Executive function and behaviour

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What are executive functions?

They’re functions that are thought to be deployed when control needs to be exerted

- Typically described as ‘supervisory’ or ‘controlling’
- Deployed when a situation is novel or difficult
- When you need to pay attention because there isn’t an automatic / habitual response to the problem or the automatic response would be inappropriate

**Example:** When the phone rings in someone else’s house, you don’t pick it up, even though the automatic tendency in your own home is to do so

- When several cognitive processes need to be co-ordinated
- Or when you need to shift from one type of process to another
Orchestration of behaviour

They’re functions that are thought to be deployed when control needs to be exerted

- Initiate
- Maintain / Sustain / Invigorate / Energise
- Stop ongoing action
- Inhibit inappropriate behaviour or prepotent response
- Switch to a different behavioural set / set shifting / mental flexibility
- Working memory: manipulation of items in short term memory
- Monitor consequences of behaviour / error monitoring
- Planning and prioritization
- Multi-tasking
- Social / emotional engagement
### When executive function breaks down

*There might be profound consequences*

<table>
<thead>
<tr>
<th>Executive function</th>
<th>Associated executive dysfunction</th>
<th>Clinical presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Task initiation</strong></td>
<td>Reduced self-generated behaviours Procrastination</td>
<td>Akinetic mutism, abulia, apathy</td>
</tr>
<tr>
<td><strong>Maintain / sustain actions</strong></td>
<td>Poor ability to stay on task or sustain attention</td>
<td>Distractible</td>
</tr>
<tr>
<td><strong>Response inhibition</strong></td>
<td>Difficulty inhibiting behaviours Acting ‘without thinking’</td>
<td>Disinhibited</td>
</tr>
<tr>
<td><strong>Cognitive flexibility</strong></td>
<td>Rigid thinking / stuck on thoughts, concepts or tasks</td>
<td>Inflexible / perseverative</td>
</tr>
<tr>
<td><strong>Working memory</strong></td>
<td>Difficulty holding information required to perform tasks</td>
<td>Difficulty following instructions or solving problems</td>
</tr>
<tr>
<td><strong>Self monitoring</strong></td>
<td>Lack of awareness when errors or inappropriate responses are made</td>
<td>Unaware</td>
</tr>
<tr>
<td><strong>Planning and prioritization</strong></td>
<td>Poor planning / organizational skills Inefficient use of time</td>
<td>Difficulty making decisions</td>
</tr>
<tr>
<td><strong>Multi-tasking</strong></td>
<td>Difficulty co-ordinating activities simultaneously or sequentially</td>
<td>Difficulty solving tasks that require multi-tasking</td>
</tr>
<tr>
<td><strong>Social / Emotional engagement</strong></td>
<td>Poor social skills, emotional lability, frustration with self / others</td>
<td>Socially and/or emotionally inappropriate</td>
</tr>
</tbody>
</table>
The ‘dysexecutive syndrome’

Evidence suggests that there is no unitary syndrome but many different syndromes

Is there a dysexecutive syndrome?

Donald T. Stuss\textsuperscript{1,2,*} and Michael P. Alexander\textsuperscript{1,3}

\begin{tabular}{|l|l|l|}
\hline
Executive function & Associated executive dysfunction & Clinical presentation \\
\hline
Task initiation & Reduced self-generated behaviours & Akinetic mutism, abulia, apathy \\
& Procrastination & Reduced fluency \\
Maintain / sustain actions & Poor ability to stay on task or sustain attention & Distractable \\
Response inhibition & Difficulty inhibiting behaviours & Distractible \\
& Acting ‘without thinking’ & Inflexible / perseverative \\
Cognitive flexibility & Rigid thinking / stuck on thoughts, concepts or tasks & Difficult choosing instructions or solving problems \\
Working memory & Difficulty holding information required to perform tasks & Clumsy/awkward \\
Self-monitoring & Lack of awareness when errors or inappropriate responses are made & Distractible \\
Planning and prioritization & Poor planning / organizational skills & Difficulty making decisions \\
& Inefficient use of time & Difficulty doing tasks that require multi-tasking \\
Multi-tasking & Difficulty co-ordinating activities simultaneously or sequentially & Social and emotionally inappropriate \\
Social / Emotional engagement & Poor social skills, emotional liability, frustration with self / others & \\
\hline
\end{tabular}
Failure on an executive function test

Doesn’t mean the patient has a primary executive function deficit

Nor is it the case that patients who have difficulties that seem to suggest a dysexecutive syndrome in real life always show deficits on executive function tests
Frontal damage and its consequences
The modern Phineas Gage

1937: University student, aged 21, during Spanish Civil War, suffered an injury while attempting to escape down a drainpipe which gave way.

Subsequently unable to work on simple manual jobs without supervision.

Required help with everyday tasks. Difficulties managing money.

Apathetic and had problems with initiating, continuing and finishing tasks.

Restless and impatient. “Always cheerful”. No antisocial behaviour reported.

Mataro et al. (2001) Arch Neurol
Frontal damage and its consequences

The modern Phineas Gage
Frontal damage and its consequences

*The modern Phineas Gage*

Mataro et al. (2001) *Arch Neurol*
Frontal damage and its consequences

The modern Phineas Gage

<table>
<thead>
<tr>
<th>Level of Severity</th>
<th>Symptoms (Item No.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate</td>
<td>Agitation (11)</td>
</tr>
<tr>
<td>Moderate-severe</td>
<td>Inattention or reduced alertness (1)</td>
</tr>
<tr>
<td></td>
<td>Memory deficit (10)</td>
</tr>
<tr>
<td>Severe</td>
<td>Decreased initiative or motivation (15)</td>
</tr>
<tr>
<td></td>
<td>Poor planning (23)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test</th>
<th>Raw Score (Assessment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive functions</td>
<td></td>
</tr>
<tr>
<td>Wisconsin Card Sorting Test</td>
<td></td>
</tr>
<tr>
<td>Categories achieved</td>
<td>0 (impaired)</td>
</tr>
<tr>
<td>Correct responses</td>
<td>29 (impaired)</td>
</tr>
<tr>
<td>Perseverative errors</td>
<td>30 (impaired)</td>
</tr>
<tr>
<td>Nonperseverative errors</td>
<td>75 (impaired)</td>
</tr>
<tr>
<td>Failure to Maintain Set</td>
<td>0 (impaired)</td>
</tr>
<tr>
<td>Verbal fluency</td>
<td></td>
</tr>
<tr>
<td>Phonemic /p/</td>
<td>2 (impaired)</td>
</tr>
<tr>
<td>Semantic (&quot;animals&quot;)</td>
<td>7 (impaired)</td>
</tr>
<tr>
<td>Luria motor</td>
<td></td>
</tr>
<tr>
<td>Learning</td>
<td>5 (impaired)</td>
</tr>
<tr>
<td>Maintenance (1 minute)</td>
<td>3 (impaired)</td>
</tr>
</tbody>
</table>

Frontal damage and its consequences

*Eslinger & Damasio’s case EVR*

- High-achieving young man – chief accountant by age 29
- Aged 35: Personality changes. Large orbitofrontal meningioma resected
- Behavioural change: invested all his savings in a risky venture, became bankrupt
- Drifted through different jobs including warehouse labourer, but fired from each
- Employers complained about poor time keeping and disorganization
- Wife left with children and divorced him after 17 yrs marriage. He moved in with his parents
- A month after divorce he remarried against advice of relatives and divorced 2 yrs later
- Needed 2hrs to get ready for work. Some days consumed by shaving and washing his hair
- If he was planning to have dinner out, planning took hours deciding seating plan, menu, etc

*Eslinger & Damasio (1985) Neurology*
Frontal damage and its consequences

*Eslinger & Damasio’s case EVR*

**Key finding:** Dissociation between intact cognitive abilities using standard tests (e.g., Wisconsin card sort) and poor use of cognition in real world environments (e.g. planning a dinner out).
Supervisory attentional system model

Norman and Shallice
Cognitive control is often term used in cognitive neuroscience

Refers to situations in which responses cannot be automatic and control needs to be exerted

Stroop test:
Name the ink colour as fast as possible.
Compare performance in congruent vs. incongruent condition

In the incongruent condition, where the ink colour is different to the word, we’re all slowed down because pre-potent / automatic response is to say the word and we have to inhibit this tendency by exerting control. In this condition there is conflict between what we normally would do and the novel task we’re being asked to perform.

Some patients with brain damage may also say the word instead of naming the ink colour.
Cognitive control is often term used in cognitive neuroscience

Refers to situations in which responses cannot be automatic and control needs to be exerted

**Eriksen flanker test:**
Press left / right button as indicated by central target arrow
Compare performance in congruent vs. incongruent condition
Cognitive control is often term used in cognitive neuroscience

One theory proposes that anterior cingulate cortex detects conflict and DLPFC exerts control

Anterior cingulate monitors for conflict

Deployed when input shows conflicting information – in non-default conditions
Major dispute about the function of ACC

Anterior cingulate cortex: adjusts behaviour to adapt to changing environments?

- Rushworth, Kolling and colleagues have proposed a key role for ACC in adjusting behaviour from persevering with current policy to adopting a new one. Analogy with animal foraging.

- According to this view: primary role of ACC is dynamically updating behavioural policies in changing environments.
Major dispute about the function of ACC

Anterior cingulate cortex: computes the expected value of control?

According to Shenhav and Princeton colleagues, ACC detects need for control (as in conflict monitoring) but also calculates its value and signal strength depends upon costs/benefits of control.

Major dispute about the function of ACC
Anterior cingulate cortex: foraging value theory vs expected value of control

Foraging value theory (FVT)
- How much reward can I expect from switching to that task?
- What are the resource costs of switching tasks?
- How much reward can I expect if I stick with this task?

Expected value of control theory (EVC)
- How much reward can I expect from performing this task?
- How much control does that task demand?
- How costly is this control?
- What are the resource costs and control costs of switching tasks?
- How demanding is the choice between these tasks?
- How much reward can I expect from performing this task?
- How much control does this task demand?
- How costly is this control?
Anterior cingulate theories

Also put in perspective of offline controller versus online transformation of inputs to outputs

Foraging value theory

Expected value of control

Heilbronner & Hayden (2016) Ann Rev Neurosci
Multiple demand network

Executive functions aren’t necessarily ‘frontal’ – a fronto-parietal system identified across studies

**Hard vs easy contrasts**
- Remembering words / non-words
- Arithmetic
- Spatial working memory
- Verbal working memory
- Three different ‘conflict tasks’
Intelligence and executive function

Strong relationship between ‘fluid intelligence’ and multiple demand network?

Fluid intelligence tasks
Duncan TICS 2010

Duncan (2013) Neuron
Intelligence and executive function

Strong relationship between ‘fluid intelligence’ and multiple demand network?

Fluid intelligence tasks
Duncan TICS 2010
IQ and executive function in frontal lesion cases

Performance on some tests explained entirely by Culture Fair IQ

![IQ and executive function in frontal lesion cases](image)
IQ and executive function in frontal lesion cases

But performance on other tests not fully accounted for by Culture Fair IQ

Lesion overlap for 6 patients with worst average residual (performance adjusting for fluid intelligence) across Go–no go, Proverbs, Hayling, Hotel and Faux Pas tests.

Roca et al (2010) Brain
IQ deficits in frontal AND parietal lesions

Two large studies have linked intelligence impairment to damage to frontal and parietal areas

Gläscher et al. (2010) PNAS

Woolgar et al. (2010) PNAS
Lessons from focal lesions applied to neurodegeneration
**Dysexecutive syndrome**

*Cognitive tests in GREFEX (Groupe de Reflexion pour l’Evaluation des Fonctions EXécutives) battery*

### Table 2. Scores in the battery and their combination into seven executive process scores.

<table>
<thead>
<tr>
<th>Tests</th>
<th>19 scores</th>
<th>Process scores</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stroop</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>naming</td>
<td>Time, Error</td>
<td>Initiation(^1)</td>
</tr>
<tr>
<td>reading</td>
<td>Time, Error</td>
<td>Initiation(^1)</td>
</tr>
<tr>
<td>interference</td>
<td>Time, Error</td>
<td>Inhibition(^2)</td>
</tr>
<tr>
<td><strong>Trail Making</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>part A</td>
<td>Time, Error</td>
<td>Initiation(^1)</td>
</tr>
<tr>
<td>part B</td>
<td>Time, Error, perseveration</td>
<td>Flexibility(^3)</td>
</tr>
<tr>
<td><strong>Verbal fluency</strong> (categorical, letter)</td>
<td>Correct response</td>
<td>Generation(^4)</td>
</tr>
<tr>
<td><strong>Modified Card Sorting</strong></td>
<td>Category</td>
<td>Deduction(^5)</td>
</tr>
<tr>
<td></td>
<td>Error, perseveration</td>
<td>Flexibility(^3)</td>
</tr>
<tr>
<td><strong>Dual task</strong></td>
<td>Mu(^6)</td>
<td>Coordination(^6)</td>
</tr>
<tr>
<td><strong>Brixton</strong></td>
<td>Error</td>
<td>Deduction(^5)</td>
</tr>
<tr>
<td><strong>Six elements</strong></td>
<td>Rank</td>
<td>Planning(^7)</td>
</tr>
</tbody>
</table>

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\(^1\) The initiation score corresponds to the average of the z scores of the completion time (corrected for the error rate in each test) in the Trail Making Test A and Stroop reading and naming subtests.

\(^2\) The inhibition score is based on the errors in the interference subtest of the Stroop Test minus the errors in the naming subtest.

\(^3\) The flexibility score is the mean value of the z scores of perseveration in the Card Sorting and Trail Making Test B.

\(^4\) The generation score is the mean value of the z scores of the fluency tests.

\(^5\) The deduction score is the z score of the category achieved in the Card Sorting test minus the z score of errors in the Brixton test.

\(^6\) The coordination score is calculated as Mu = 100\[1-(decrement of digit series recall on dual task + decrement of tracking on dual task)/2\]

\(^7\) The planning score is the z score of the six elements task.
# Dysexecutive syndrome

*Behavioural inventory in GREFEX battery* I Structured interview with caregiver like NPI

<table>
<thead>
<tr>
<th>Behavioral Dysexecutive Syndrome Inventory</th>
<th>Behavioral indices</th>
<th>Behavioral disorders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domains*</td>
<td></td>
<td>cutoff scores at the 5% level</td>
</tr>
<tr>
<td>Global hypoactivity with apathy-abulia</td>
<td>Grouped into hypoactivity with apathy-abulia domain</td>
<td>frequency x severity of 2 or 3 domains &gt; cutoff score</td>
</tr>
<tr>
<td>Difficulties for anticipation and initiation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disinterest and indifference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hyperactivity-distractibility-psychomotor instability</td>
<td>Grouped into hyperactivity-distractibility-psychomotor instability domain</td>
<td>frequency x severity of 2 or 3 domains &gt; cutoff score</td>
</tr>
<tr>
<td>Irritability-impulsivity-aggressiveness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Euphoria, emotional lability and moria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stereotyped and perseverative behavior</td>
<td>Stereotyped and perseverative behavior</td>
<td>frequency x severity &gt; cutoff score</td>
</tr>
<tr>
<td>Environmental dependency</td>
<td>Environmental dependency</td>
<td>frequency x severity &gt; cutoff score</td>
</tr>
<tr>
<td>Anosognosia-anosodiaphoria</td>
<td>Anosognosia-anosodiaphoria</td>
<td>frequency x severity &gt; cutoff score</td>
</tr>
<tr>
<td>Spontaneous confabulations</td>
<td>Spontaneous confabulations</td>
<td>frequency x severity &gt; cutoff score</td>
</tr>
<tr>
<td>Disorders of social behavior</td>
<td>Disorders of social behavior</td>
<td>frequency x severity &gt; cutoff score</td>
</tr>
<tr>
<td>Disorders of sexual behavior</td>
<td>Disorders of sexual behavior</td>
<td>frequency x severity &gt; cutoff score</td>
</tr>
<tr>
<td>Behavioral dysexecutive syndrome</td>
<td>≥ 3/12 domains impaired</td>
<td></td>
</tr>
</tbody>
</table>

Dysexecutive syndrome

Both behavioural and cognitive changes occur

Dysexecutive syndrome
Both behavioural and cognitive changes occur


Hypoactivity-Apathy
Hyperactivity-Distractibility
Anosognosia
Confabulations
Sexual behaviour
Environmental dependency
Social behaviour

Initiation
Inhibition
Planning
Co-ordination
Generation

Shifting
Deduction

FIGURE 1: Frequency (%) of behavioral (upper part) and cognitive (lower part) dysexecutive disorders in patients and controls (A) and in patients (B) according to the presence of loss of autonomy.

FIGURE 2: Pattern (frequency %) of behavioral (left) and cognitive (right) disorders according to the disease. BI = brain injury; I = impairment.

Godefroy et al: Dysexecutive Syndrome

December, 2010
Behavioural or dysexecutive presentations in Alzheimer’s
disease

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>75</td>
<td>55*</td>
<td>29*</td>
<td>58</td>
<td>59</td>
<td>61</td>
</tr>
<tr>
<td>Agea</td>
<td>65.8 ± 8.5</td>
<td>64.7 ± 8.8</td>
<td>69.2 ± 8.5</td>
<td>64.4 ± 8.6</td>
<td>63.8 ± 6.8</td>
<td>63.7 ± 8.1</td>
</tr>
<tr>
<td>Sex (% male)</td>
<td>68.0</td>
<td>72.7</td>
<td>60.7</td>
<td>65.5</td>
<td>71.2</td>
<td>62.3</td>
</tr>
<tr>
<td>Education (years)b</td>
<td>15.5 ± 3.1</td>
<td>15.7 ± 2.3</td>
<td>15.7 ± 2.7</td>
<td>15.8 ± 2.5</td>
<td>15.4 ± 3.2</td>
<td>17.3 ± 1.9</td>
</tr>
<tr>
<td>MMSEc</td>
<td>22.7 ± 5.6</td>
<td>22.5 ± 5.4</td>
<td>24.6 ± 3.3</td>
<td>22.5 ± 4.1</td>
<td>23.7 ± 5.4</td>
<td>29.4 ± 0.7</td>
</tr>
<tr>
<td>CDRd</td>
<td>0.9 ± 0.6</td>
<td>0.9 ± 0.4</td>
<td>0.8 ± 0.3</td>
<td>0.9 ± 0.5</td>
<td>1.1 ± 0.7</td>
<td>0 ± 0</td>
</tr>
<tr>
<td>GDSg</td>
<td>3.4 ± 2.9</td>
<td>3.2 ± 2.8</td>
<td>3.7 ± 3.2</td>
<td>2.9 ± 2.1</td>
<td>5.0 ± 3.4</td>
<td>2.0 ± 2.6</td>
</tr>
<tr>
<td>NIIf</td>
<td>14.3 ± 16.8</td>
<td>15.4 ± 17.6</td>
<td>12.3 ± 18.1</td>
<td>7.0 ± 11.0</td>
<td>21.9 ± 20.0</td>
<td>2.7 ± 1.2</td>
</tr>
<tr>
<td>% APOE ε4 carriersg</td>
<td>51.7</td>
<td>59.5</td>
<td>40.0</td>
<td>72.1</td>
<td>18.9</td>
<td>16.7</td>
</tr>
<tr>
<td>APOE ε4 +/+ ++++</td>
<td>6/25/29</td>
<td>6/19/17</td>
<td>2/8/15</td>
<td>14/17/12</td>
<td>0/10/43</td>
<td>3/7/50</td>
</tr>
<tr>
<td>TIV (l)</td>
<td>1.60 ± 0.17</td>
<td>1.60 ± 0.15</td>
<td>1.61 ± 0.19</td>
<td>1.59 ± 0.15</td>
<td>1.64 ± 0.16</td>
<td>1.57 ± 0.14</td>
</tr>
<tr>
<td>Autopsy-confirmed</td>
<td>24</td>
<td>17</td>
<td>12</td>
<td>8</td>
<td>21</td>
<td>-</td>
</tr>
<tr>
<td>PET/CSF biomarkers</td>
<td>41/22</td>
<td>28/18</td>
<td>15/10</td>
<td>26/29</td>
<td>23/23</td>
<td>-</td>
</tr>
</tbody>
</table>

Ossenkoppele et al (2015) Brain
Patients presented initially with cognitive difficulties (53%) and behavioural-predominant presentations of Alzheimer's disease (mean age: 64.7). The average CDR was 8.5, median: 71.3, range: 53.7–83.5. Table 1. Clinical groups consisted of mildly impaired patients with mean MMSE scores ranging from 22 to 25 and with dysexecutive Alzheimer's disease, 59.5% and 40% patients with behavioural Alzheimer's disease and patients were relatively young at time of diagnosis and more often than with behavioural changes (25%, Fig. 1A).

Clinical features of Alzheimer's disease pathology have been characterized by a milder and more restricted behavioural profile than in behavioural variant frontotemporal dementia, co-occurrence with primary co-morbid (2/6 (33%), 3/6 (22%) or 4/6 (20%), Rascovsky et al., 2011). The majority of patients were more prominent than disinhibition and loss of empathy, while hyperorality and perseverative/compulsive behaviours were relatively less common. Neuropsychiatric Inventory scores also indicate that the behavioural profile of patients with behavioural Alzheimer's disease is characterized by a milder and more restricted behavioural profile than in behavioural variant frontotemporal dementia [2/6 (33%), 3/6 (22%) or 4/6 (20%), Rascovsky et al., 2011].

Among 24 autopsied behavioural Alzheimer's disease/dysexecutive Alzheimer's disease patients, only two had primary co-morbid pathological features characteristic of progressive supranuclear palsy. In conclusion, behavioural Alzheimer's disease presentations are characterized by a milder and more restricted behavioural profile than in behavioural variant frontotemporal dementia. Co-occurrence with primary co-morbid is modest (9/75 patients). Sixty per cent of patients with a dysexecutive-predominant syndrome (dysexecutive Alzheimer's disease) had a dysexecutive-predominant syndrome (dysexecutive Alzheimer's disease). We performed structured chart reviews to ascertain first symptoms reported by patients and caregivers, (2015).
Behavioural or dysexecutive presentations in Alzheimer’s
Behavioural or dysexecutive presentations in Alzheimer’s
Behavioural / dysexecutive syndromes in other dementias

Transdiagnostic approach across three disorders

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>bvFTD</th>
<th>PPA</th>
<th>CBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample size</td>
<td>243 (100.0%)</td>
<td>124 (51.0%)</td>
<td>34 (14.0%)</td>
<td>85 (35.0%)</td>
</tr>
<tr>
<td>DKEFS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal fluency</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Tower Test</td>
<td></td>
<td></td>
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<tr>
<td>Sorting Test</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>EF 3 composite</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>FrSBe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apathy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disinhibition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Executive dysfunction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
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</tbody>
</table>

FrSBe protocols were based on the Lund-Manchester Group consensus criteria. This approach across three disorders

Table 4: Estimated correlation coefficient of EF and DB latent variables

Models 3 & 4

Gansler et al (2017) JNINP
Behavioural / dysexecutive syndromes in other dementias

Executive dysfunction on cognitive tests
Dysexecutive behaviour
Both executive dysfunction and dysexecutive behaviour

Gansler et al (2017) JNNP
Summary

Executive function and behaviour

- Executive functions or cognitive control processes are fundamental to successful human behaviour and social interactions
- When they are dysfunctional, profound cognitive and behavioural changes may emerge to give rise to a dysexecutive syndrome
- Although focal lesions have been crucial in developing our understanding it is clear that these principles can also be applied to neurodegenerative cases
- A frontoparietal multiple demand network rather than frontal cortex alone might mediate control
- One current debate focuses on precise role of anterior cingulate cortex in cognitive control