Therapy and Assessment in Virtual Reality: Accessible realism for exercising cognitive functions

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• Charity with hospitals across the country

• 500 service users in 2016, mostly TBI or stroke

• Average length of stay is 7 months

• Worked with practitioners in Glasgow and Swindon
Challenges of Executive Function

- Initiation
- Task persistence
- Organisation
- Awareness
- Response inhibition
- Generative thinking
Goals for the Assessment and Therapy of Executive Functions

• Functionally-relevant interactions
  • Variable cognitive demand
  • Grounded in daily living
  • Ecologically relevant goals

• Practical problems
  • Irregular practice
  • Unpredictable environment
  • Difficult for therapists to observe and report
Virtual Reality

• Simulates real world scenarios that are too...
  • Difficult to re-create in the physical world
  • Dangerous to life and limb
  • Time consuming

• Feeling of “being there”
  • Head-mounted display fills entire field of view
  • Room tracking matches movement to what is seen
Virtual Reality
Simulates real world scenarios
Presence inspires realistic behaviours

Executive Function Therapy
How does someone behave in real world settings?
Virtual Environment
Virtual Environment

- What street is the post office on?
- What time is the next bus?
- What time is post collected from West Street on Saturdays?
- What is the phone number of the post office?
- What time does the supermarket close?
Behaviour Recording

- Everything is recorded or “logged”, even things difficult to measure in reality
  - Interpersonal distance
  - Direction of gaze
  - Head movement

- Might be used to identify key behaviours

- Replayable for therapeutic conversations, facilitating insight
Advantages for Rehabilitation

• Controllable – no waiting for something to happen

• No travel time

• Reduced risk to self and others

• Opportunities to replay and analyse data

• However ... there are some exclusion criteria e.g. claustrophobia

Practical problems of assessment and therapy

• Irregular practice
• Unpredictable environment
• Difficult for therapists to observe and report
Potential Drawbacks

• Discrepancies from experiences in the real world

• Virtual audio and visual – other senses, not so much!

• Restricted movement

• Motion sickness

VR is not a magic bullet – it must be incorporated into a principled user-centered design process if its potential is to be realised
Supporting therapeutic interactions

• Keeping the therapist in the therapeutic loop

• Continuous adjustment of level of demand, responding to service user reactions

• Controlling dialogue with virtual characters
Conclusion

• Virtual reality environments can be used to draw out instances of behaviour that *may* be meaningful to clinicians

• It is a relatively accessible technology that increases opportunities for social interactions

• *Still a lot to learn!* Therapeutic input is necessary to interpret data and identify steps to clinical use.
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Questions?

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