Someone to Watch Over Me: impact of Self-Monitoring Training (SMT) on behavioural symptoms of neurobehavioural disability

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Questions for this session...

1. In this session we are going to examine evidence of a causal relationship between poor self-monitoring skills and ABI behaviour disorders.

2. Argue that reduced ability to accurately self-monitor is secondary to attentional impairment.

3. Review case study data to determine the efficacy of treatment approaches derived from operant principals and procedures.

3. Propose Self-monitoring Training (SMT) has particular relevance.
Outcomes After ABI

Complex, non-homogenous population with a wide range of different needs

- Physical
- Functional
- Cognitive
- Emotional
- Psychosocial
- Behavioural

ABI rarely inflicts just one identifiable problem
In studies conducted over many years, challenging behaviour has been recognized as posing a greater long-term impediment to community integration after TBI than physical disabilities.
Neurobehavioural Disability (NBD)

Conceptualising what underpins these difficulties – the concept of NBD

Prof Rodger Wood (2001)
Complex, subtle, pervasive constellation of cognitive-behavioural changes that characterise post-acute ABI
Neurobehavioural Disability

- Damaged neural systems
- Neurocognitive impairment
- Environmental factors
- Pre-morbid personality traits
- Post-injury learning

Symptoms of NBD

Social Handicap
Questions for this session...

Are these behavioural problems ‘severe’?

Woof!
Severe behavioural problems extend beyond aggression...
Case Studies

Present a series of historical cases with shared characteristics

- All survivors of Herpes Simplex Encephalitis (HSE)
Common Characteristics of Case Studies #1

Presentation

Characteristic presentation underlies cases with the most severe challenging behaviour:

1. Anterograde memory disorder

2. Dysexecutive syndrome

Overall level of intellectual ability generally preserved at the premorbid level
Dysexecutive Syndrome

The ‘Executive Functions’
Shorthand for a diverse and varied range of behavioural competencies that include:

• Planning
• Initiation
• Sequencing
• Ability to sustain attention
• Ability to resist interference
• Monitoring, ability to utilise feedback
• Co-ordinate simultaneous activity (multitask)
• Cognitive flexibility (change set)
• Ability to deal with novelty

(Crawford, 1998; Evans, 2017)
Dysexecutive Syndrome

These competencies enable a person to determine goals, formulate new and useful ways of achieving them, and then follow and adapt an initial plan in the face of competing goals and changing circumstances, often over prolonged periods of time (Burgess and Alderman, 2004)

Damage to these competencies gives rise to a range of behavioural and other symptoms collectively referred to as the ‘dysexecutive syndrome’ (Baddeley, 1986; Baddeley and Wilson, 1988)
Common Characteristics of Case Studies #2

Behaviour

Garrulous, constant flow of verbal output:
1. With and without aggressive/ISB content
2. Impervious to social cues behaviour was inappropriate, lacked awareness
3. Appeared to have little ability to exert inhibitory control
4. Prevented individual and group rehabilitation – increased vulnerability
Common Characteristics of Case Studies #3

Lack of Responsiveness to Rehabilitation

Cases were ‘treatment’ resistive, they did not respond to NbR programmes including mainstream behaviour modification interventions based on operant learning theory:

1. Positive reinforcement programmes
2. Use of various types of extinction programmes
Reducing Verbal Outbursts Using Differential Reinforcement Methods

(Alderman & Knight, 1997)
Verbal Aggression: Poor Response to Two Differential Reinforcement Interventions

![Graph showing frequency of verbal aggression over hygiene programme sessions]

- **DRI (Token Economy)**
- **DRL**

Frequency of verbal aggression is plotted against hygiene programme sessions. The graph illustrates the response to two different differential reinforcement interventions.
On further reflection...

These rehabilitation participants did not typically respond well to reinforcement procedures and seemed ‘treatment resistive’

Concluded that executive difficulties with awareness and monitoring impairments underpinned ‘challenging’ behaviours

Evidence: observational, theoretical, experimental and response to treatment
A Neurocognitive Explanation for NBD

Evidence for Causal Relationship between Poor Self-monitoring and ABI Behaviour Disorders

1. Observational

2. Theoretical

3. Experimental

4. Response to Treatment
No awareness of incontinence
CE: Effect of DRI on Verbal Aggression

Weeks

DRI+ Intermittent feedback

DRI+ no feedback

15’ intervals outbursts observed

1 5 9 13 17 21 25
A Neurocognitive Explanation for NBD

Evidence for Causal Relationship between Poor Self-monitoring and ABI Behaviour Disorders

1. Observational
2. Theoretical
3. Experimental
4. Response to Treatment
Can theories of executive function inform assessment and treatment options?
Dysexecutive Syndrome

• Increased distractibility
• Poor monitoring of own performance
• Poor monitoring of environmental changes
• Problems utilising feedback
• Secondary memory impairment
Reduced ability to monitor and attend to cues can lead to ‘behavioural perseveration’
What is the functional explanation for such a pattern of deficits?

A Simplified Model of Working Memory (from Baddeley, 1986)
Functional explanation for behaviour

Unable to allocate attentional resources efficiently, less able to monitor two or more ongoing events so may neglect:

• Physiological changes
• Changes in own behaviour
• Changes in the environment

May help to explain actions that are ‘no longer appropriate’ through ‘behaviour perseveration’

Poor response to some operant programmes may be because of this

Consistent with observation of NbR participants
Operant Conditioning

All behaviour has consequences; the nature of these consequences is a powerful determinant of whether that behaviour is repeated.

STIMULUS → BEHAVIOUR → CONSEQUENCES

- Fails to perceive impact of behaviour on environment
- Lacks concurrent awareness of reward contingencies
A Neurocognitive Explanation for NBD

Evidence for Causal Relationship between Poor Self-monitoring and ABI Behaviour Disorders

1. Observational
2. Theoretical
3. Experimental
4. Response to Treatment
Multitasking: motor task performance & secondary verbal tasks

- Controls
- ABI responders
- ABI (DES) non-responders

Tracking Performance (% TOT)

(Alderman, 1996)
A Neurocognitive Explanation for NBD

Evidence for Causal Relationship between Poor Self-monitoring and ABI Behaviour Disorders

1. Observational
2. Theoretical
3. Experimental
4. Response to Treatment
Encouraging people to monitor using behavioural approaches can lead to reduction in challenging behaviour.
Effect of Scheduled Feedback on Inappropriate Interaction with Males in a 19 year Old Female with Severe ABI

(Zencius et al, 1990)
Improving self-monitoring

Ultimately a self-management strategy that requires:

1. **Self-evaluation**
   *Person is able to evaluate their behaviour against some yardstick*

2. **Self-recording**
   *Person is able to maintain a record of whether or not a behaviour occurred*
A Hypothesis and Suggestions for Intervention Characteristics

• Baddeley’s Working Memory Model suggests disinhibition attributable to impairment of skills that enable multiple monitoring of self and environment: DR interventions can be helpful

• However, not all have sufficient attentional resource to maintain concurrent awareness of programme contingencies and own behaviour/cues in social environment

• Collective evidence suggests intervention requires:
  - Immediate feedback
  - Immediate contingency
  - Low demand on memory
  - Motor component (procedural learning)
Comparison of operant procedures to facilitate learning in cases with monitoring impairments

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Also consider

| Cue saliency                       | low                         | high                  |

(Alderman & Burgess, 1994)

(Alderman, Fry & Youngson, 1995)
Response Cost

- An operant conditioning intervention
- Based on principle of negative punishment, that is, removal of something of value contingent on a target behaviour, leading to a decrease in the frequency of that behaviour (Alderman & Burgess, 1990)
- Person given a set amount of tokens to carry
- Exchanges tokens for a reinforcer at a set time if has retained minimum target number of tokens
- Loses one token each time target behaviour observed
Response Cost

Loses one token each time target behaviour observed

1. Staff immediately gain person’s attention

2. State behaviour has just occurred

3. Prompt person to hand over token

4. Give reminder on importance of holding token

Promotes self-evaluation

Record of behaviour
**GAS: management of behaviour disturbance**

Effect of response cost on frequency verbal aggression, rhyming & swearing

‘A’ - behaviours “timed-out-on-the-spot”. ‘B’ - response cost. Each data point represents the total number of target behaviours recorded across the two 30-minute trials comprising each session.
CE: Effect of DRI on Verbal Aggression

Weeks

15' intervals outbursts observed

DRI+ feedback

DRI+ no feedback

CE: Effect of DRI on Verbal Aggression

Weeks
CE: motor task performance & secondary verbal tasks

Tracking Performance (% TOT)

Tr +DF Tr +DB Tr +TE Tr +Co Tr +VF
CE: Reduction in Verbal Aggression Using Response Cost

Weeks

15’ intervals outbursts observed

DRI+ feedback

DRI+ no feedback

Response Cost

DRI+ feedback

0 5 10 15 20 25 30 35

0 5 10 15 20 25 30 35

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CE: Reduction in Verbal Aggression Using Response Cost
Comparison of operant procedures to facilitate learning in cases with monitoring impairments

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*(Alderman & Burgess, 1994)*

Also consider

| Cue saliency | low | high |

*(Alderman, Fry & Youngson, 1995)*
The Case of AB

• 36 year old woman
• HSE one year before admission
• Diagnosed with “Frontal Lobe Syndrome”
• Multiple behaviour problems
  - Stealing food
  - Disinhibition
  - Lack of social awareness
  - Blunt social behaviour
  - Repetitive, stereotyped speech

(Alderman & Ward, 1991)
The Case of AB

• Poor response to differential reinforcement interventions

• Problems with monitoring, utilising feedback and memory

• 5 hour time-sample of repetitive speech
  - 985 in total
  - 581 in rehab sessions
  - 404 at other times

(Alderman & Ward, 1991)
The Case of AB

(Alderman & Ward, 1991)
The Case of AB

(Alderman & Ward, 1991)
Cognitive rehabilitation of monitoring problems that drive post-ABI behaviour disorders: from response cost to self-monitoring training
Self-Monitoring Training (SMT) was first described in the treatment of SK*

The Case of SK

- 21 year old female
- HSE 13 months prior to admission
- Continuous flow of verbal output
- “...she tends to bark out standard repetitive statements like a computer or a parrot”
- Commented incessantly on actions of others
- Loud, inappropriate, provoked others

(Alderman et al., 1995)
The Case of SK

- Time-sampled for 382 minutes
- 3388 self-initiated utterances (mean 8.9 p/min)
- No response to reinforcement/extinction interventions
- Rehabilitation could not proceed, behaviour increased risk
- Responded to Response Cost

(Alderman et al., 1995)
SK: management of behavior disturbance

Mean frequency per minute self-initiated verbal utterances before and after intervention, within the rehabilitation unit

![Bar chart showing mean frequency per minute self-initiated verbal utterances before and after intervention.](chart.png)
The Case of SK

- Time-sampled for 382 minutes
- 3388 self-initiated utterances (mean 8.9 p/min)
- No response to reinforcement/extinction interventions
- Rehabilitation could not proceed, behaviour increased risk
- Responded to Response Cost
- Did not generalise to community rehab

(Alderman et al., 1995)
The Case of SK

Response Cost impractical in community because:

- Longer sessions
- Too many tokens (480 for 2 hours!)
- Too frequent exchange points
- Would highlight disability

Intervention needed to incorporate:

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(Alderman et al., 1995)
The 5 Stages of Self-monitoring Training (SMT)

First, re-establish self-monitoring skills

Second, encourage reduction in target behaviour

1. Baseline

2. Spontaneous self-monitoring

3. Prompted self-monitoring

4. Independent self-monitoring + accuracy reward

5. Independent self-monitoring + DRL

(Alderman et al., 1995)
SK: improvement in ability to self-monitor verbal output through participation in SMT

(Alderman, Fry & Youngson, 1995)
SK: reduction in verbal output and improvement in self-monitoring skills in Stage 5 of SMT

(Alderman, Fry & Youngson, 1995)
SK: acquisition of improved inhibitory control over verbal output in the community following SMT

Mean p/min

Pre-SMT: 8.3
2 wks post: 2.6
5 mths post: 2.4

(Alderman, Fry & Youngson, 1995)
Mean frequency per minute self-initiated verbal utterances before and after intervention, within the rehabilitation unit and the community.
SMT has proved effective with NbR participants since SK

• Behaviour especially characterised by high frequency, unregulated verbal output

• Patients presenting with this behaviour typically have acquired neurological impairment as a consequence of anoxia or infection

• Gains in increased awareness and greater inhibitory control over behaviour tend to maintain
Self-monitoring training (SMT)

- Effective, growing evidence base
- Cognitive remediation (skill-building) approach underpinned by neuropsychological theory and behavioural methods
- Fully engages the recipient, helps create positive therapeutic relationships
- Applicable across a wide range of contexts and environments, including community settings
- Training and support available
Treatment of stable delusional confabulations using self-monitoring training

B. Dayus and M.D. van den Broek

NEUROPSYCHOLOGICAL REHABILITATION, 2000, 10 (4), 415–427
Response Cost vs. SMT
Response Cost vs. SMT

• When clinical situation necessitates rapid solution response cost best option

• Response cost may be used as pilot to evaluate longer-term investment of implementing SMT

• Response cost readily incorporated within environment, gives staff clear and consistent means of responding

• SMT offers a community solution

• SMT ‘cognitive rehabilitation for NbR symptoms’

(Alderman, et al., 1995)
Putting it all together...
The Case of FO

- 25 year old male
- HSE 7 years previously
- Severe anterograde memory impairment, dysexecutive syndrome
- Bizarre behaviour problems
  - Repetitive hip thrusting & rocking
  - Repetitive body rubbing & patting
  - Odd walking patterns
  - Prolific, constant stream of verbal output

(Alderman, 2002; Alderman, 2003)
The Case of FO

Behaviour recordings showed that in a week:

- Body rubbing/patting = 77
- Odd walking = 769
- Hip thrusting/rocking = 2750

(Alderman, 2002; Alderman, 2003)
FO: Effect on Hip Thrusting & Rocking of Behavioural Programme

(Alderman, 2002; Alderman, 2003)
FO: Reduction in Hip Thrusting, Inappropriate Walking & Body Patting using Response Cost

(Alderman, 2002; Alderman, 2003)
The Case of FO

Self-initiated verbal utterances

Mean p/min

Sessions

(Alderman, 2002; Alderman, 2003)
FO: Effect of SMT on Accuracy Self-monitoring & Frequency of All Self-initiated Verbal Output

 Aydın, 2002; Alderman, 2003
FO: Reduction in Self-initiated Verbal Output Pre & Post-SMT

(Alderman, 2002; Alderman, 2003)
Someone to Watch Over Me: impact of Self-Monitoring Training (SMT) on behavioural symptoms of neurobehavioural disability

• A range of evidence has been reviewed that supports a causal relationship between poor self-monitoring skills and behavioural symptoms of NbD

• Two treatment approaches appropriate for people with self-monitoring impairments have been described

• Case study data presented to underpin the efficacy of these approaches – effective and gains maintain
Thanks for Listening!