An introduction to cognitive remediation for individuals who experience psychosis.

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Currently recruiting people with a diagnosis of schizophrenia or schizoaffective disorder to participate in a 24 session course of cognitive training.

Recruitment will continue throughout 2016.

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Agenda

- Understanding the need
  - The link between cognition and everyday functioning

- Cognitive Remediation Therapy
  - What is it?
  - Does it work?

- Current research
  - Aim of research
  - BrainHQ (by Posit Science)
  - Observations from participants to-date

- Question time
Understanding the need

- Individuals with psychotic illness:

  Level of occupational and social functioning and activities of daily living (e.g., self care)

<table>
<thead>
<tr>
<th></th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deterioration from pre-onset functioning</td>
<td>90.4</td>
</tr>
<tr>
<td>Obvious/Severe dysfunction in socialising, past year</td>
<td>63.2</td>
</tr>
<tr>
<td>Obvious/Severe dysfunction in self care, past 4 weeks</td>
<td>32.3</td>
</tr>
</tbody>
</table>

Morgan et al., 2010 Australian national survey “People living with psychotic illness 2010”, p. 4.
A majority of individuals diagnosed with schizophrenia experience difficulties in at least one area of cognition.

- Processing speed
- Attention
- Working memory
- Learning and memory
- Reasoning and problem solving

Heinrichs et al. 2013

Nuechterlein et al., 2008
Understanding the need

- Link between cognition and social functioning:

![Diagram showing the relationship between Attn/Working Memory, Processing speed, Executive Functioning, Social Competence, and Social Functioning.]

Figure 1. Predictors of real-world social functioning

(Social Competence = Social Skills Performance Assessment. Real-world social functioning as measured on the Specific Level of Function Scale. Observer rated scale considering initiating, accepting & maintaining social contacts; effectively communicating.)

Adapted from Bowie et al., 2008
(pathways between clinical symptoms & functioning not shown)
Understanding the need

- Link between cognition and community functioning:

Figure 2. Predictors of real-world community functioning

(Social Competence = Social Skills Performance Assessment [SSPA]. Functional Competence = UCSD Performance Based Skills Assessment [UPSA]. Real-world community functioning as measured on the Specific Level of Function Scale. Observer rated scale considering shopping, using telephone, paying bills, use of leisure time, use of public transportation.)

Adapted from Bowie et al., 2008
(pathways between clinical symptoms & functioning not shown)
Understanding the need

- Link between cognition and work skills:

  ![Diagram showing the link between cognition and work skills]

  Figure 3. Predictors of real-world work skills

  *(Social Competence = Social Skills Performance Assessment [SSPA]. Functional Competence = UCSD Performance Based Skills Assessment [UPSA]. Real-world work skills as measured on the Specific Level of Function Scale. Observer rated scale considering employable skills, level of supervision required to complete tasks, ability to stay on task, punctuality.)*

Adapted from Bowie et al., 2008

*(pathways between clinical symptoms & functioning not shown)*
Understanding the need

- Importance of cognition understated
- Central role of cognition in skills acquisition
“To... foster functional recovery, it will be important to view cognitive remediation and enhancement as a platform upon which skills could be more easily taught and later generalized when facing dynamic social and occupational demands.”

Bowie et al., 2008
Cognitive Remediation Therapy (CRT)

“...an intervention targeting cognitive deficits (attention, memory, executive function, social cognition, or meta-cognition) using scientific principles of learning with the ultimate goal of improving functional outcomes.”

Cognitive Remediation Expert Working Group, 2012
# CRT: Types of intervention

<table>
<thead>
<tr>
<th>CRT Methodology</th>
<th>Variations in Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Restorative (drill &amp; practice) Strategy Compensatory</td>
</tr>
<tr>
<td>Duration &amp; intensity</td>
<td>From 2–5 days/week From 4–52 weeks</td>
</tr>
<tr>
<td>Technology</td>
<td>Pen &amp; paper vs computer–based</td>
</tr>
<tr>
<td>Format</td>
<td>Individual vs Group Mix of individual &amp; group Within wider rehabilitation program</td>
</tr>
<tr>
<td>Cognitive Target</td>
<td>Top–down vs bottom–up processing Single vs multiple domains</td>
</tr>
</tbody>
</table>

*McGurk et al., 2013*
CRT: Effectiveness

- **Meta-analyses**
  - Global cognition: **Moderately effective** (Cohen’s $d = 0.41^{1}–0.45^{2}$)
  - Cog. @ follow-up: **Moderately effective** (Cohen’s $d = 0.43^{2}$)
  - Functioning: **Moderately effective** (Cohen’s $d = 0.42^{2}$)
  - Funct. @ follow-up: **Small–moderate** (Cohen’s $d = 0.37^{2}$)

1McGurk et al., 2007; 2Wykes et al., 2011 incorporating 40 independent studies involving over 2,000 participants
CRT: Effectiveness

- Success rates: 50% – 60% do not realise improvements
  
  *Hodge et al., 2010; Medalia & Richardson, 2005; Vita et al., 2013*

  - Suggestive that those who do respond, enjoy greater benefits than what is reported…
## Predictors of outcome: response to CRT

<table>
<thead>
<tr>
<th>Type</th>
<th>Factor</th>
<th>Support (Yes / No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic</td>
<td>Age</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Education</td>
<td>✓</td>
</tr>
<tr>
<td>Cognitive</td>
<td>Baseline functioning</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>IQ trajectory</td>
<td>✓</td>
</tr>
<tr>
<td>Clinical</td>
<td>Baseline symptom severity</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Medication type/dosage</td>
<td>✓</td>
</tr>
<tr>
<td>Treatment engagement</td>
<td>Attendance (no. sessions)</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Intensity (ave. hrs/mth)</td>
<td>✓</td>
</tr>
<tr>
<td>Learning Potential</td>
<td>Training task progress</td>
<td>✓</td>
</tr>
</tbody>
</table>
Current research: Research aim

To increase our understanding of factors that influence the effectiveness of cognitive remediation therapy in people diagnosed with schizophrenia.

- More considered approach about who is referred to CRT – one size does not fit all
- Potential changes to CRT programs—or the way in which they are delivered—to increase the number of positive responses
Computer-based, drill & practice

Individual focus but can be delivered in small groups

Bottom-up approach that incorporates training on higher order processes

Specifically targets visual learning & memory

(Surti et al. 2012; est. ES: $d = 0.43$ *small sample size)

Specifically targets verbal learning & memory

(Fisher et al. 2009; ES: $d = 0.86$ and $0.89$ respectively)
The science of learning and neuroplasticity

- To optimise training outcomes, training should be:
  - Intensive
  - Attentionally engaging
  - Adaptive
  - Rewarding

*Adcock et al., 2009*
CRT: BrainHQ, Posit Science

- Optimises training outcomes: Intensive

**Target Tracker**
Try to keep track of objects in motion as you flex your divided attention skills. [Learn More](#)

**Stage 4**
Play any open level to beat a previous score or unlock new ones.
CRT: BrainHQ, Posit Science

- Optimises training outcomes: Attentionally engaging

Watch for a vehicle in the center of the screen and a road sign in the periphery. Click START to begin.
CRT: BrainHQ, Posit Science

- Optimises training outcomes: Adaptive
Optimises training outcomes: Rewarding

You reached your goal!

Your speed was **63 milliseconds**.
You beat your baseline of **126 milliseconds**.

This score equates to 3 stars

Replay for a higher score  Move up to try a different level
Exit to return to the challenge page

Move up

baseline  
**126 ms**

best  
**63 ms**
Participant experience

- Flexibility
- Control
- Support
- Potential benefits
Current research: Timeline

2014
- Ethics approval
- Select cognitive remediation therapy tool

2015–2016
- Recruit participants
- Facilitate cognitive remediation sessions

2017
- Data analysis and dissemination of results
# Participant experience

<table>
<thead>
<tr>
<th>Timing</th>
<th>Duration</th>
</tr>
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<tbody>
<tr>
<td>Pre-assessment</td>
<td>20 minutes</td>
</tr>
<tr>
<td>Participant briefing and consent</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Pre-intervention</td>
<td>2 x 3 hour sessions</td>
</tr>
<tr>
<td><strong>24 session visual CRT module</strong></td>
<td></td>
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<tr>
<td><em>Mid-intervention</em></td>
<td>1 hour</td>
</tr>
<tr>
<td><strong>24 session (optional) auditory CRT module</strong></td>
<td></td>
</tr>
<tr>
<td>Post-intervention</td>
<td>3 hours</td>
</tr>
<tr>
<td>Follow-up (12 weeks)</td>
<td>1 hour</td>
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</tbody>
</table>
Observations to-date

- Engagement
  - Attendance from 1 to 3 times per week
  - 85% retention rate
  - 23% committed to completing more than minimum number of sessions
  - Variable level of task engagement
Observations to-date

- Reported improvements in aspects of cognition
  - Concentration
  - Processing speed
  - Visual processing
Observations to-date

- Observable improvements in aspects of cognition
  - Selective attention
  - Sustained attention
Reported improvements in untrained tasks

- Reconnected with old hobbies
- Able to focus on writing tasks for longer periods of time
- Increased confidence in social conversations
Participant goals and sources of motivation

- Reducing isolation
- Sharpening thinking skills
- Stepping stone to further training
- Helping to improve the quality of life of people living with psychotic illness
- Supporting research
"Your brain--every brain--is a work in progress. It is PLASTIC. From the day we're born to the day we die, it continuously revises and remolds, improving or slowly declining, as a function of how we use it."

- Michael Merzenich, PhD


References
Questions