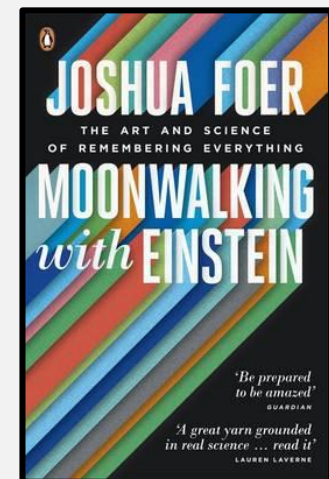
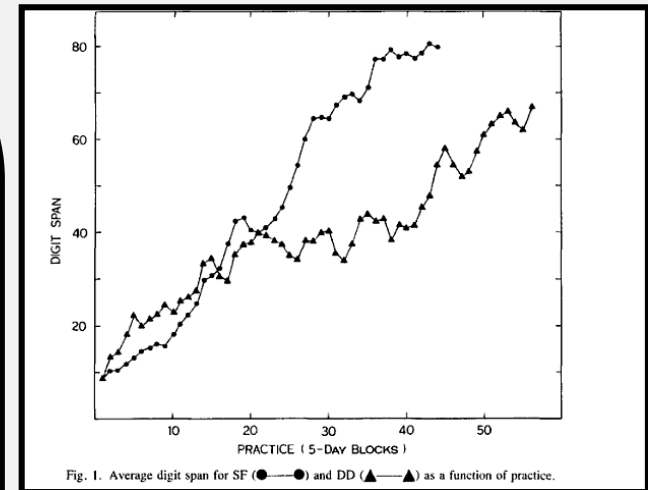
- I want things to go back to how they were before
- I want to be able to do more things by myself, without having to be reminded
- I worry so much about my memory
- If I could just keep up with my friends, to make jokes not just being on the outside listening
- To feel less like a disabled person
- To feel worthwhile
- To contribute to my family again

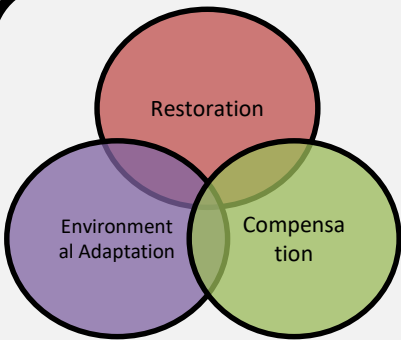




Working Memory Training: An Example Restorative Approach?

- Ericsson, Chase & Faloon (1980) 3-5 days per week digit span training increased capacity from 7-78 items over 20 months in case SF
- However, spatial and letter span were unchanged
- SF used a strategy of chunking items and linking them to meaningful information first small groups then super groups
- Replicated with another participant
- No generalisation to everyday life
- In his 2011 book, journalist Joshua Foer tells the story of how he interviewed memory champions for a newspaper article and went on to be USA Memory Champion himself, using their strategies!
- Similar in some respects to Luria's Mnemonist





Working Memory Training: Evidence of Restoration

- Klingberg et al. (2005) conducted a randomised controlled trial of computerised working memory training in children with ADHD relative to placebo intervention
- They found improvements in WM on tests and parent/teacher ratings of attentional behaviour, which re-awakened interest in cognitive training and dozens of papers on the topic have since been published.
- The intervention is now commercially available via Pearson Assessment, whose website states:



80%

**OF PARTICIPANTS
EXPERIENCED AN AVERAGE
30% REDUCTION IN MEASURES
OF INATTENTIVENESS.**



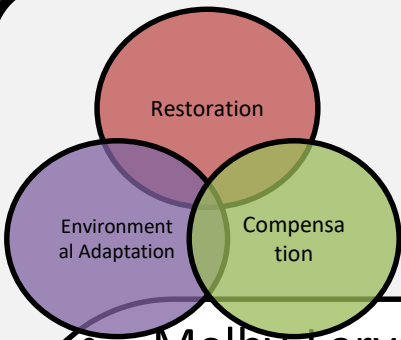
80%

**OF PARTICIPANTS IMPROVE
THEIR WORKING MEMORY BY
AN AVERAGE OF 33%.**



80%

**OF ADULTS AND 90% OF
CHILDREN, ON AVERAGE,
COMPLY WITH THE
INTERVENTION PROTOCOL.**



Working Memory Training: Systematic Review & Meta-analysis

- Melby-Lervåg, Redick & Hulme (2016)
- There is reliable evidence of intermediate transfer post-training (i.e. compared with untrained WM tasks)
- No evidence of far transfer (i.e. to tasks like arithmetic or reading comprehension)
- No relationship between change in WM and change on transfer measures
- Analysis of p-values from published and 'grey' literature showed publication bias

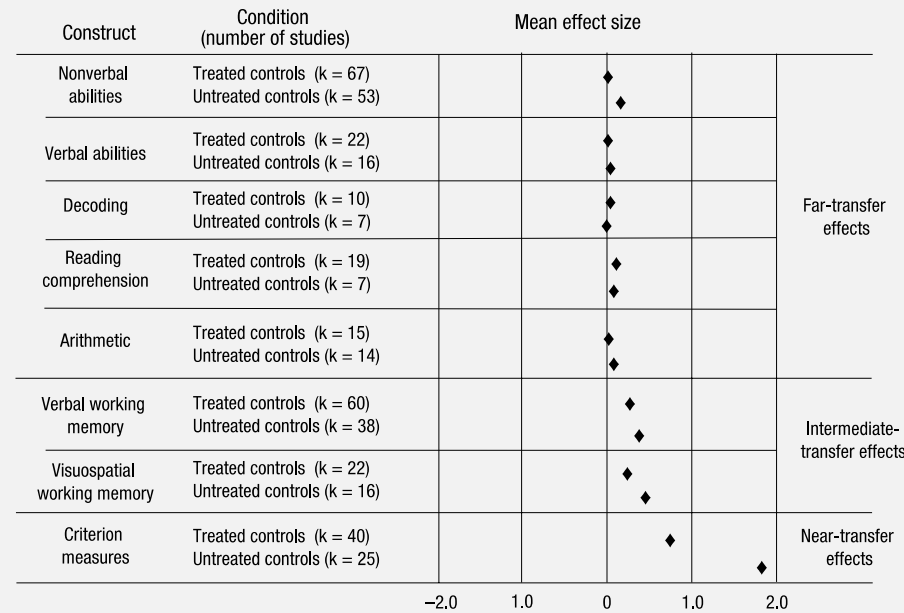
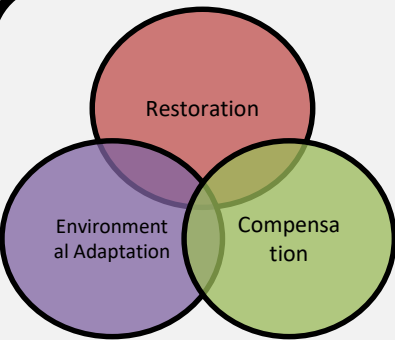


Fig. 2. Mean effects (g) on the transfer measures for studies with treated and untreated controls (k = number of studies)



Working Memory Training: Practitioner Views vs Guiding Principles

- Trainers perceive benefits in their clients but these are no longer supported by the scientific literature
- We need to follow principles regarding evidence-base and outcome measurement
- And update our practice in line with the best evidence

Briony Westgate, Darren Dunning, Harley Roberts & Anna-Lynne Ruth Adlam

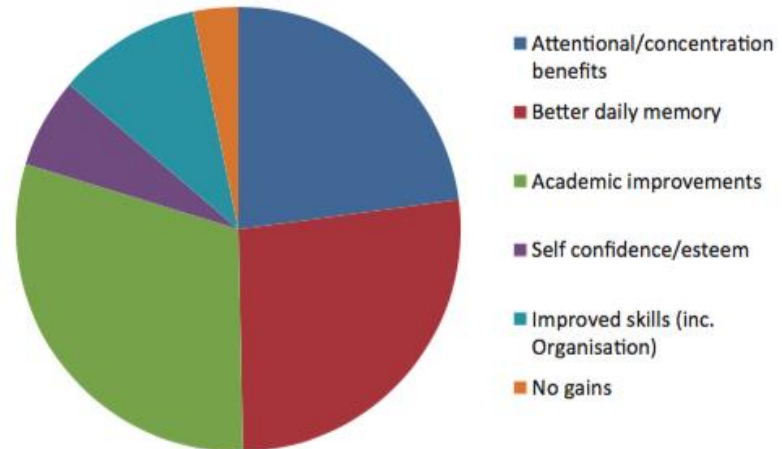


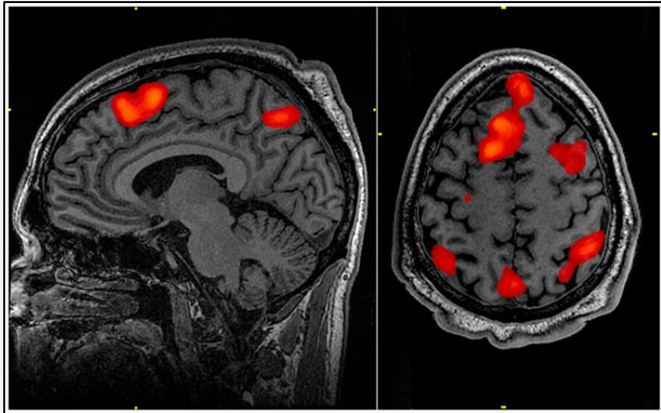
Figure 3: Percentage of responses to the question 'What outcome effects/training gains do you find?'

Restoration

Environmental
Adaptation

Compensation

Broader Issues in Working Memory Training: Is it Really Restorative?



- What do the observed changes in WM test performance represent?
 - Neural plasticity and improvement of underlying function?
 - Increased efficiency specific to trained task parameters?
 - Adoption of strategies?
- Hermann et al (1988): “General ability either cannot be trained, or can be trained only with procedures hitherto untried”

Restoration

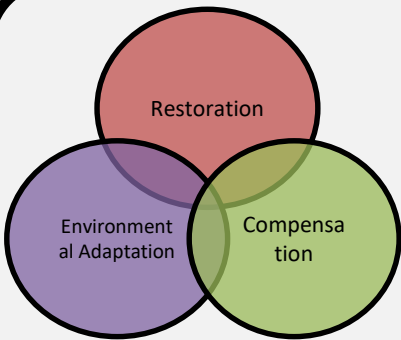
Environmental
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Compensation

Working Memory Training: Where Are We Now?



- Research imperative:
 - Conduct studies of high methodological quality
 - Enhance focus on generalisation: It must be planned from the outset
- Clinical imperative:
 - Be transparent about the evidence-base
 - Follow clinical guidance
 - Help patients to meet their own goals



INCOG Expert Panel Recommendations on Restoration

- **Attention and Information Processing**

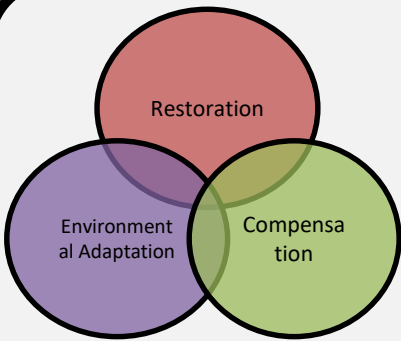
- “There is insufficient evidence to support ... practice on de-contextualized computer-based tasks for attention.”
- There is some evidence supporting dual task training but this needs replication and must be functionally-oriented

Ponsford et al. (2014)

- **Memory**

- “Restorative strategies have regained significant popularity, given broader access to computer technology; however, evidence for efficacy of these techniques remains weak”.

Velikonja et al. (2014)

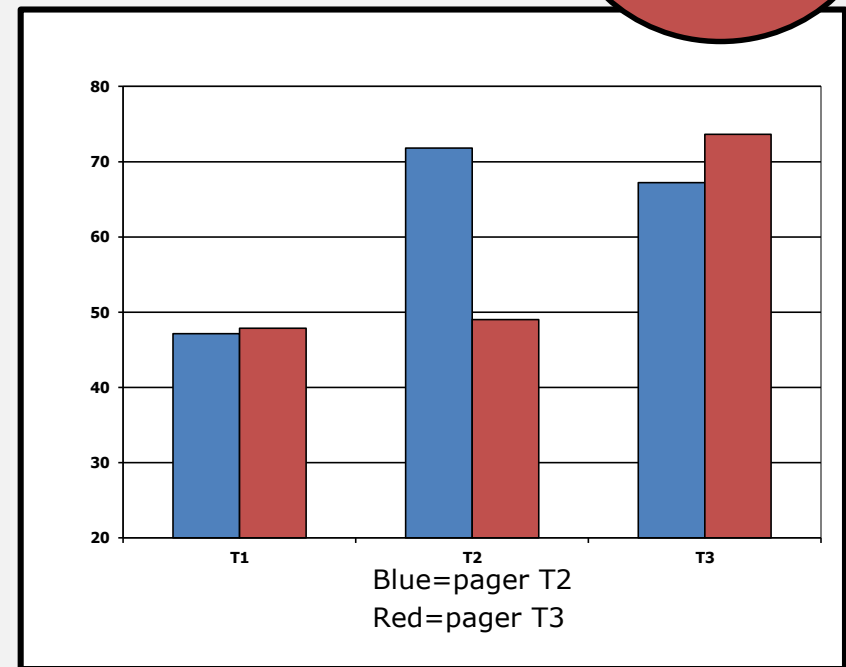


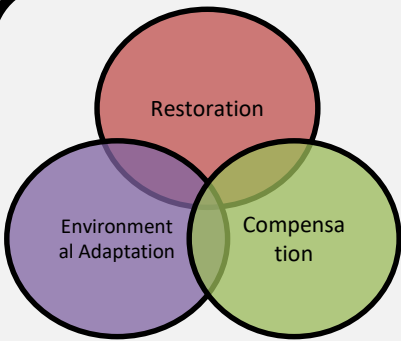
Compensating for Memory & Planning Problems: NeuroPage Device

Use goals to drive rehab

Generate evidence where it is lacking

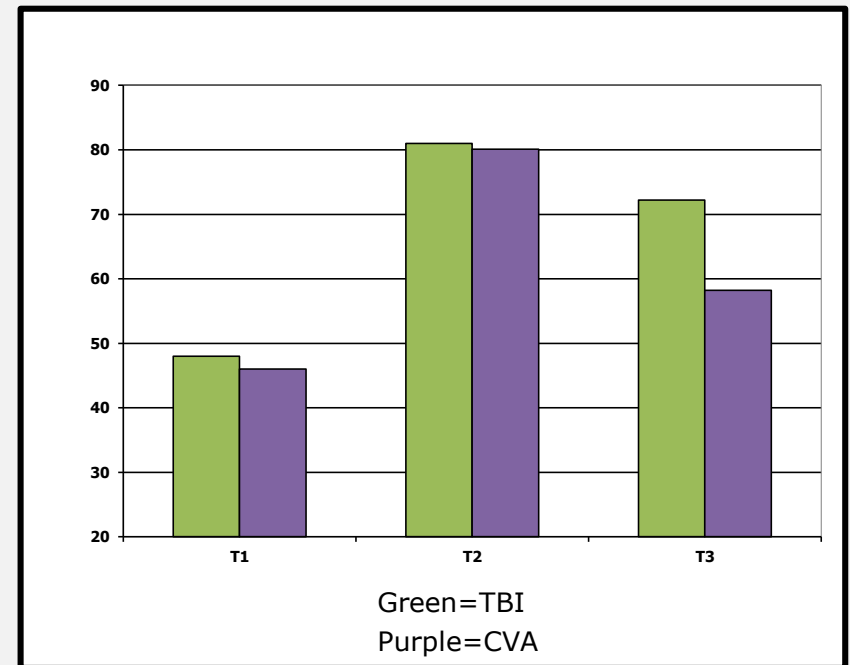
- Wilson et al (1997, 2001) NeuroPage trials: Software sends reminder messages according to personalised schedule of goals
- Randomised controlled trial found that 85% of the 143 participants showed a statistically significant improvement in goal attainment
- Effective method of compensating for memory and/or planning problems
- Reduces stress for relatives and carers (Teasdale et al., 2009)





NeuroPage Produces Lasting Benefits for Some

- Fish et al. (2008) found evidence that benefits generalization beyond the NeuroPage period
- TBI group learned from using the pager, whereas the CVA group did not
- In this sample, CVA group had combined memory and executive impairments which likely reduced their ability to maintain their new routines without support.



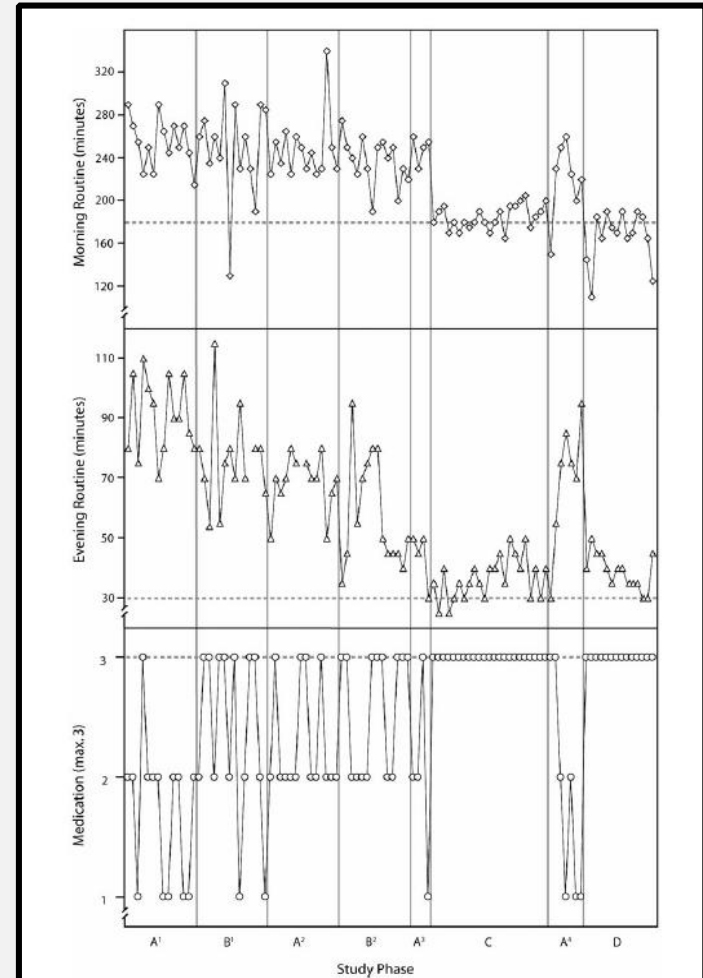
Restoration

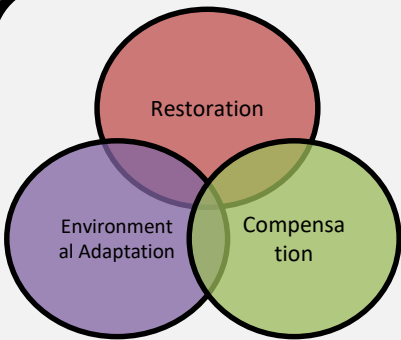
Environmental
Adaptation

Compensation

From the Group to the Individual

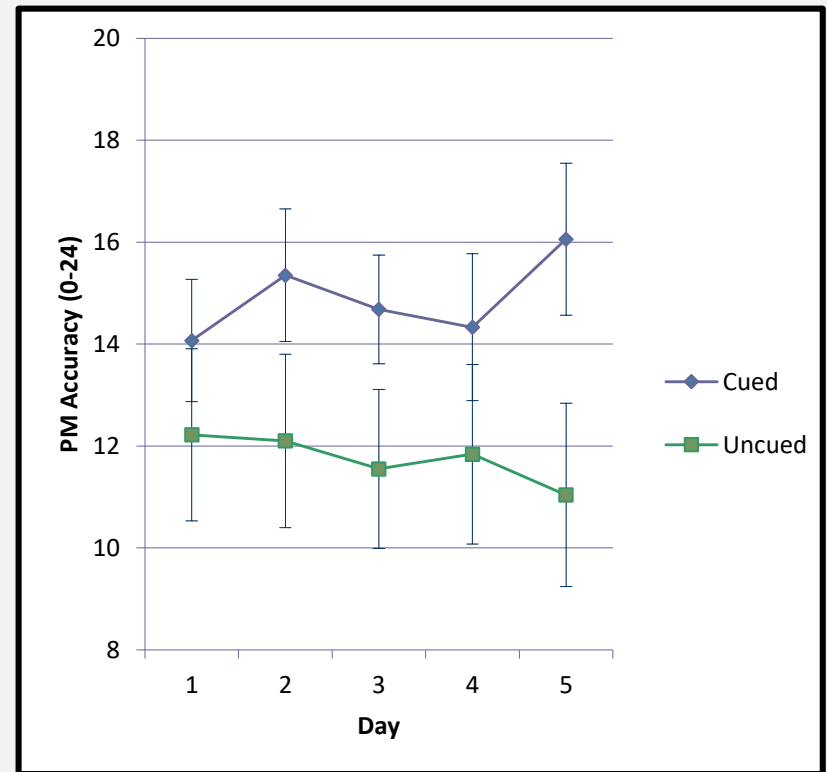
- Fish, Manly & Wilson (2008) used NeuroPage with RP, a woman with bilateral frontal damage from a ruptured aneurysm
- RP engaged in repetitive behaviours for many hours per day, which limited the activities she could otherwise undertake
- RP knew what she wanted to do, but couldn't put her intentions into action
- NeuroPage enabled her to meet her own goals reliably, much better than with a paper organiser
- *RP and her husband were delighted – they felt they had their lives back*

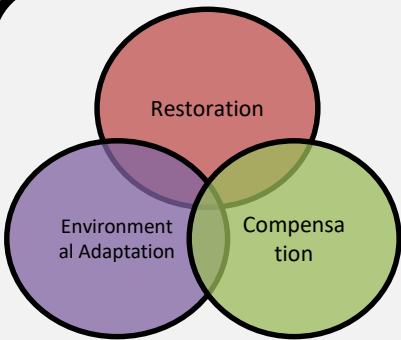




Compensating with Metacognitive Strategies

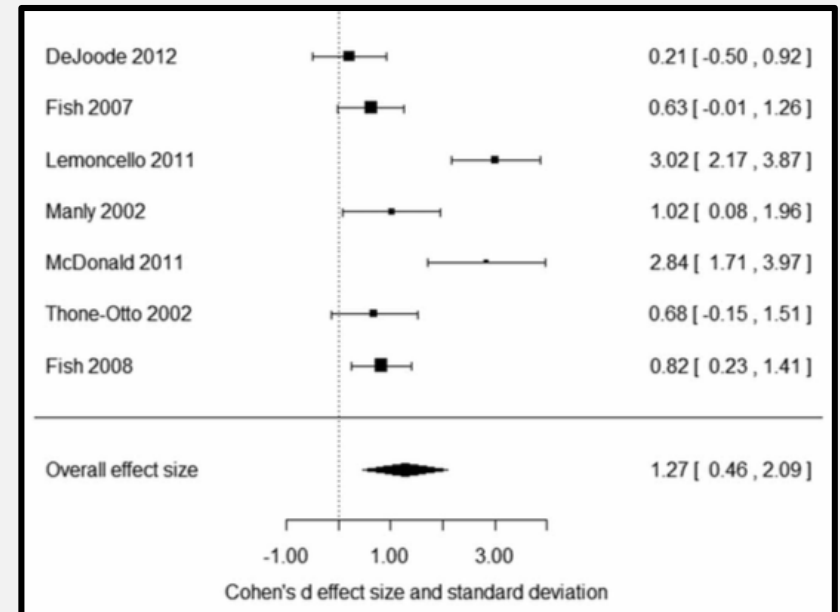
- Fish et al. (2007) found that non-specific cues to “Stop and think about what you are doing” improved prospective memory performance of people with ABI in everyday life
- Some evidence that this also applies to goals that participants set for themselves (Gracey et al., 2015)

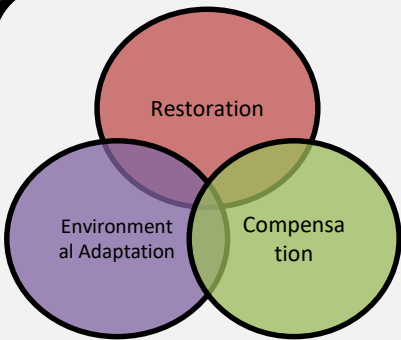




Compensatory Aids Meta-Analysis

- Jamieson et al. (2014) conducted a systematic review and meta-analysis of 'cognitive prosthetic technology' in people with cognitive impairment and found a large effect size when averaged across studies.





INCOG Recommendations on Compensation

- **Attention and Information Processing**

- Metacognitive strategy training focused on functional everyday activities is appropriate

Ponsford et al (2014)

- **Memory**

- The recommendations ... support the integration of internal and external compensatory strategies implemented using appropriate instructional techniques that consider functional relevance and important patient characteristics.

Velikonja et al. (2014)

- **Executive Function and Self-Awareness**

- Intervention programs incorporating metacognitive strategy instruction for planning, problem-solving, and other cognitive-executive impairments have a solid evidence base.

Tate et al. (2014)

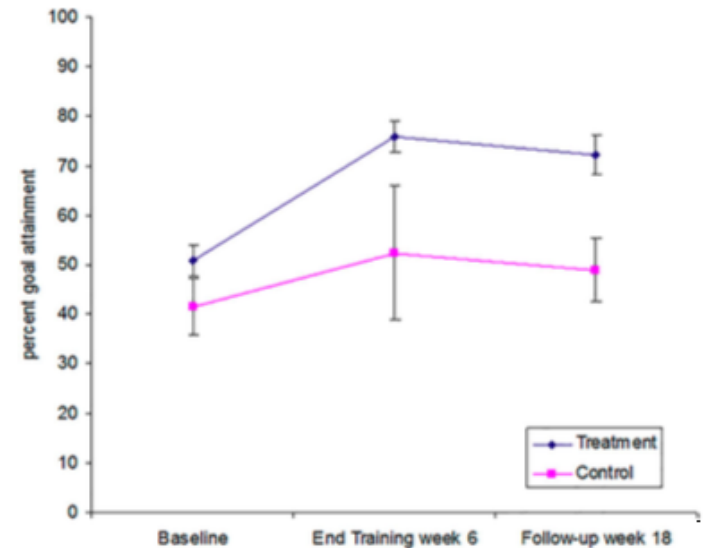
Restoration

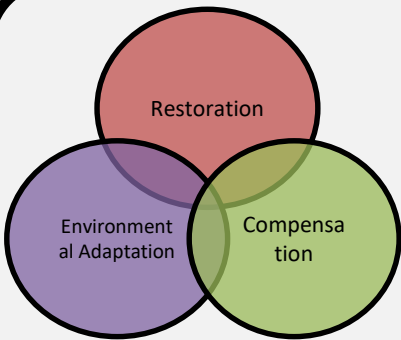
Environmental Adaptation

Compensation

Modifying the Environment

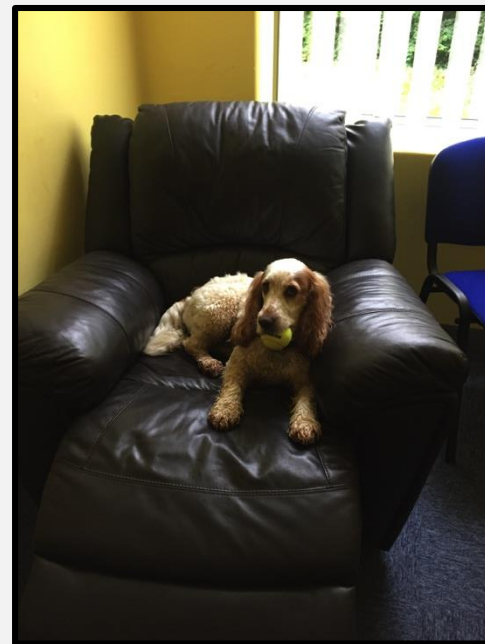
- Find technological solutions: Install gadgets, e.g. sensors to switch off gas when person leaves house (e.g. Jasiewicz et al., 2011; Storey, 2010).
- Memory aids clinic: most popular items: whiteboard, “doorganiser”, pillboxes
- Dewar et al. (2016) evaluation of a memory aids clinic found significant gains in everyday memory performance





Modifying the Environment

- “Robotic” interventions to remind, prompt action, or for social functions (Moyle, 2017)
- Social identity approaches: join groups to promote wellbeing (Alex and Cath Haslam, Australia)
- Accommodate deficits: change job, adapt home, modify expectations
- Train staff to work effectively with the brain injured person
- Even pet therapy...



Our therapy dog “on the couch” at the OZC

Summary

- I have tried to illustrate a range of studies that demonstrate putting guiding principles into practice
- There is good evidence that **restorative procedures to train cognitive function produce very specific effects**,
- There is also strong evidence that **compensatory strategy training leads to improved everyday functioning according to clients' own goals**
- In research, group designs and the need to follow protocols can make it difficult to apply all of the principles, particularly on individual formulation and tailored approaches – Jill's talk will provide much more on this.

Follow the
evidence
base

Generate
evidence
where it is
lacking

Use goals to
drive rehab

Conclusions

- We need to do what is best for our patients *now*
- This requires us to listen to what they want, help them set realistic goals, and shape their expectations
- We also have a responsibility to advance the field through systematic research into new treatments
- This means we cannot give up on restorative approaches, but need to ensure that we also enable clients to access the compensatory and environmental interventions that will help them most
- Remember the overlap... compensation may improve the underlying functions, or combine with medications may promote plasticity
- We need both, and each must be done simultaneously

Respect
individual
values

Create
shared
understand-
ing through
formulation

Acknowledgements

- Professor Barbara Wilson
- Dr Tom Manly
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- The whole team at the Oliver Zangwill Centre for Neuropsychological Rehabilitation
- Dr Pauline Monro



Thank you for listening!

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