Exploring the relationship between cognition and real world reasoning in adults with severe TBI at 6 months post injury

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Impairments following TBI

Cognitive Communication Disorder	Cognitive Impairment
• E.g.	• Executive functions
• Excessive talkativeness or inappropriate comments	• Problem-solving, reasoning, self-monitoring
• Difficulty staying on topic	• Attention and speed of thinking
• Repetitiveness of ideas, whole conversations or stories	• Memory

(ASHA, 2005)

(McDonald, 2013)

Assessment of cognitive communication disorder

- Traditional aphasia batteries not sensitive (Turkstra, Coelho, & Ylvisaker, 2005)
- Functional Assessment of Verbal Reasoning and Executive Functions (FAVRES) (MacDonald & Melnichouk, 2005).
- Standardised test (MacDonald & Johnson, 2005)
- Four activity level tasks

Aim

- Clinicians use FAVRES to determine the presence of cognitive communication disorder
- Limited research on the nature of the association between cognitive communication disorder and cognition
- *Does performance on FAVRES reflect on cognitive skills?*

Research questions

1. Is the overall performance on the FAVRES associated with overall neuropsychological test performance?

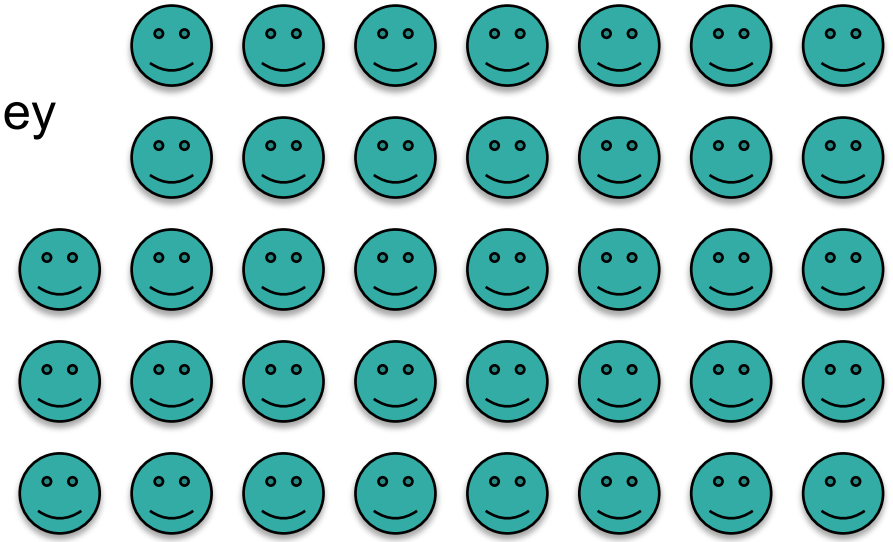
1. What is the association between the performance on each of the FAVRES subtests and overall neuropsychological test performance?

1. What is the association between the performance on each of the FAVRES subtests and the performance on each of the three cognitive measures including attention and speed of thinking, memory and executive function?

Design and Participants

- Cross-sectional observational study
  - 1 group of participants at 6 months post injury
  - Approved by a local institutional ethics committee
  - Data is a sub-set from a larger longitudinal study focusing on communication recovery funded by NHMRC

- Participants
  - Recruited from 3 brain injury units in Sydney
  - 31 males, 7 females
  - Aged 16-56 years at time of TBI
  - PTA 10-96 days (mean 42.42 days)



Procedure

Speech Pathology Ax

FAVRES

1. Planning an event
2. Scheduling a workday
3. Deciding on gifts
4. Building a case to solve a problem

Cognitive Neuropsychology Screen

Attention and speed of thinking

Memory

Executive Function

FAVRES Measures

Time

Length of time to complete task (minutes)

Accuracy

Score for correct response

Rationale

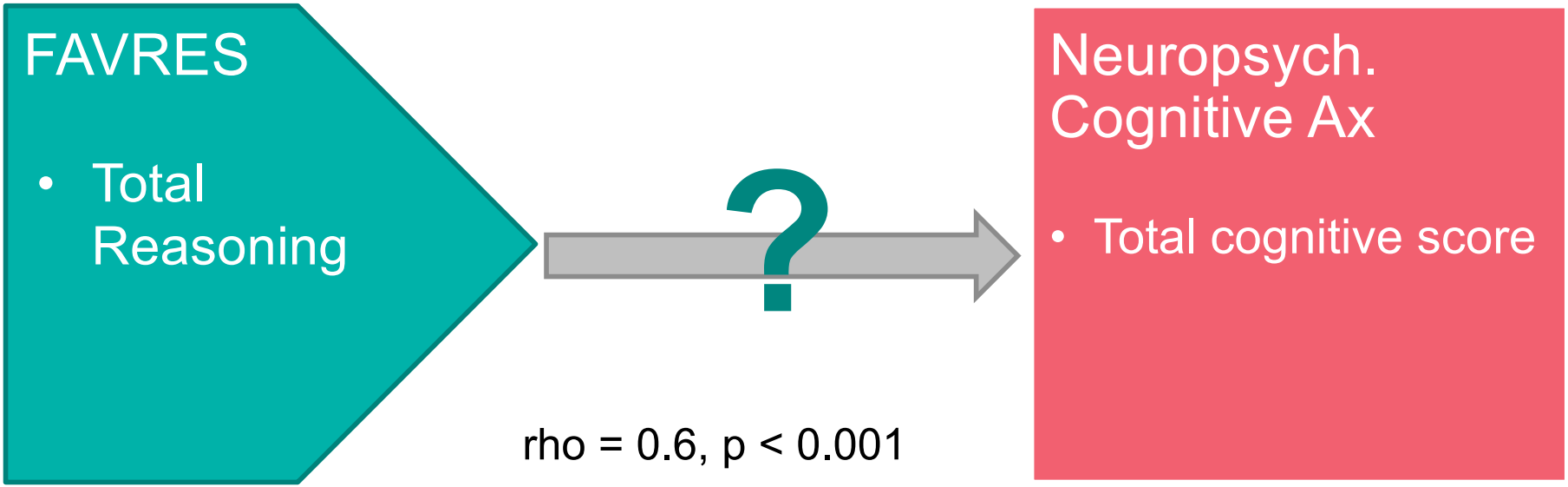
Score for reasons provided for choice of answer

Total Reasoning

Score for verbal reasoning

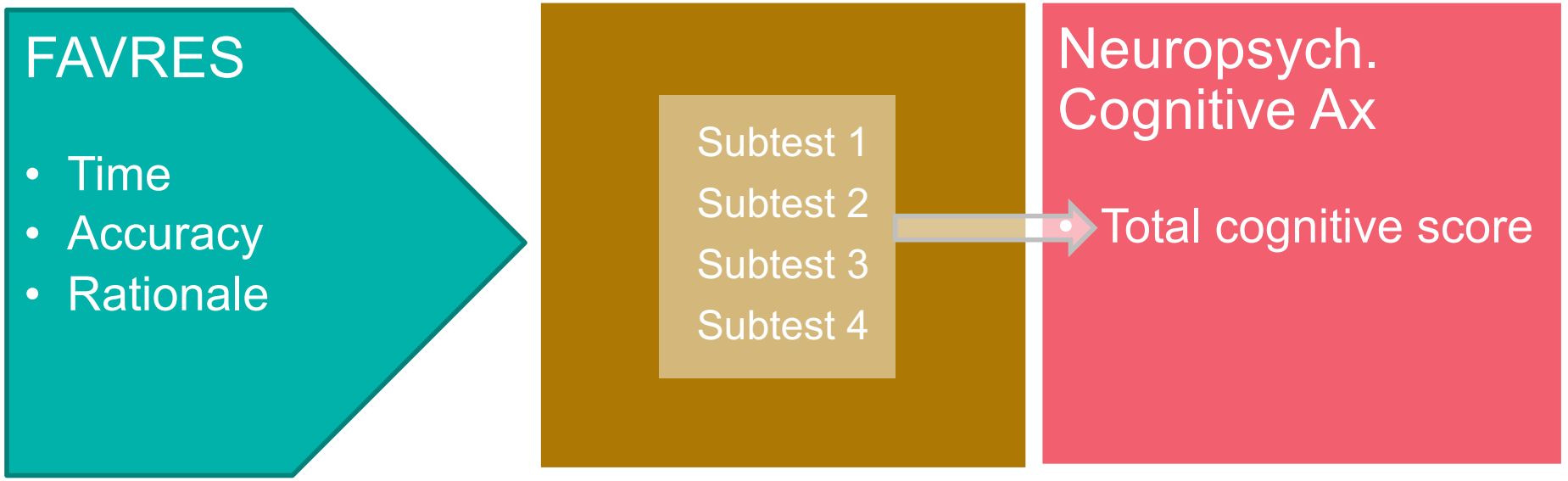
Results

Research Question 1



Results

Research Question 2



Results: research question 2

Task 1 Planning a event	**Total cognitive score**
Accuracy score	
Rationale score	
Time score	

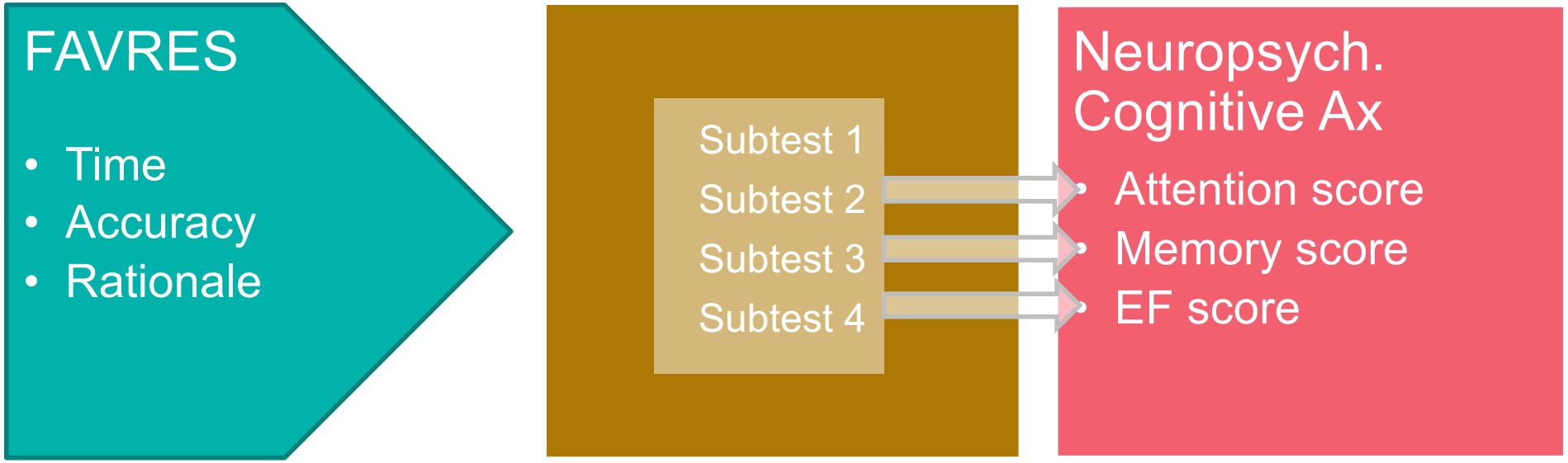
Task 2 Scheduling	**Total cognitive score**
Accuracy score	
Rationale score	
Time score	

Task 3 Choosing a gift	**Total cognitive score**
Accuracy score	
Rationale score	
Time score	

Task 4 Written complaint	**Total cognitive score**
Accuracy score	
Rationale score	
Time score	

Results

Research Question 3



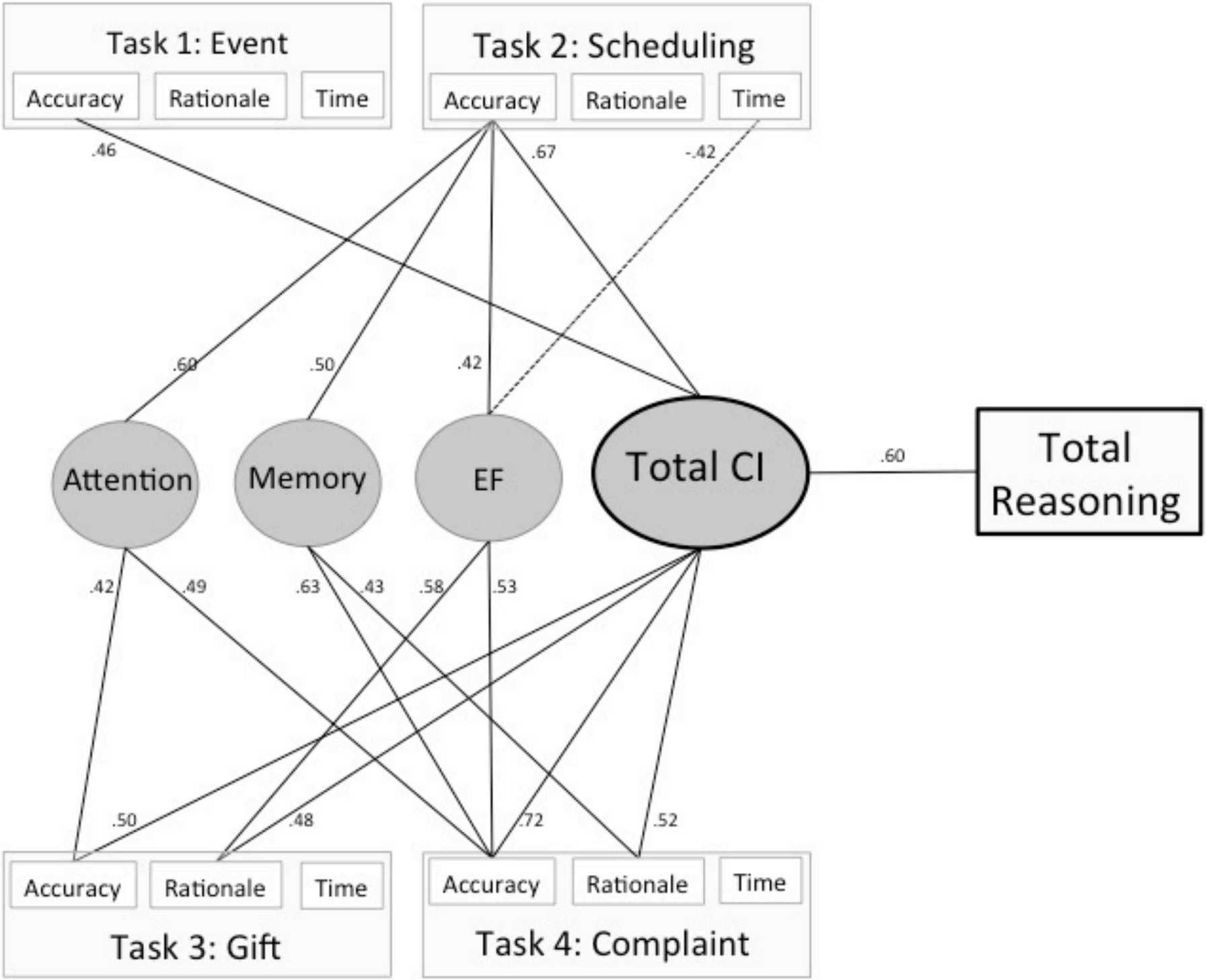
Results: research question 3

Task 1 Event Planning	**Attention**	**Memory**	**EF**
Accuracy			
Rationale			
Time			

Task 2 Scheduling	**Attention**	**Memory**	**EF**
Accuracy			
Rationale			
Time			

Task 3 Choosing a gift	**Attention**	**Memory**	**EF**
Accuracy			
Rationale			
Time			

Task 4 Writing a complaint	**Attention**	**Memory**	**EF**
Accuracy			
Rationale			
Time			


Task 1: Event
Accuracy
Rationale
Time
Task 2: Scheduling
Accuracy
Rationale
Time
.46
.67
-.42
.60
.50
.42
Attention
Memory
EF
Total CI
.60
Total Reasoning
.42
.49
.63
.43
.58
.53
.50
.48
.72
.52
Accuracy
Rationale
Time
Task 3: Gift
Accuracy
Rationale
Time
Task 4: Complaint

Post-hoc analysis of Task 4:

Strategies of Observed Learning Outcomes (SOLO) taxonomy

Table 1. Description of SOLO levels, adapted from Biggs and Collis (1982)

SOLO level	SOLO description	Explanation
1	Prestructural	No logical interrelation between question and answer, e.g. denial, tautology, transduction
2	Unistructural	Only one relevant aspect is mentioned
3	Multistructural	Several relevant features mentioned, but are not linked up
4	Relational	Correctly drawing a general conclusion from particular instances
5	Extended abstract	Elaborating and extrapolating beyond the given situation, incorporating all relevant data

Penn, C., Jones, D., & Joffe, V. (1997)

Task 4: SOLO taxonomy

› Example 1: Multi-structural (level 3)

"My roof is leaking and has not been fixed. Lack of response is not good. Why has the roof leaked? The roof needs to be repaired."

Results

› Example 2: Relational (level 4)

"Hello Mr. Porter, I'm sorry but I won't be paying for the roofing job by Klaus because he didn't turn up when he promised and I had a chair belonging to my brother Dan which is now ruined and rotten.

I won't be paying any extra for the job because of your error in hiring Klaus who obviously wasn't suitable for the job you gave him.

My house interior is ruined and I think you have to reconsider your secretary too because she couldn't find my contract. I was very disappointed not to have heard from you sooner as the rain has been ongoing with no word of apology from you with regards to the delays in completing my job."

Results

› Example 2: Relational (level 4)

"Hello Mr. Porter, I'm sorry but I won't be paying for the roofing job by Klaus because he didn't turn up when he promised and I had a chair belonging to my brother Dan which is now ruined and rotten.

I won't be paying any extra for the job because of your error in hiring Klaus who obviously wasn't suitable for the job you gave him.

My house interior is ruined and I think you have to reconsider your secretary too *because she couldn't find my contract.* I was very disappointed not to have heard from you sooner *as the rain has been ongoing* with no word of apology from you with regards to *the delays in completing my job."*

Conclusions

› **Lack** of associations between **Task 1** and **cognitive scores**

→ Participants perform well in Task 1 but demonstrate difficulty in subsequent tasks

→ Task 1 not strongly correlated with Tasks 2, 3 and 4 (Rietdijk et al., 2013)

→ Reduced cognitive demand required

→ May not be as sensitive to the detection of cognitive communication disorder

→ But important entry-level task

Conclusions

› **Tasks 2** and **Task 4** were **strongly** associated with **cognitive scores**

→ Opportunities for further Ax

e.g. SOLO taxonomy

→ Potentially focus on administration of **Task 2** and **Task 4**

Reduce administration time

(↓ fatigue and ↓ frustration)

Conclusions

- There **is** an **association** between performance on the **FAVRES** and **cognitive performance**
  - → FAVRES **robust measure** for assessment of cognitive communication
  - → 24 receiving Rx **BUT** 31 diagnosed with CCD
    - → Other measures can **miss** people with cognitive communication disorder
    - → Significant implications upon reintegration
  - → **Functional** and **interdisciplinary** approach

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Questions