

The realization of delayed intentions

Developmental trends and underlying mechanisms

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1 Introduction

Intentional behavior...

... an everyday challenge!

Who has never failed in tasks such as ...

... remembering a friend's birthday? **"unreliable person!"** (non-cognitive)

... calling a colleague between 3.00 pm and 3.15 pm?

... taking medication before lunch?

... picking someone up after work? **"bad memory"** (cognitive)

The ability to realize delayed intentions = both cognitive plus
non-cognitive skills

→ **prospective memory**

1 Introduction

What is prospective memory (PM)?

▶ "Remembering" to do something

Kliegel, M., McDaniel, M.A., & Einstein, G.O. (Eds.) (2008). *Prospective Memory: Cognitive, Neuroscience, Developmental, and Applied Perspectives*. Mahwah: Erlbaum.

▶ Key characteristics (Craig, 1986; Einstein & McDaniel, 1990, 1996; Guynn, 2003)

- ▶ *self-initiated* realization of intentions at a specific moment
- ▶ PM types: time-based; event-based
- ▶ PM = dual-task: ongoing activity + prospective task

1 Introduction

Why study prospective memory?

→ *Highly relevant to everyday life*

➤ 50-80% of everyday "cognitive" problems across the lifespan are prospective memory problems

→ Development and maintenance of **independence**

→ Work-related errors (e.g., medical settings, aviation)

→ *High clinical relevance*

➤ **Autism** (Altgassen, Williams, Bölte & Kliegel, in press)

➤ **ADHD** (Kliegel, Ropeter & Mackinley, 2006)

➤ **Depression** (Altgassen, Kliegel, & Martin, in revision)

➤ **Parkinson** (Kliegel, Phillips, Lemke & Kopp, 2005; Altgassen et al., 2007)

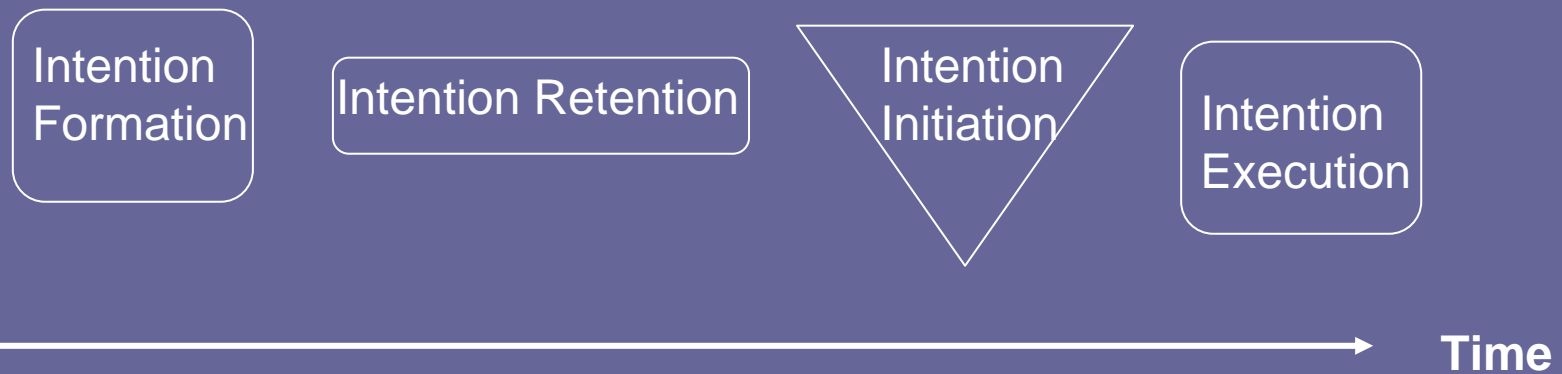
➤ **Diabetics** (Kliegel, 2004; Kliegel et al., 2002)

1 Introduction

General conceptual model

► PM is a multiphase process

(Ellis, 1996; Kvavilashvili & Ellis, 1996)



(Kliegel et al., 2002)

2 Descriptive Overview

Does PM develop across the lifespan?

Age differences across the lifespan

Adults:

„Recent evidence indicates that some forms of prospective memory ... are unaffected by aging.“ (Kausler & Kausler, 2001)

older > younger (e.g., Patton & Meit, 1993)

older = younger (e.g., Einstein & McDaniel, 1990)

older < younger (e.g., Kliegel et al., 2000)

→ several studies

Children:

„Children's attempts at prospective remembering may be an important precursor to the development of strategies.“
(Meacham & Colombo, 1980).

older > younger (e.g., Kliegel & Jäger, 2007)

older = younger (e.g., Sommerville et al., 1983)

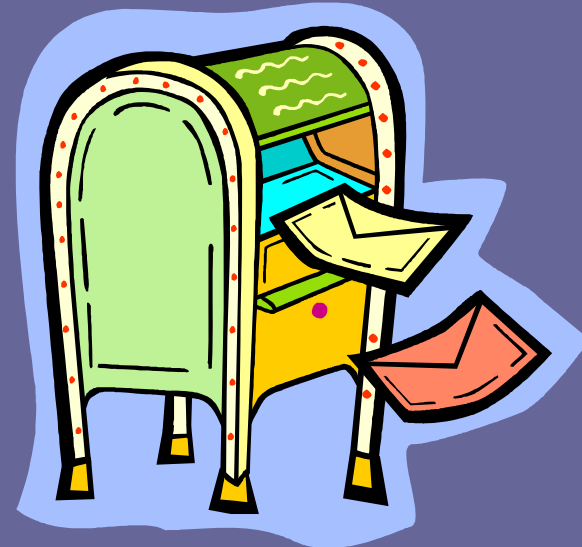
→ very few studies

→ no (longitudinal) life-span study

2 Descriptive Overview

Typical naturalistic task

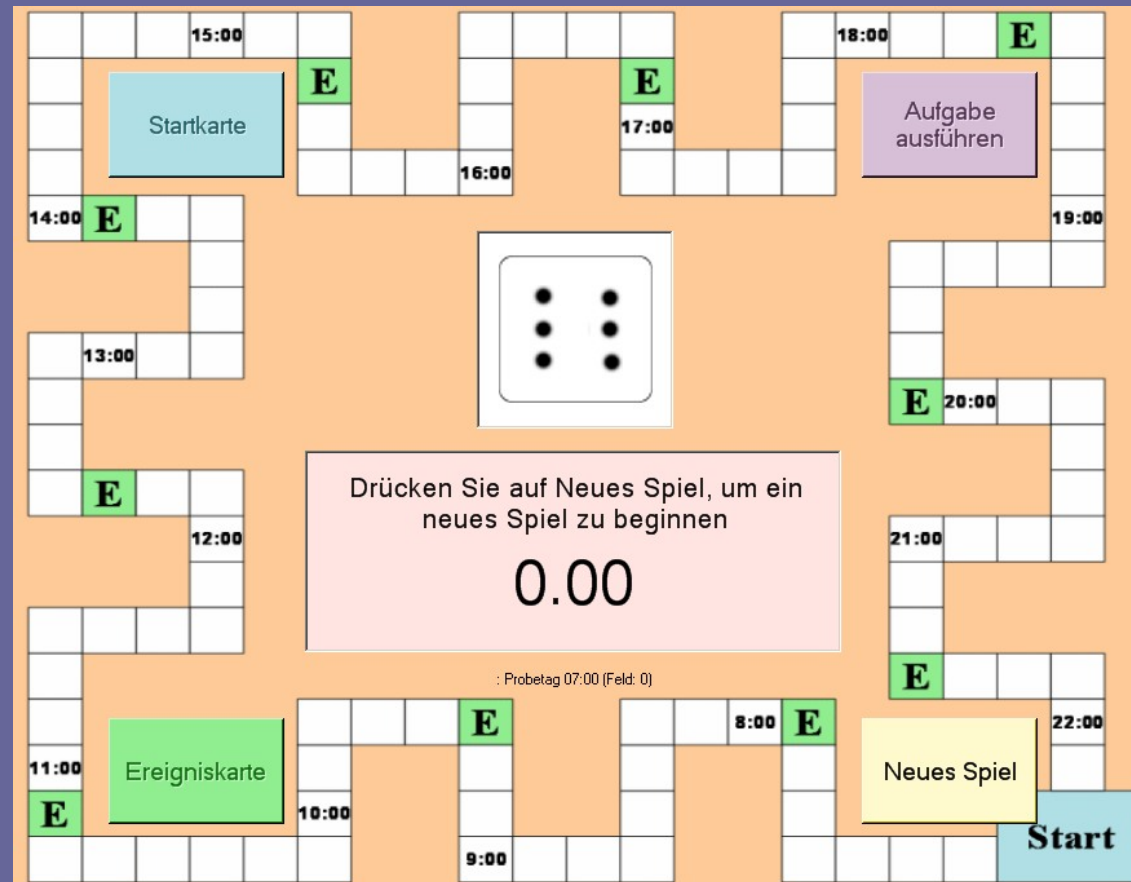
„Please remember to post a letter every Tuesday“
(e.g., Patton & Meit, 1993)



2 Descriptive Overview

Lab-based task simulating daily life

Virtual Week (German version)



Regular Tasks
Irregular Tasks

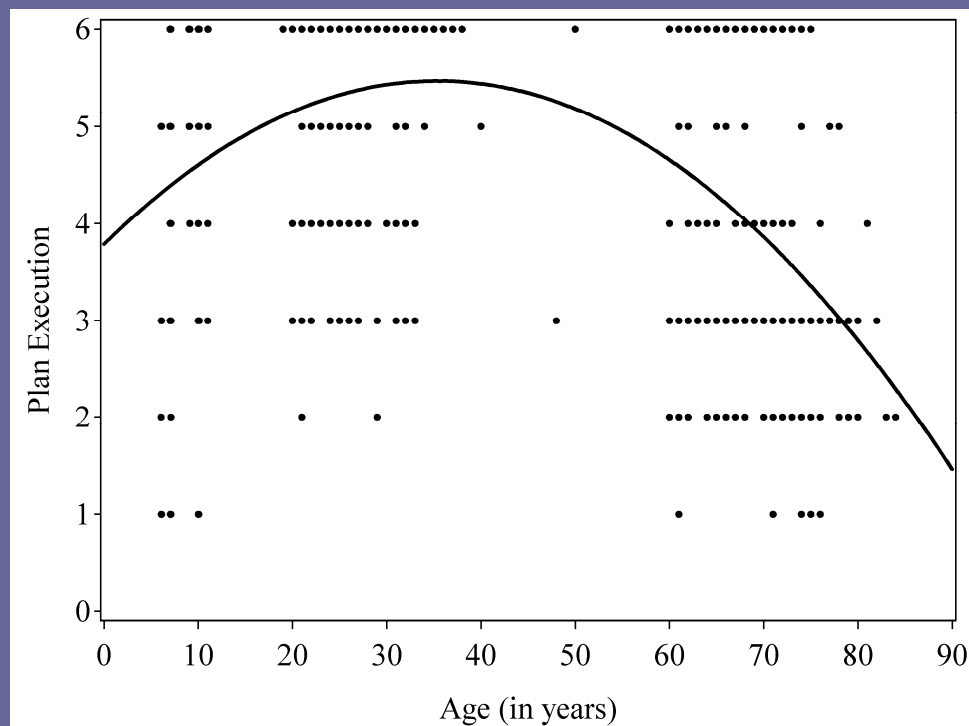
(Rendell & Craik, 2000;
Aberle, Kliegel, Rendell, in preparation)

2 Descriptive Overview

Does PM develop across the lifespan?

Age differences across the *lifespan*:
(Pooled) data indicate inverted U-shaped function

$N = 557$; age 5-86



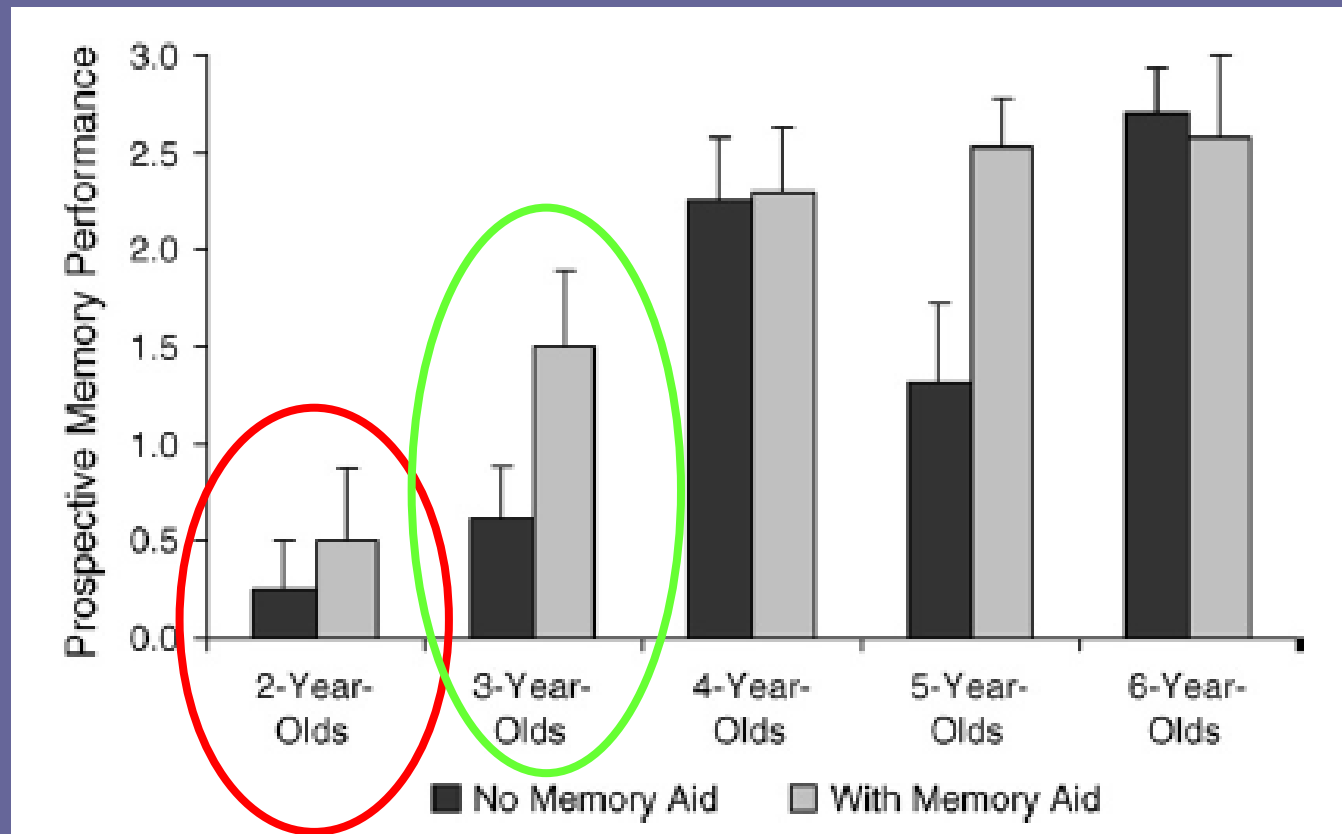
Same or
different
developmental
mechanisms?

Kliegel, Mackinlay & Jäger (2008)

2 Descriptive Overview

When does PM emerge?

Very few studies on preschoolers

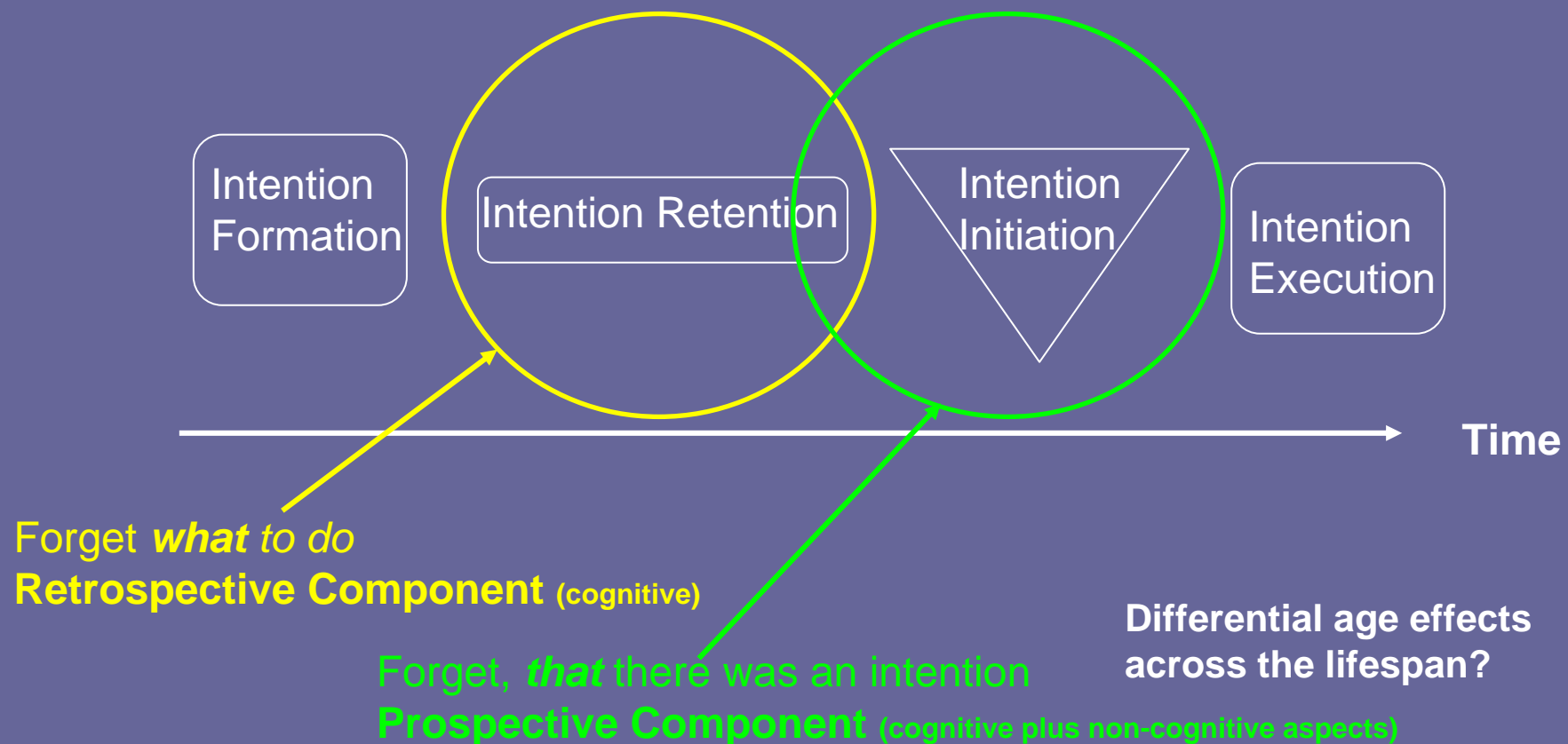


3 Explanatory Models

Why does PM develop?

① Ellis' (1996) model: Decomposing the process

PM = Retrospective plus prospective component



3 Explanatory Models

Why does PM develop?

Life-span study (Zöllig, West, Martin, Altgassen, Lemke, & Kliegel, 2007, *Neuropsychologia*)

Three age groups

Children:	age: 12.9 ± 0.6
Young Adults:	age: 22.5 ± 1.4
Old Adults:	age: 70.1 ± 5.5

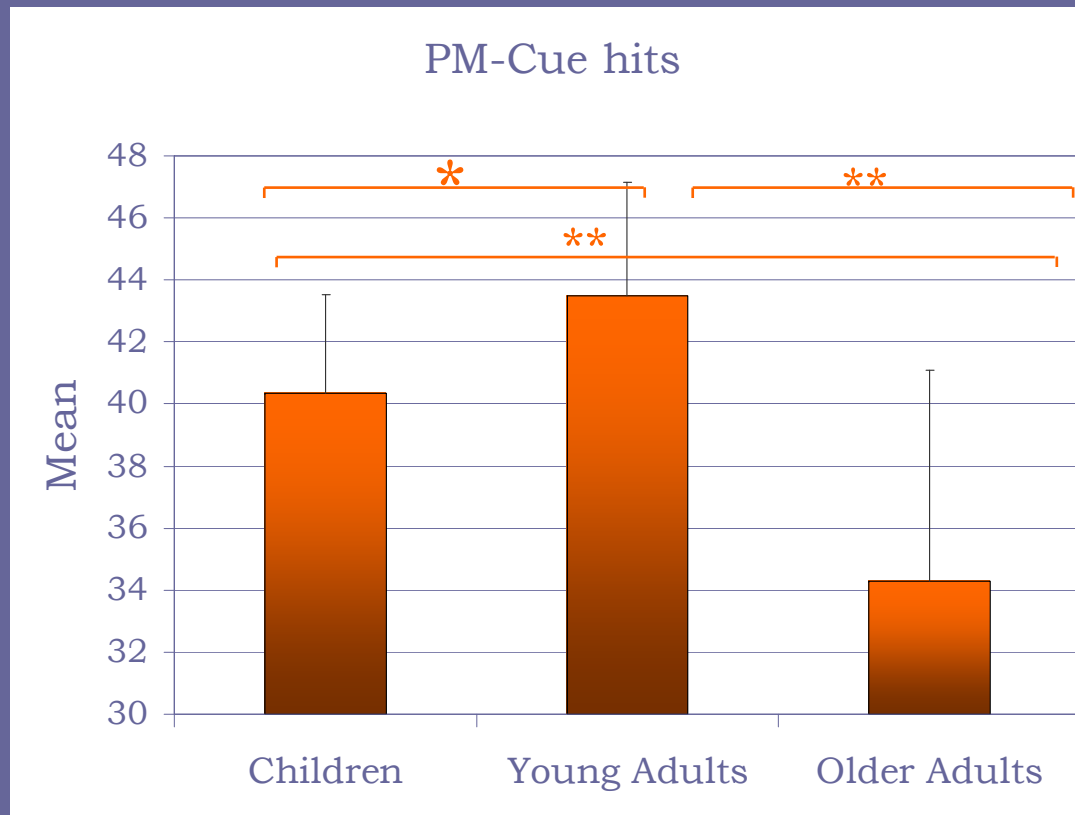
Paradigm that allows to disentangle both:
retrospective and prospective component

- behavioral
- physiological

3 Explanatory Models

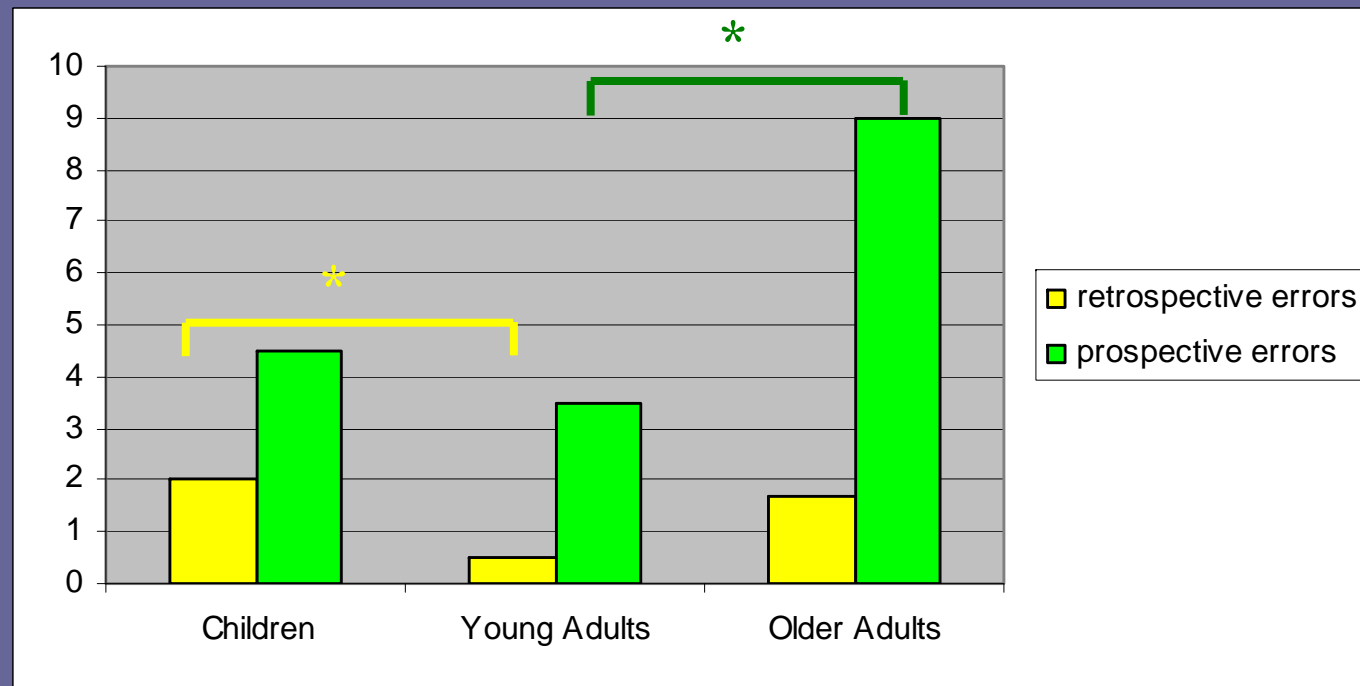
Why does PM develop?

Old adults < Children < Young adults → Why?



3 Explanatory Models

Why does PM develop?



Children

Older Adults

3 Explanatory Models

Why does PM develop?

Developmental inverted U-shaped performance,
but differential processes underlying age differences

Processes involved in age-related PM:

- **Children**

Retrospective component

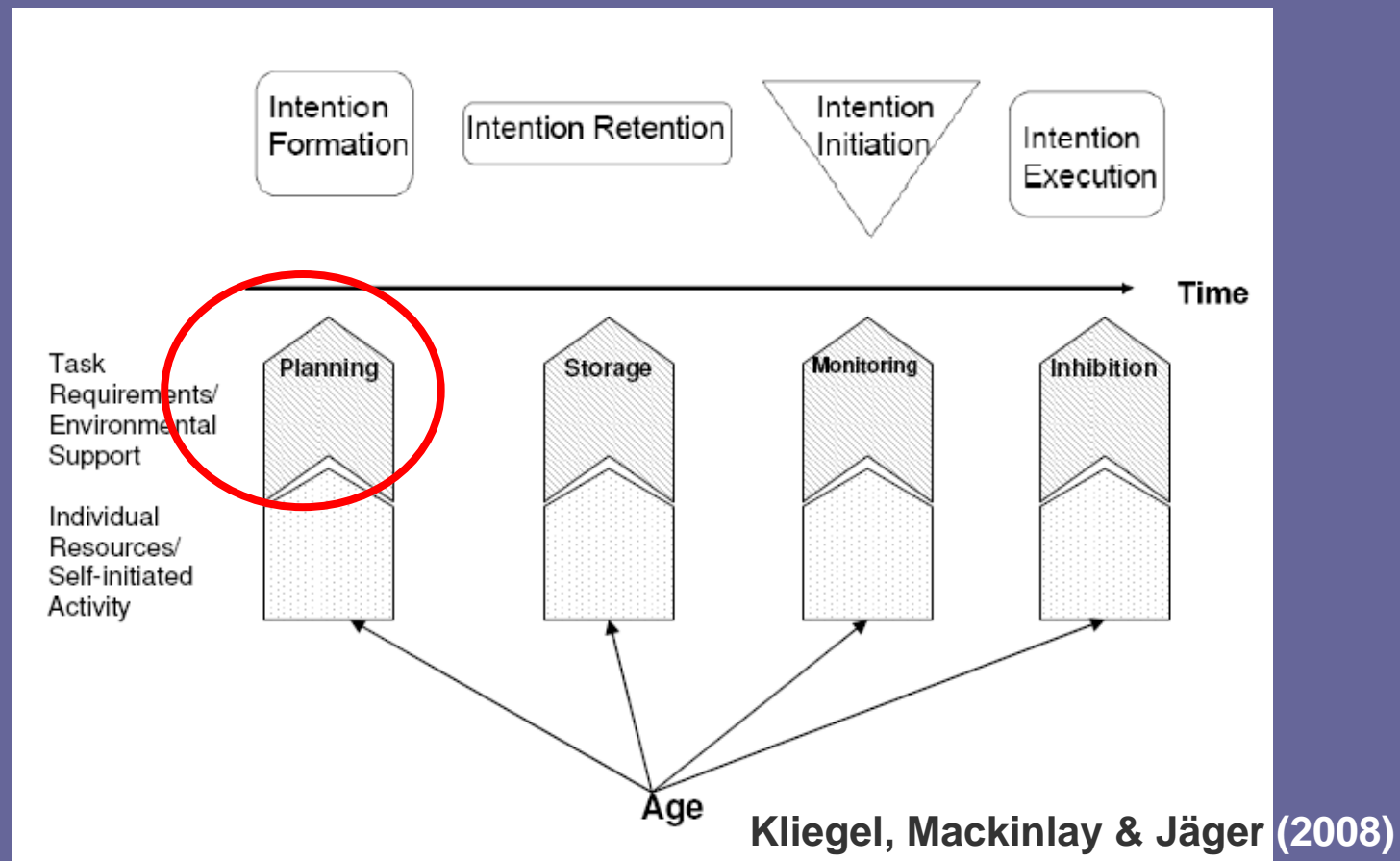
- **Older adults**

Prospective component

3 Explanatory Models

Why does PM develop?

② Task↔Resource Interaction Framework



3 Explanatory Models

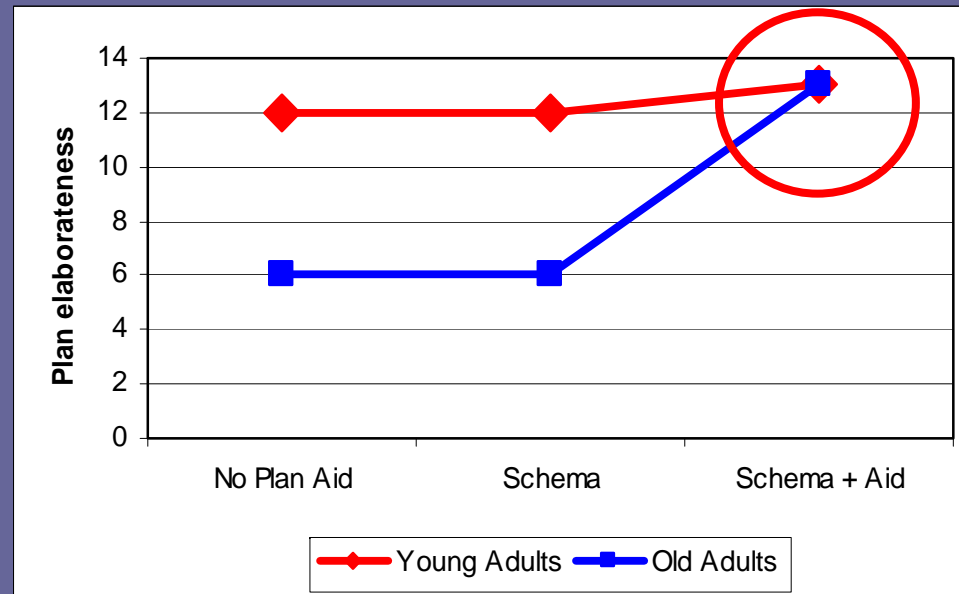
Why does PM develop?

Planning (Kliegel, Martin, McDaniel, Einstein & Moor, 2007, *Memory and Cognition*)

- Do planning aids improve prospective *planning / intention formation*?
- Does this lead to improvements in (delayed) prospective memory *performance / intention realization*?
- Age effects?

3 Explanatory Models

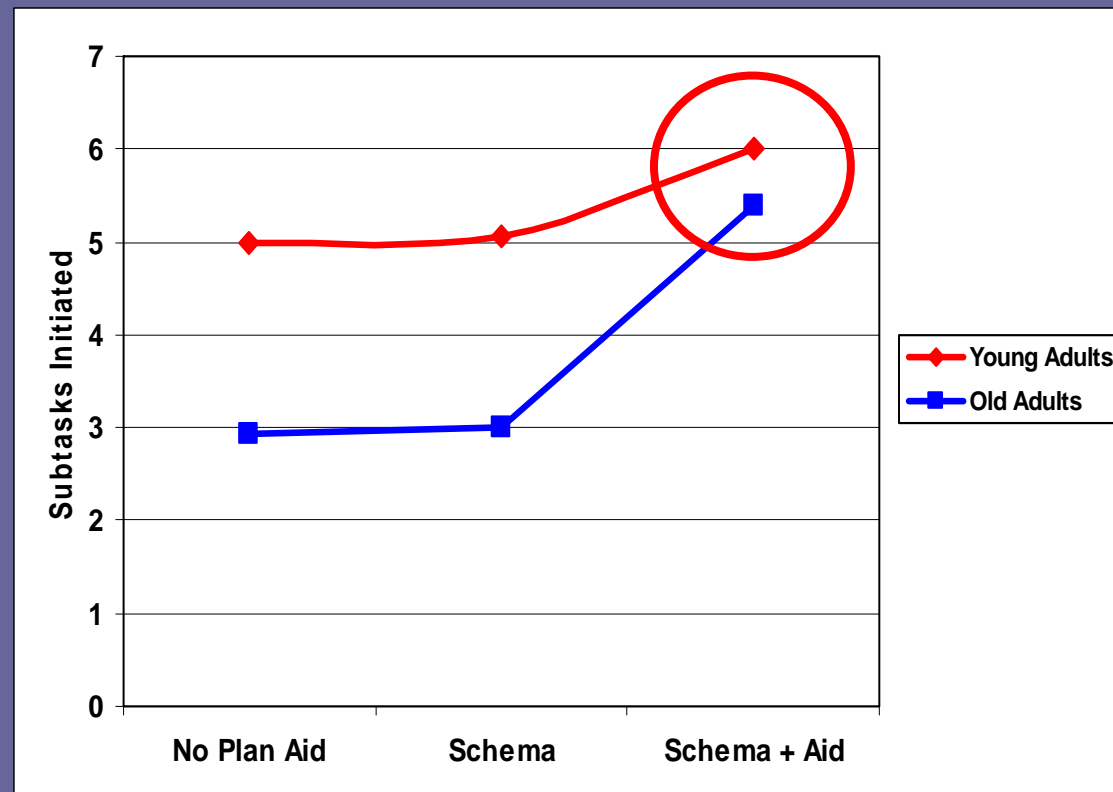
Why does PM develop?



Plan Formation

3 Explanatory Models

Why does PM develop?

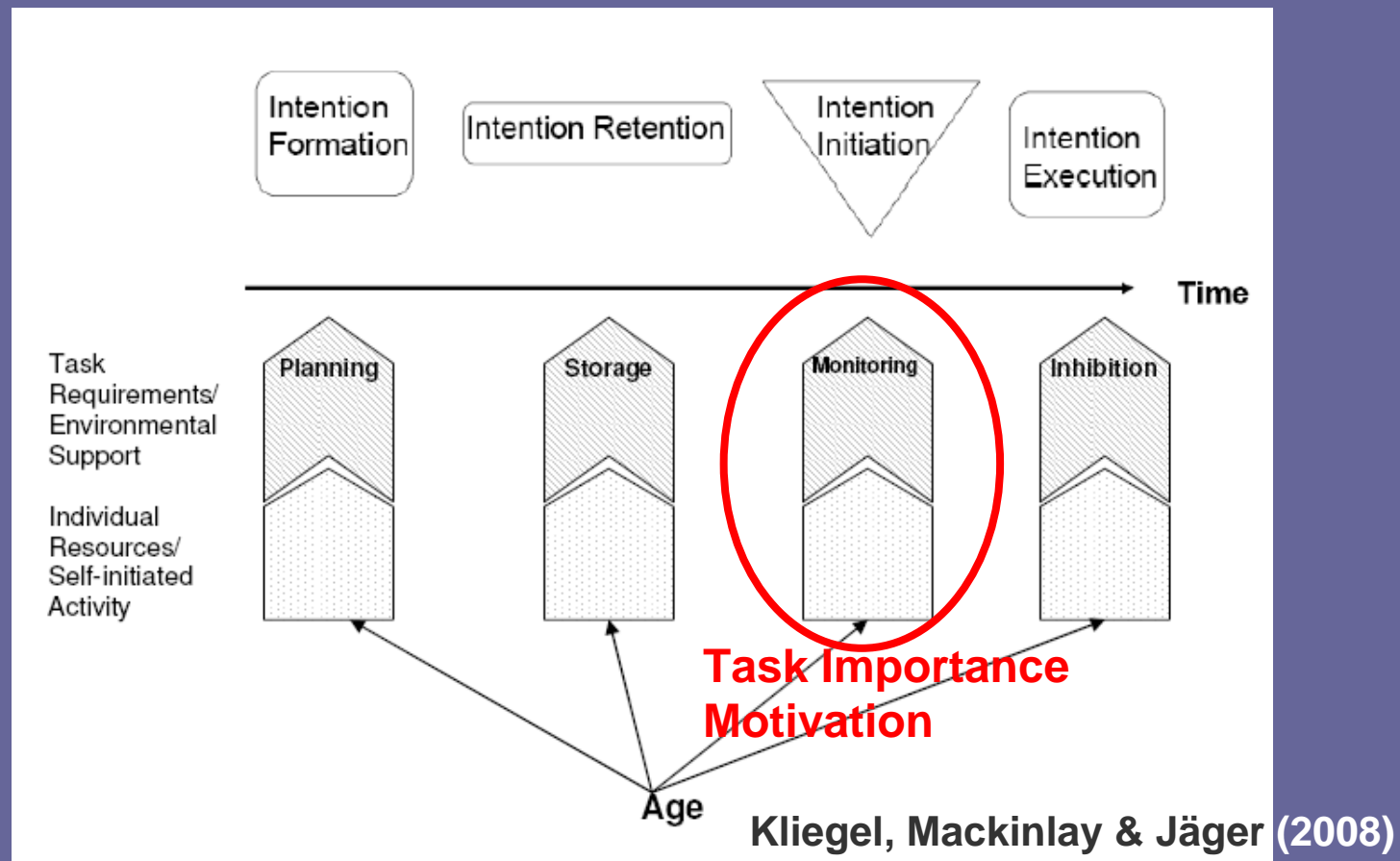


Delayed Realization

3 Explanatory Models

Why does PM develop?

Task↔Resource Interaction Framework

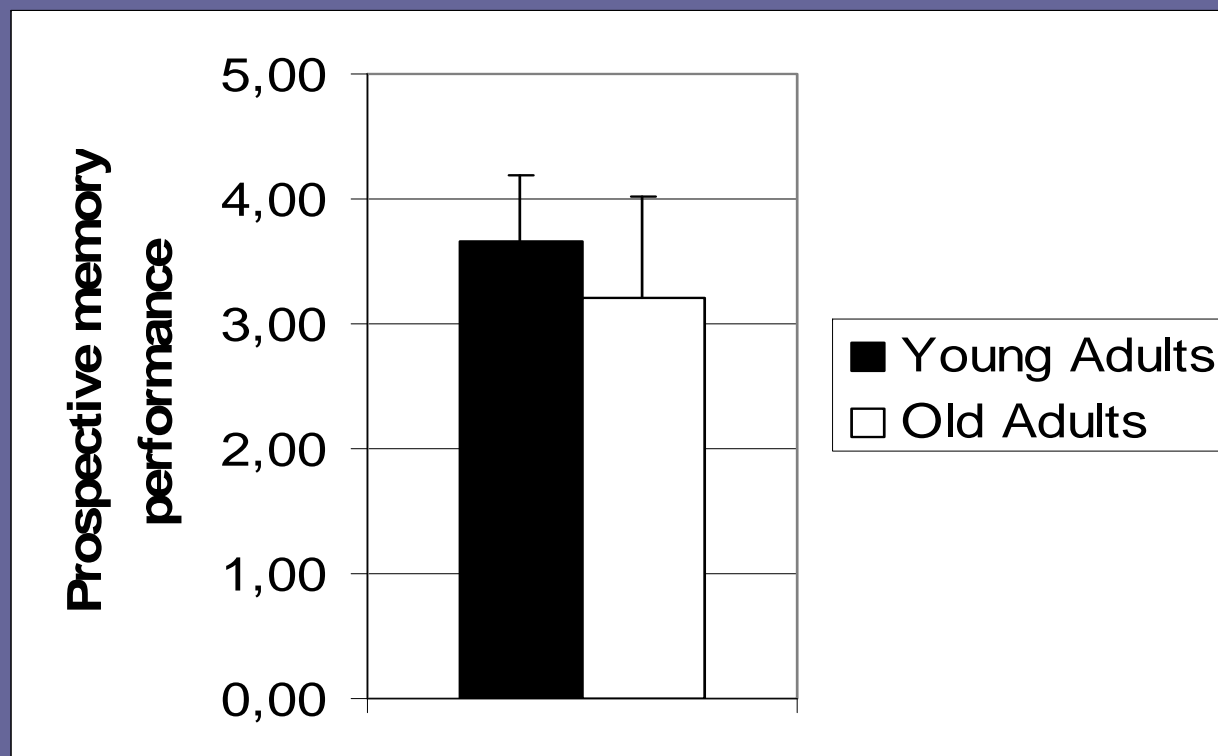


3 Explanatory Models

Why does PM develop?

Effect of task importance on age differences in PM

① Adult age range (Kliegel, Phillips & Jäger, submitted)

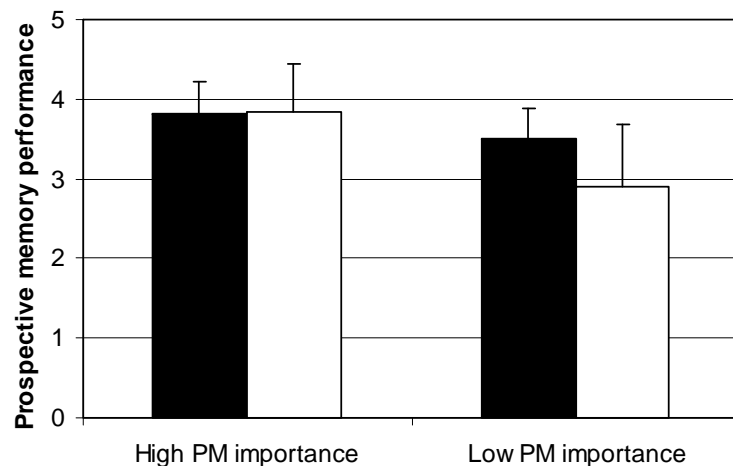


Age effect $F(1,75) = 4.87, p < .05, \eta^2 = .063$

3 Explanatory Models

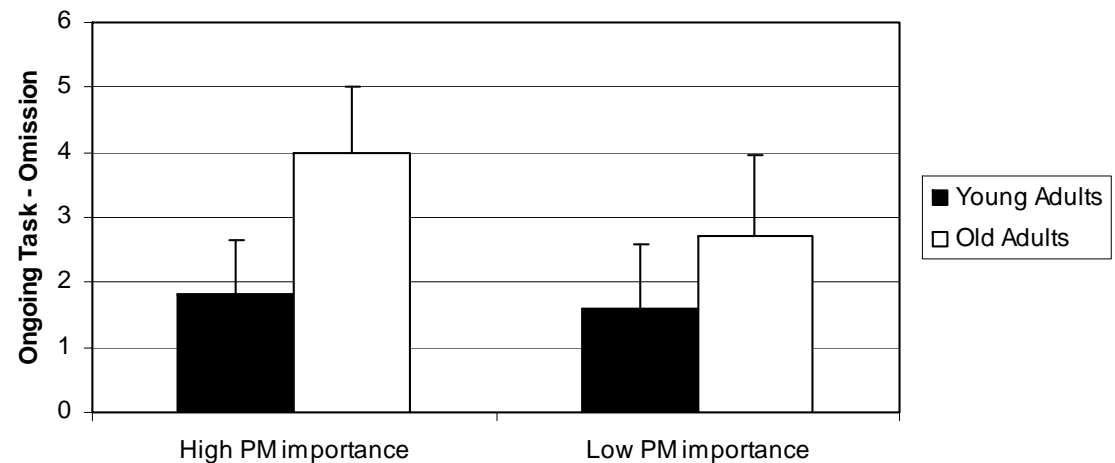
Why does PM develop?

Prospective memory



Interaction $F(1,75) = 5.97, p < .05$

Ongoing task (cognitive interface)



Interaction $F(1,75) = 4.44, p < .05$

Similar effects in

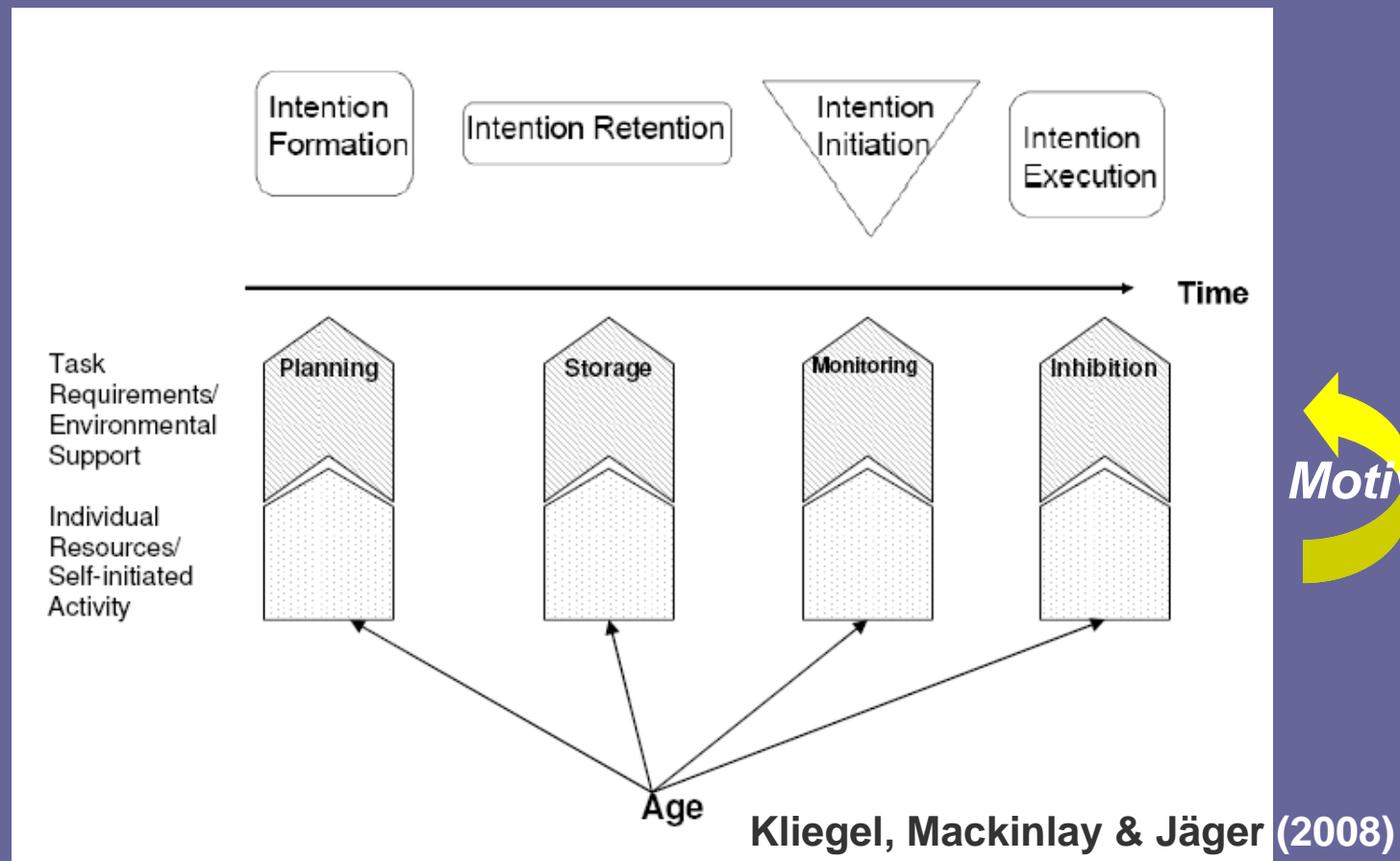
- ② **adolescence** (Wang, Kliegel, Yang & Liu, 2006)
- ③ **preschoolers** (Kliegel, Brandenberger & Aberle, in press)

3 Explanatory Models

Why does PM develop?

Active Task ↔ Resource Interaction Framework

*Meta-
cognition*



Motivation

4 Outlook

What's left to do?

Conceptual issues:

- **AcTRIF: Systematically test other factors and the role of metacognitive processes**
- **Cognitive ⇔ Non-cognitive *Interface***

Empirical issues:

- **Influence of personality factors, e.g., conscientiousness, on age-related performance?**
- **Influence of other "non-cognitive" factors e.g., stress e.g., social importance**
- ***Development* throughout the whole lifespan (early childhood, extremely old age)? → common mechanisms**

Thank you for your attention