COGNITIVE FUNCTION
SESSION II: MEASUREMENT

Sophie von Stumm
Psychological and Behavioural Science London
School of Economics and Political Science
s.von-stumm@lse.ac.uk
Technologies for assessing cognitive function

- Smartphone app for adults
  - Short-term memory
  - Processing speed
  - Working memory
- Smartphone app for infants
- 3D Online Game
  - Early learning
  - Spatial ability
- Remote access
- Extremely large samples
- Gamified
- Precise measure
Do you feel ... ?

- Awake
- Nervous
- Happy

Next

Memorize the following numbers ...

- 2620
- 8646
- 1090
- 8267
- 4508

Indicate all pairs that are equal

- 856592153494
- QMA3FV2UMPAX
- AE97QUUTC19J
- P3820KLWGWIK
- 238520682562
- 885951737386
- MZX5EE01DG1J
- LC2N1AZQ1GRR
- 280000520610
- ZIISENDZKV10

Working Memory

```
3  
5  
2  
6  
+3  
-1  
-6  
+9  
5s 5s 30s
```
Registrations: 24,375 from 158 countries: 16,639 men, 7,519 women, 217 no gender stated
>24,000 registered

>15,000 users

700 users ≥ 10 valid completions
Training gains

Short-term Memory

Working Memory

Better/ worse mood (within-person)

within-person  between-person

0%  10%  20%  30%  40%  50%  60%  70%  80%  90%  100%

Short-term memory  Processing speed  Working memory  Good mood  Bad mood

Short-term Memory

Working Memory
• 53 mothers of infants aged 2-15 week

• Use app for 3 weeks (maximum \( n_{\text{assessments}} = 15 \))

• Complete 3 surveys
  • well-being & support (x3)
  • sleep & diets (x9)
  • milestones (x3)
Sleep, feeding practices, child development and outcomes...

How many meal-sized portions of shellfish, for example a large bowl of clams, have you eaten in the past 2 days?

In the past 24 hours, how many portions of veggies have you eaten?
Examples for typical portions of vegetables are 3 heaped table spoons of carrots or half a large courgette.

In the past 24 hours, how many units of alcohol have you had?
A unit alcohol is equivalent to a half pint of beer (250ml) or a very small glass of wine (76 ml).
<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>ICC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother wellbeing</td>
<td>3.25</td>
<td>0.50</td>
<td>0.52</td>
</tr>
<tr>
<td>Mother support</td>
<td>2.61</td>
<td>0.48</td>
<td>0.68</td>
</tr>
<tr>
<td>Mother diet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fish</td>
<td>0.60</td>
<td>0.65</td>
<td>0.19</td>
</tr>
<tr>
<td>Fruit</td>
<td>2.27</td>
<td>0.28</td>
<td>0.55</td>
</tr>
<tr>
<td>Vegetables</td>
<td>2.95</td>
<td>1.02</td>
<td>0.49</td>
</tr>
<tr>
<td>Alcohol</td>
<td>0.81</td>
<td>0.81</td>
<td>0.29</td>
</tr>
<tr>
<td>Total dietary supplements</td>
<td>1.71</td>
<td>0.69</td>
<td>0.79</td>
</tr>
<tr>
<td>Mother sleep</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother time in bed</td>
<td>8.65</td>
<td>4.85</td>
<td>0.18</td>
</tr>
<tr>
<td>Mother hours asleep</td>
<td>6.28</td>
<td>3.17</td>
<td>0.55</td>
</tr>
<tr>
<td>Frequency attending to baby</td>
<td>2.80</td>
<td>3.46</td>
<td>0.30</td>
</tr>
<tr>
<td>Mother overall sleep quality</td>
<td>3.00</td>
<td>0.66</td>
<td>0.30</td>
</tr>
<tr>
<td>Mother on baby</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baby feeds</td>
<td>6.48</td>
<td>1.40</td>
<td>0.47</td>
</tr>
<tr>
<td>Baby hours asleep</td>
<td>14.85</td>
<td>4.42</td>
<td>0.55</td>
</tr>
</tbody>
</table>
Instruction] We now ask you to try a few different tasks with your baby. Please read the instructions for each task carefully and put the phone in a safe place before trying with your baby. Please make sure you focus on your baby until you have completed the task and only then return to your phone. Please make sure that your baby is awake and comfortable when you attempt the tasks. If your baby becomes upset or irritable, please don’t persist in completing the tasks but comfort your baby.

[Task] Please place your baby on the tummy on a comfortable and suitable surface, for example a changing table. How does your baby react?

How did your baby react? Tick all that apply.

- My baby did not react in any noticeable way.
- My baby became upset or cried.
- My baby turned the head to the left or right side.
- My baby flapped with the arms.
- My baby lifted the head from the surface.
- My baby lifted the upper body placing weight on both arms.
- My baby rolled over onto the back.
- I did not try the task with my baby.
3D Online Game: SPATIAL SPY
map reading with memory

navigation based on cardinal points

scanning

Malanchini et al., in preparation
a.

Scanning
Perspective Taking
Orientation Landmarks
Orientation Directions
Map Reading With Memory
Map Reading No Memory

b.

Spatial Orientation

SC
PT
OL
OD
MWM
MNM

Malanchini et al., in preparation
Thank you!

Acknowledgements: for their tireless help Hannah Scott, Rachel Latham, & PSYT; for the funding support the Jacobs Foundation; British Academy; and the Imagination Institute.