

Introduction

Theory of Mind (ToM) and **Metacognition (MC)** are the two main areas of theory and research on children's knowledge about the mental world:

ToM refers to children's awareness of the representational character of the **other's mind** or the human mind, in general (Hughes et al., 2011).

MC is focused on the awareness, monitoring and control of **one's own mind**, its cognitive processes and skills (Sodian et al., 2012).

Many recent studies address the impact of other dimensions of cognitive development (e.g., executive functions, language) on *either* the development of MC (e.g., Roebbers, 2017; Annevirta et al., 2007) *or* the development of ToM (e.g., Schneider et al., 2014; Milligan et al., 2007).

However, despite the conceptual and functional similarities in ToM and MC, their developmental interconnection is not extensively explored in the literature (Misailidi, 2010).

Aim

This study aimed at investigating the developmental link between ToM and MC across a wide age-span (from 4 to 13 years of age). It also aimed at detecting the role of executive functions and language in this relationship.

Method

Participants:

- N= 362 students, equally distributed across the ages from **4 to 13 years of age**.
- Middle socio-economic class.
- Coming from schools in Greece.
- Typically developing, with no motor, sensory, linguistic or other developmental disorders.

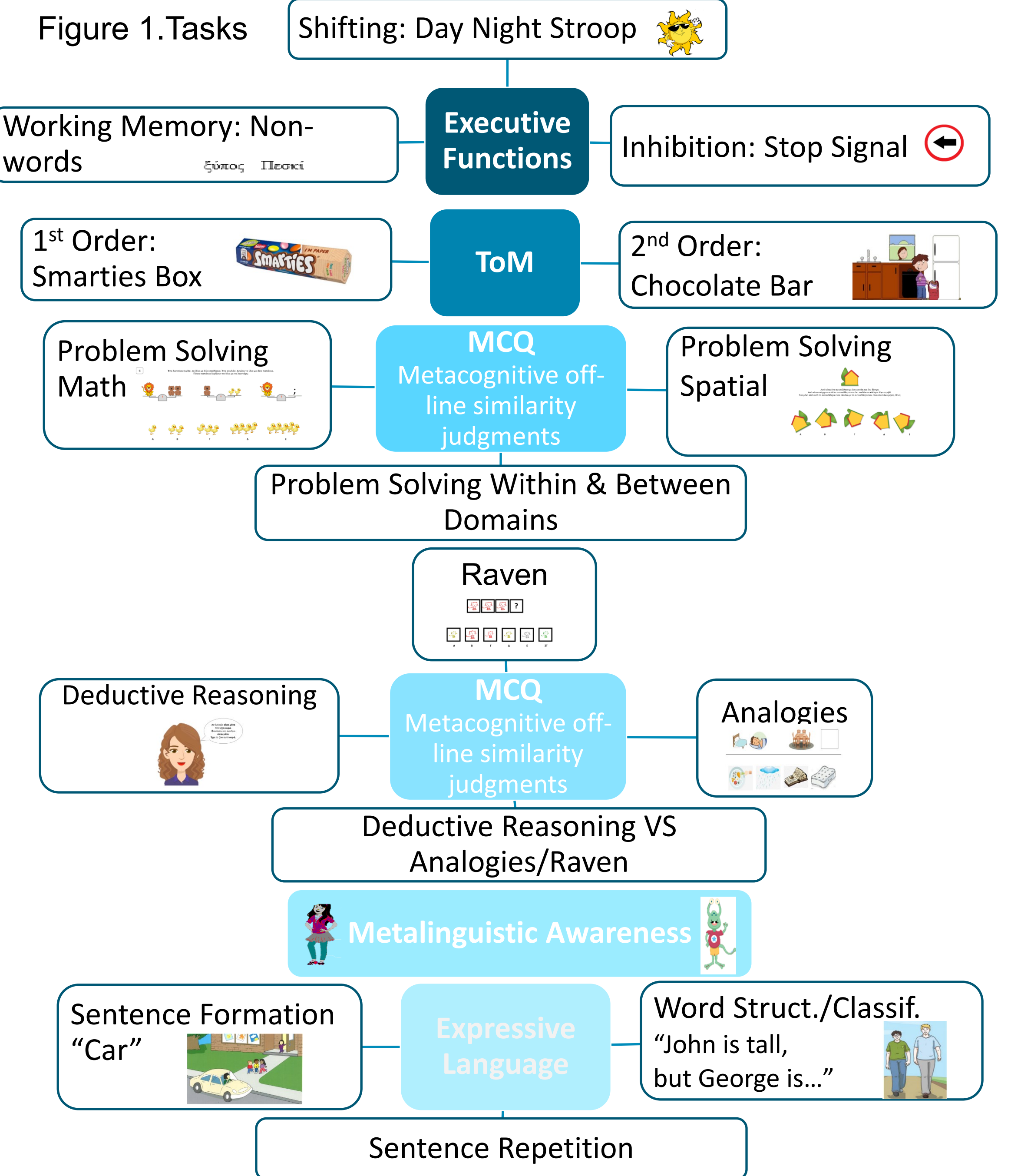
Procedure:

All children were tested individually, in a quiet room during school hours. Administration of the tasks was completed in 5-7 sessions (depending on children's age) to avoid fatigue.

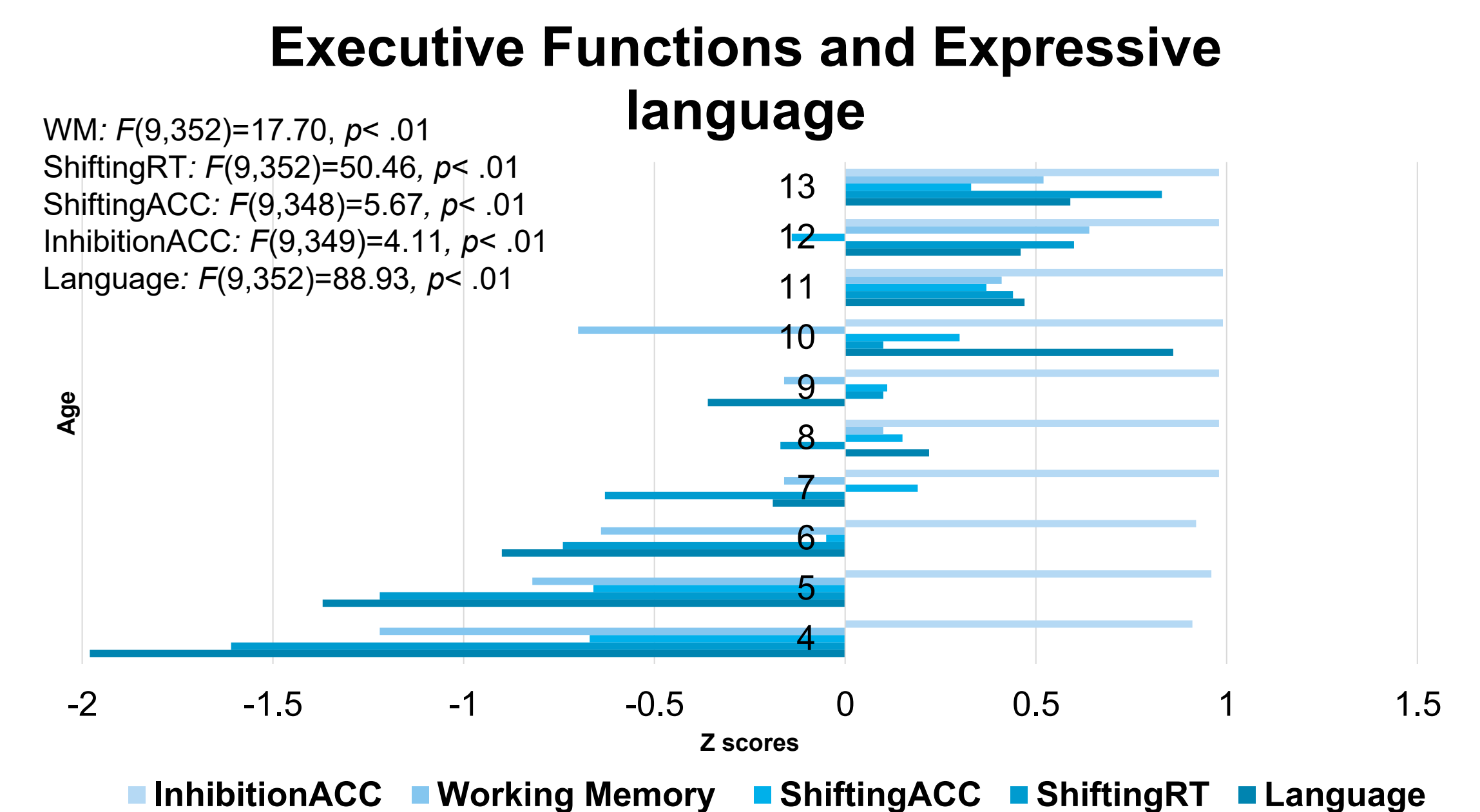
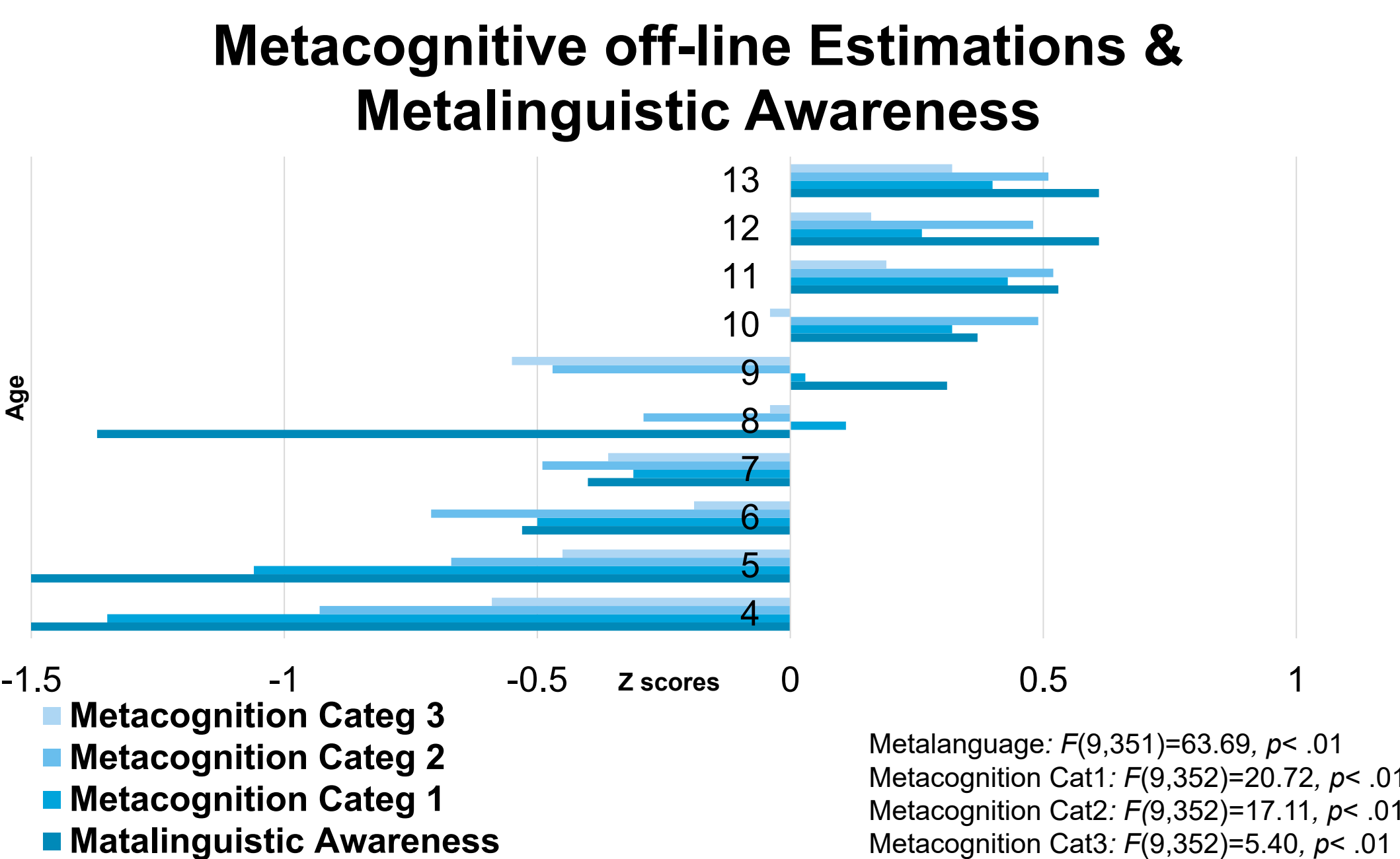
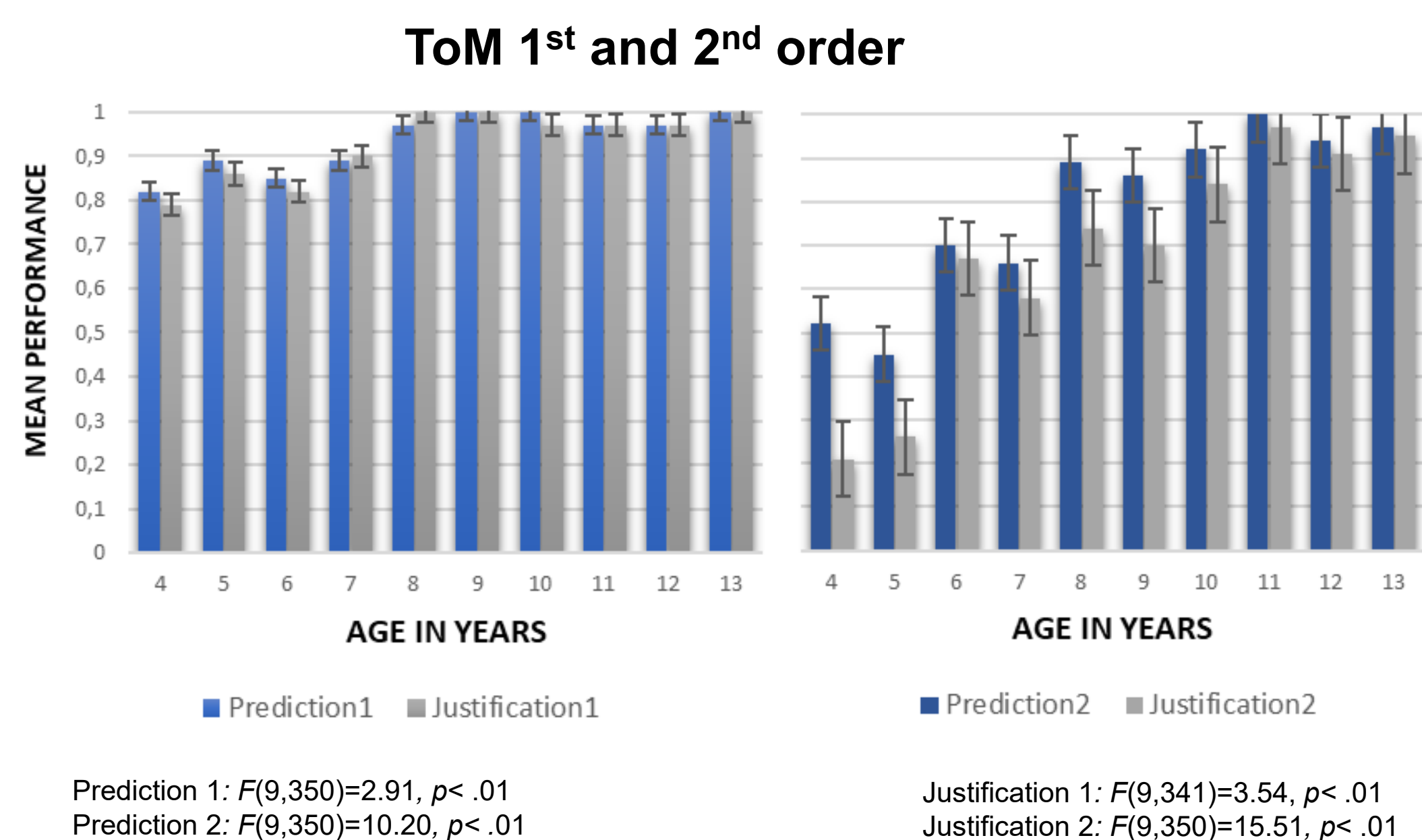
Measures:

A battery of 11 tasks was administered addressing the following (see, Figure 1):

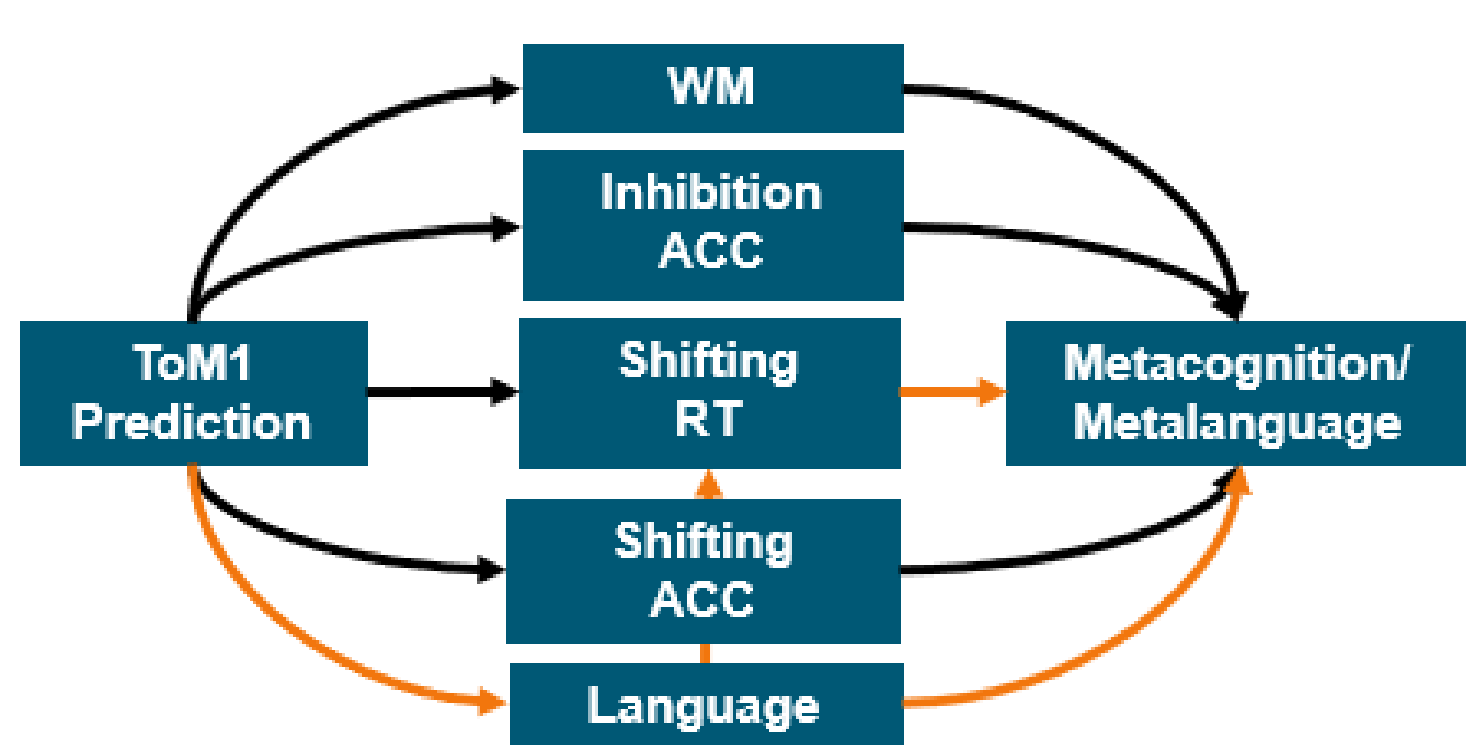
- executive functions (inhibition, shifting, working memory)
 - ToM (1st and 2nd order false-belief tasks)
 - Metacognitive off-line estimations acquired through the administration of problem-solving tasks and reasoning tasks (similarity judgements) and a metalinguistic awareness (ML) task
 - Expressive Language (Sentence Repetition, Word Structure/Classification, Sentence Formation)
- In both ToM and metacognitive tasks, participants were asked to justify their responses.



Results

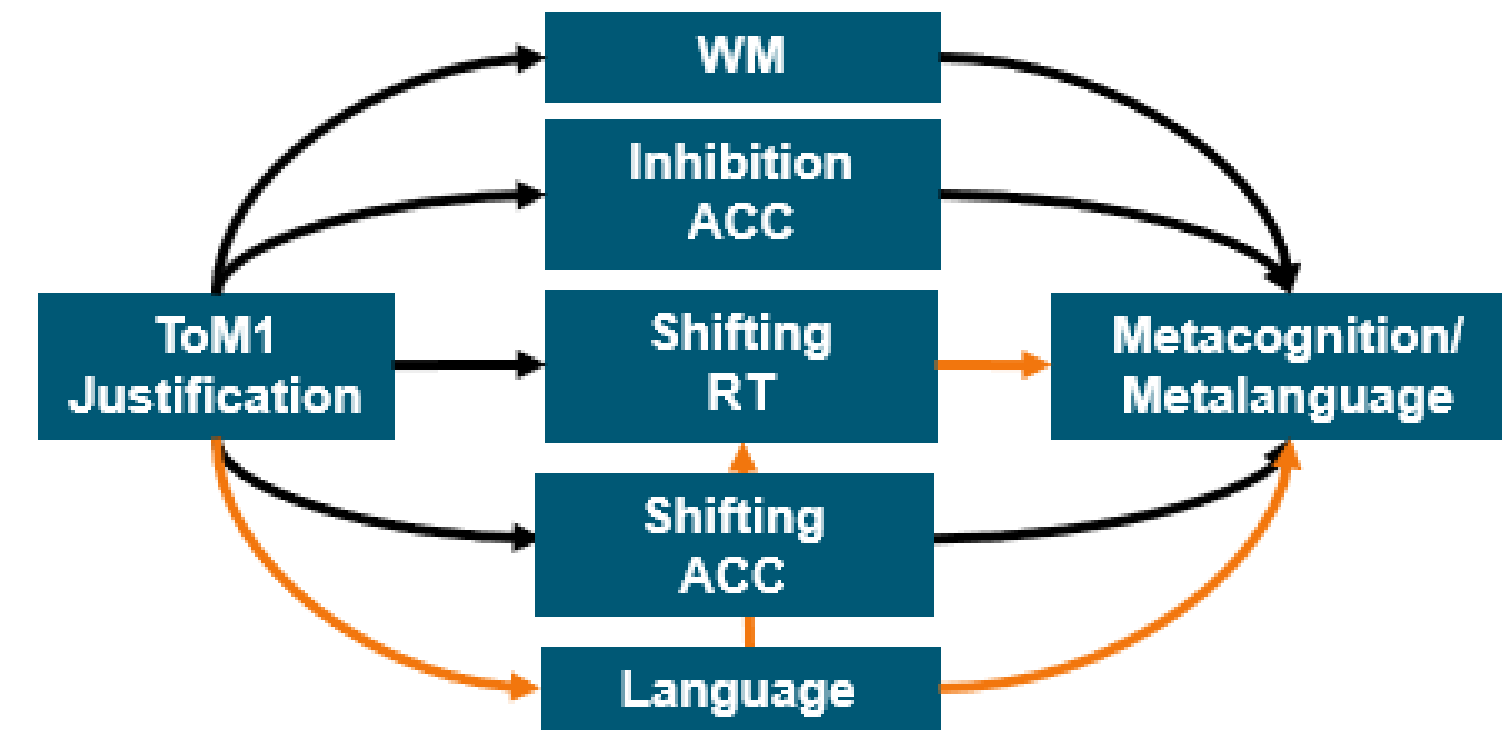


Pathway Analysis-ToM 1st order Prediction



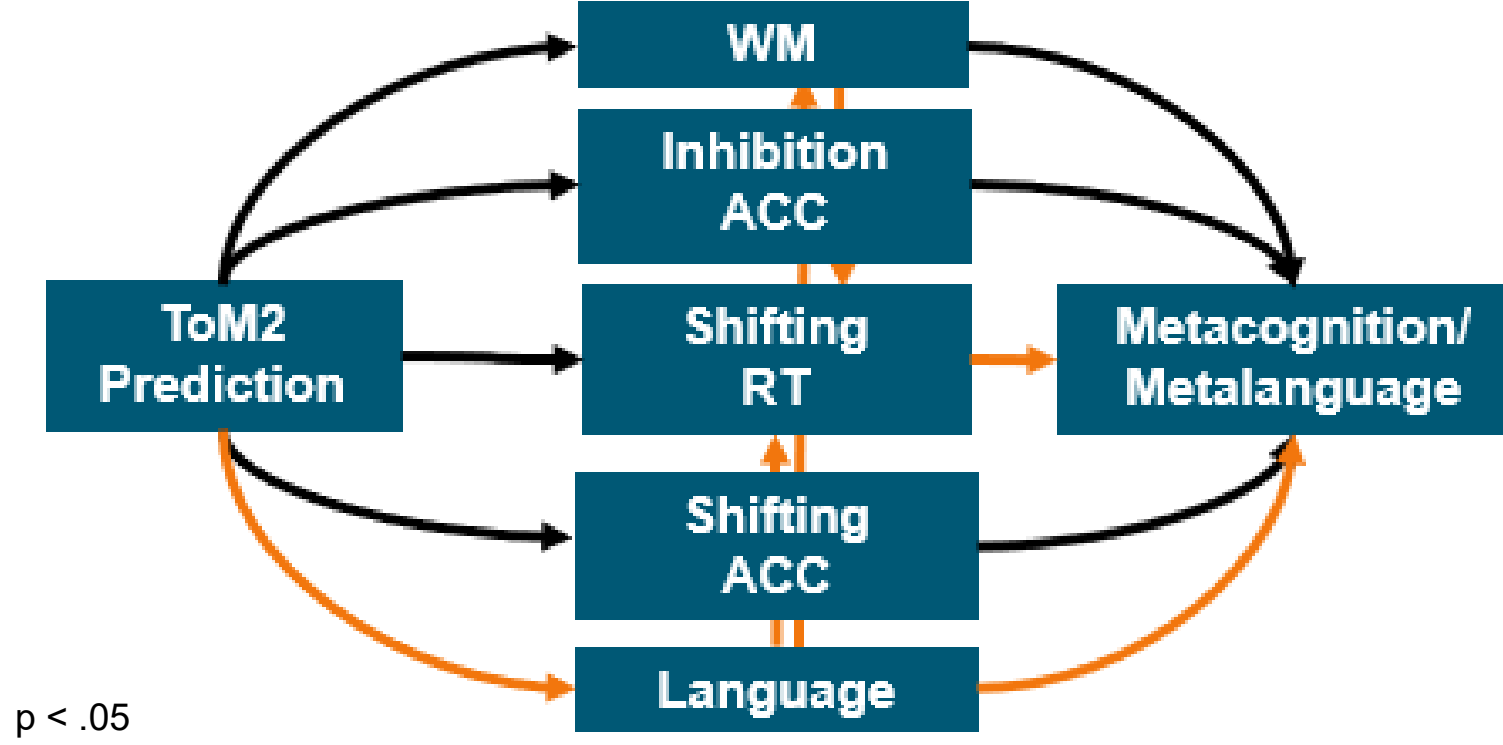
Statistically significant pathways:
ToM 1st order Pred → Language → Metacognition/Metalanguage
ToM 1st order Pred → Language → Shifting RT → Metacognition/Metalanguage

Pathway Analysis-ToM 1st order Justification



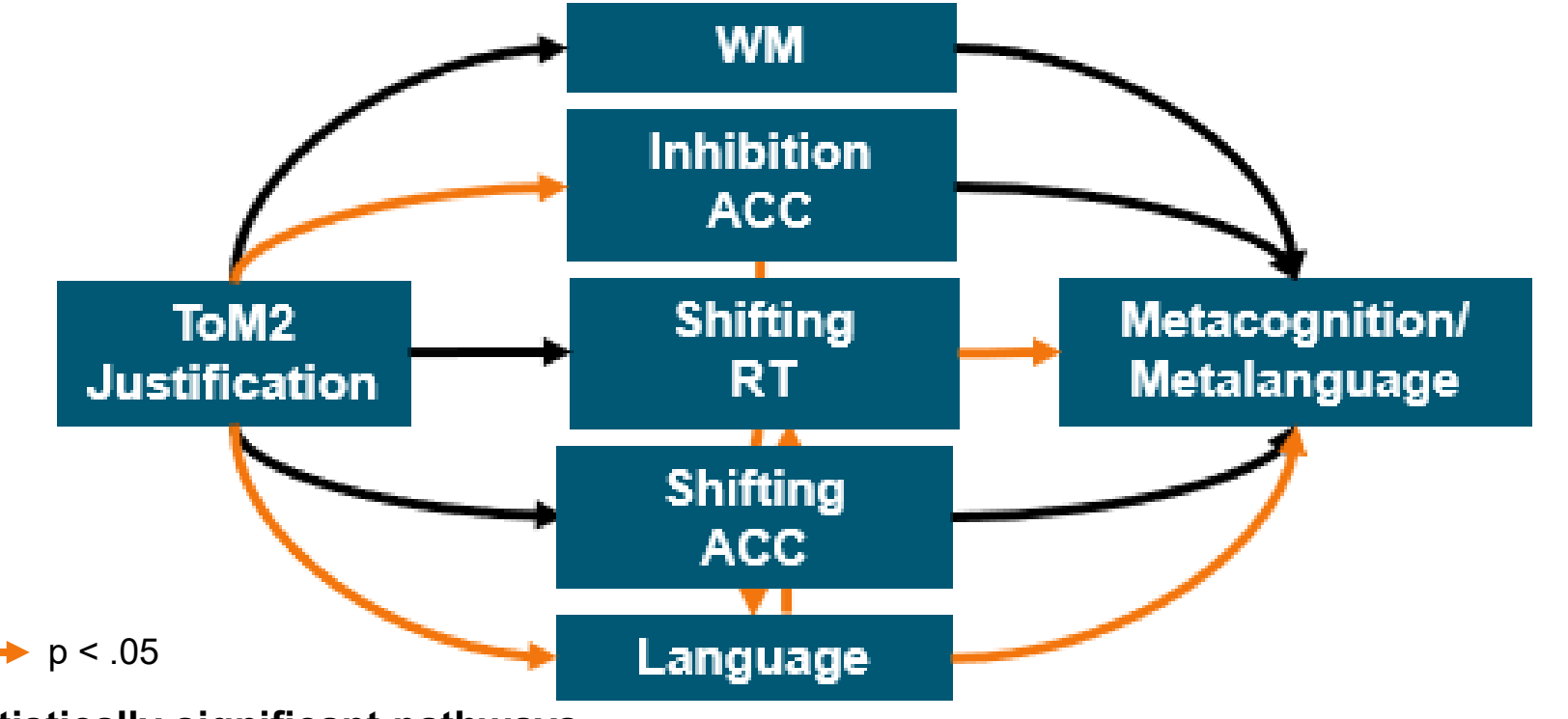
Statistically significant pathways:
ToM 1st order Justif → Language → Metacognition/Metalanguage
ToM 1st order Justif → Language → Shifting RT → Metacognition/Metalanguage

Pathway Analysis-ToM 2nd order Prediction



Statistically significant pathways:
ToM 2nd order Pred → Language → Metacognition/Metalanguage
ToM 2nd order Pred → Language → Shifting RT → Metacognition/Metalanguage
ToM 2nd order Pred → Language → WM → Shifting RT → Metacognition/Metalanguage

Pathway Analysis-ToM 2nd order Justification



Statistically significant pathways:
ToM 2nd order justif → Language → Metacognition/Metalanguage
ToM 2nd order justif → Inhibition ACC → Language → Metacognition/Metalanguage
ToM 2nd order justif → Language → Shifting RT → Metacognition/Metalanguage
ToM 2nd order justif → Inhibition ACC → Language → Shifting RT → Metacognition/Metalanguage

Conclusions

- Participants' performance of all assessed cognitive functions was significantly higher in older age groups (based on post-hoc tests).
- ToM 1 performance is already present at 4 years of age, while ToM 2 performance appears at 6 years of age and from 11 years is fully established.
- ToM justifications gradually reflect a better understanding of mental states.
- Language, working memory, efficiency (reaction time in shifting task) and efficacy (accuracy in inhibition task) mediate the effect of ToM on MC and ML.
- This mediating role is complex and should be further explored.

References

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