

Definitions of Fluency: Conceptual & Methodological Challenges

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Fluency

- Conceptualizations

- Historical

- Current

- Methodology

- an example of fluency as mediator

- future directions

LaBerge & Samuel (1974)

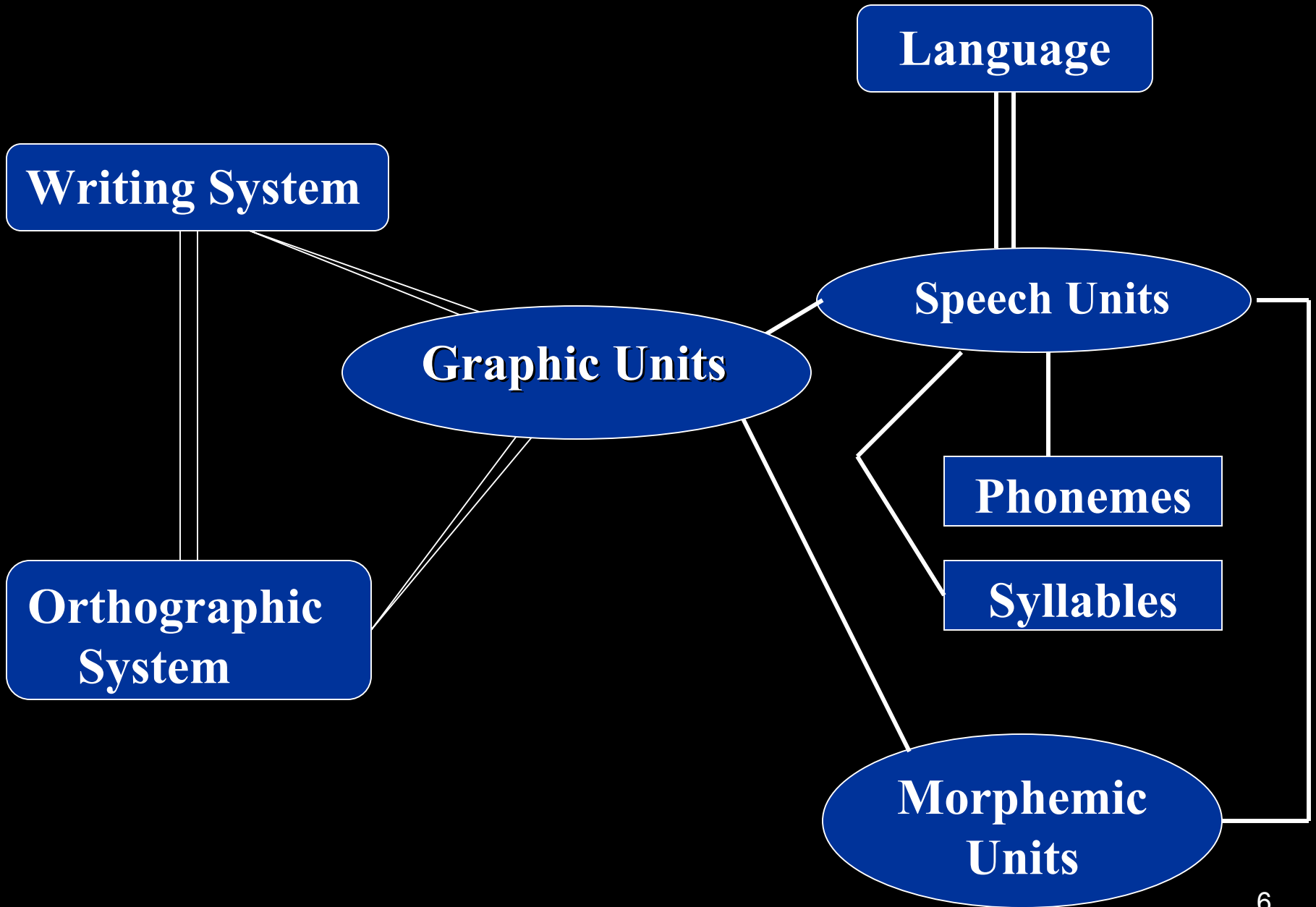
- Automaticity for underlying subskills (from the visual code, to the semantic code, to comprehension)
- As lower-level subskills achieve automatic rates, attention can be allocated to higher-level comprehension-related skills

Doehring (1976)

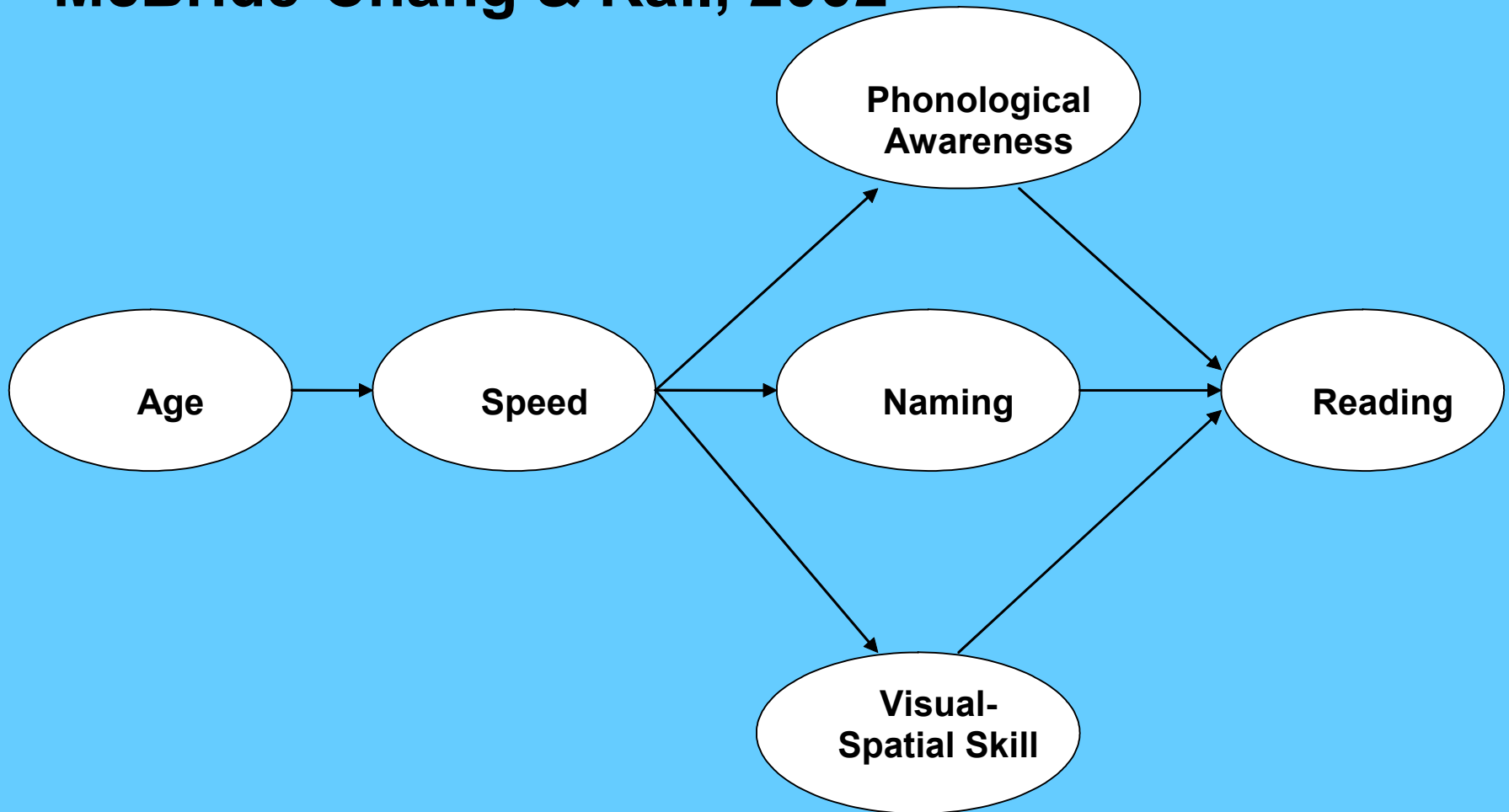
“the relative course of acquisition of skills for processing the *graphological* features of letters, the *orthographic* regularities of letter combinations, the *semantic* features of words, and the *semantic-syntactic* constraints of word sequences. These are the skills that must be mastered beyond the level of simple accuracy to the point where accurate processing becomes rapid enough to be classified as fluent reading.” (p. 2)

Perfetti (1977, 1985, 1992)

- **Verbal Efficiency Theory** emphasizes the *quality* of orthographic, phonological, and semantic representations.
- Weak quality delays rapid retrieval (and the shift from a functional to autonomous lexicon), making the system less efficient and unable to allocate attentional resources to comprehension.



McBride-Chang & Kail, 2002



Implications of Historical Perspective

- For fluency, one needs:
 - High quality orthographic, phonological, semantic, and syntactic representational systems
 - Attention to connections between and among these systems
 - Emphasis on rapid retrieval of information from each system through learning/practice

Current Perspectives

Fluency as an *outcome* of word recognition

- “ability to read connected text rapidly, smoothly, effortlessly, and automatically with little conscious attention to decoding” (Meyer, 2002)
- “rate and accuracy in oral reading” (Shinn et al., 1992)
- “immediate result of word recognition proficiency” (NRP, 2000)

Developmental Perspective

“In its beginnings, reading fluency is the product of the initial development of accuracy and the subsequent development of automaticity in underlying sublexical processes, lexical processes, and their integration in single-word reading and connected text. These include perceptual, phonological, orthographic, and morphological processes at the letter-, letter-pattern, and word-level;

Developmental Perspective (cont.)

“as well as semantic and syntactic processes at the word-level and connected-text level. After it is fully developed, reading fluency refers to a level of accuracy and rate, where decoding is relatively effortless; where oral reading is smooth and accurate with correct prosody; and where attention can be allocated to comprehension.” (Wolf & Katzir-Cohen, 2001)

Developmental Perspective

Instructional Implications:

Repeated reading, by itself, is insufficient to address the rapid processing of the multiple systems comprising fluency.

The Reading Pillar

NRC, 1998

Skilled Reading

Fluency

Speed and ease of reading with comprehension

Comprehension

Conceptual Knowledge/vocabulary
Strategic processing of text

Word Recognition

Decoding using alphabetic principle
Decoding using other cues
Sight Recognition

Emergent Reading

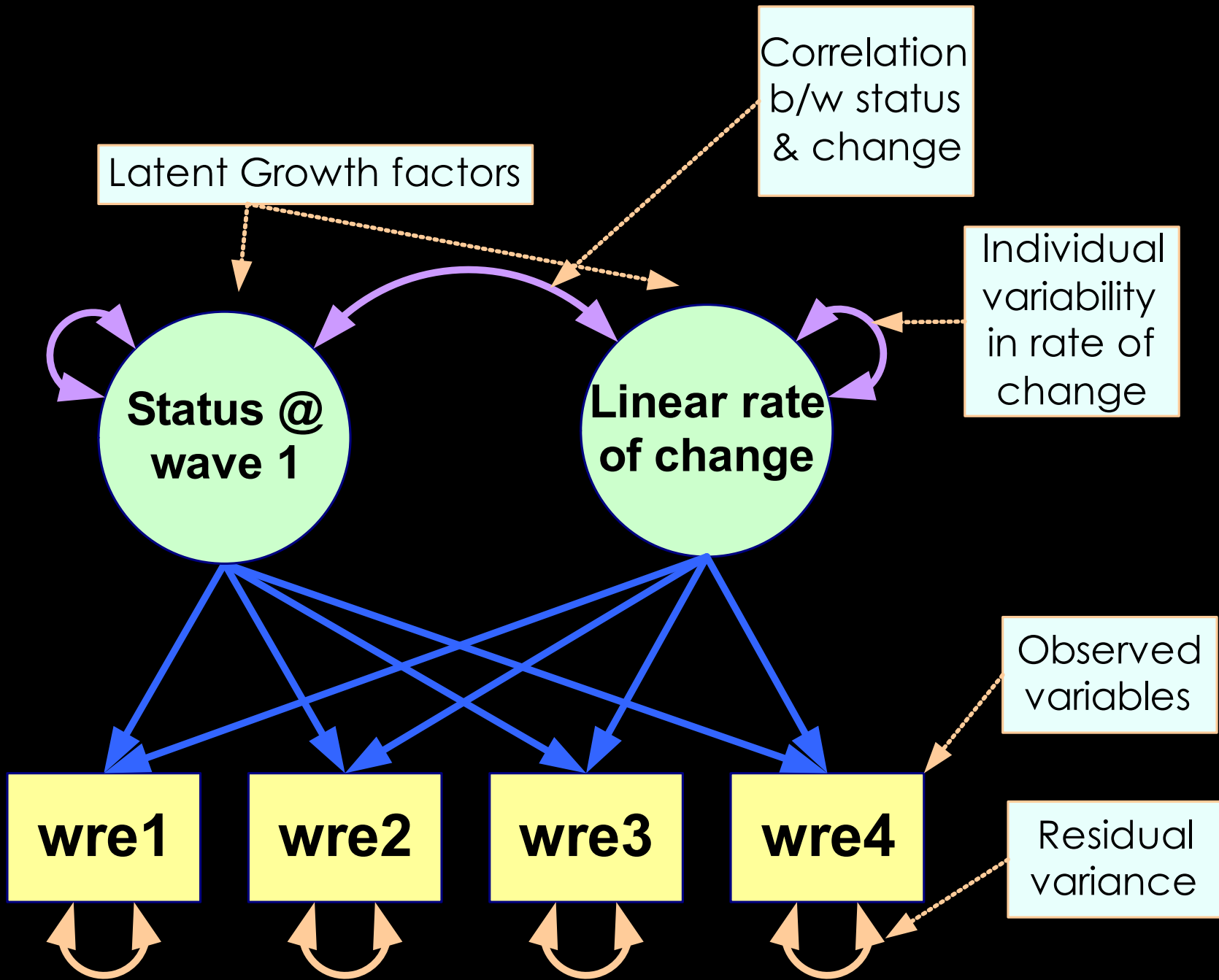
Print Awareness & Letter Knowledge
Motivation to Read
Oral Language including Phonological Awareness

Methodological Challenges

- Example from a longitudinal, multilevel study of observed variables
- Future directions with a latent variable, IRT-based, longitudinal, multilevel approach

Classroom frequencies

Grade	Classrooms	Individuals
2	114	913
3	115	1134
4	69	754



Latent Growth Curve Model

- average level of outcome @ wave 1
- average linear rate of change
- Individual-differences in status at wave 1
- Individual-differences in linear rate of change
- Correlation b/w status & linear change
- Residual or Unexplained variance

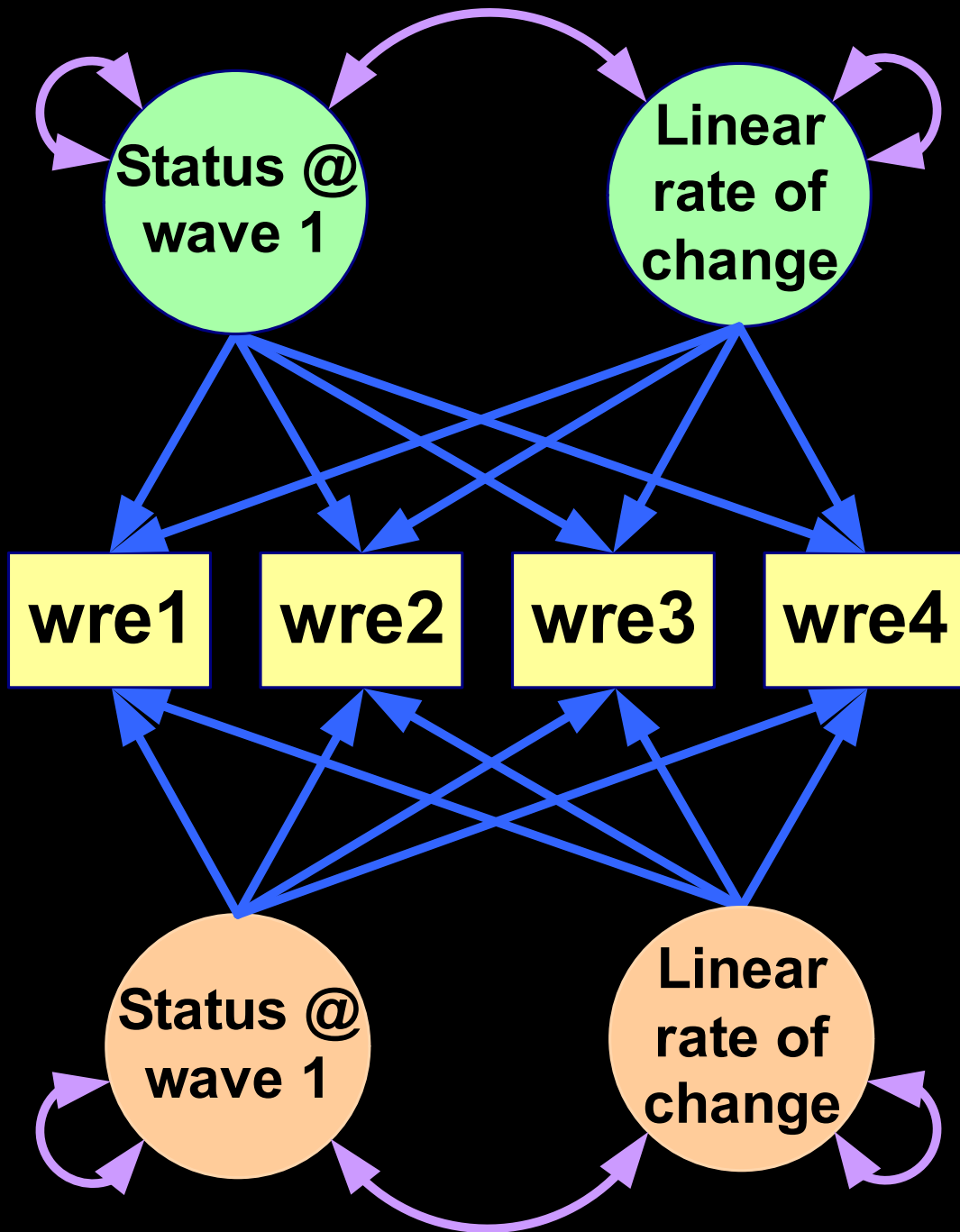
Multilevel Latent Growth Curve Model

Between-Group Growth Model

- Grand-mean: level of outcome @ wave 1
- Grand-mean: average linear rate of change
- Between-classroom variability in status at wave 1
- Between-classroom variability in linear rate of change
- Correlation b/w status & linear change

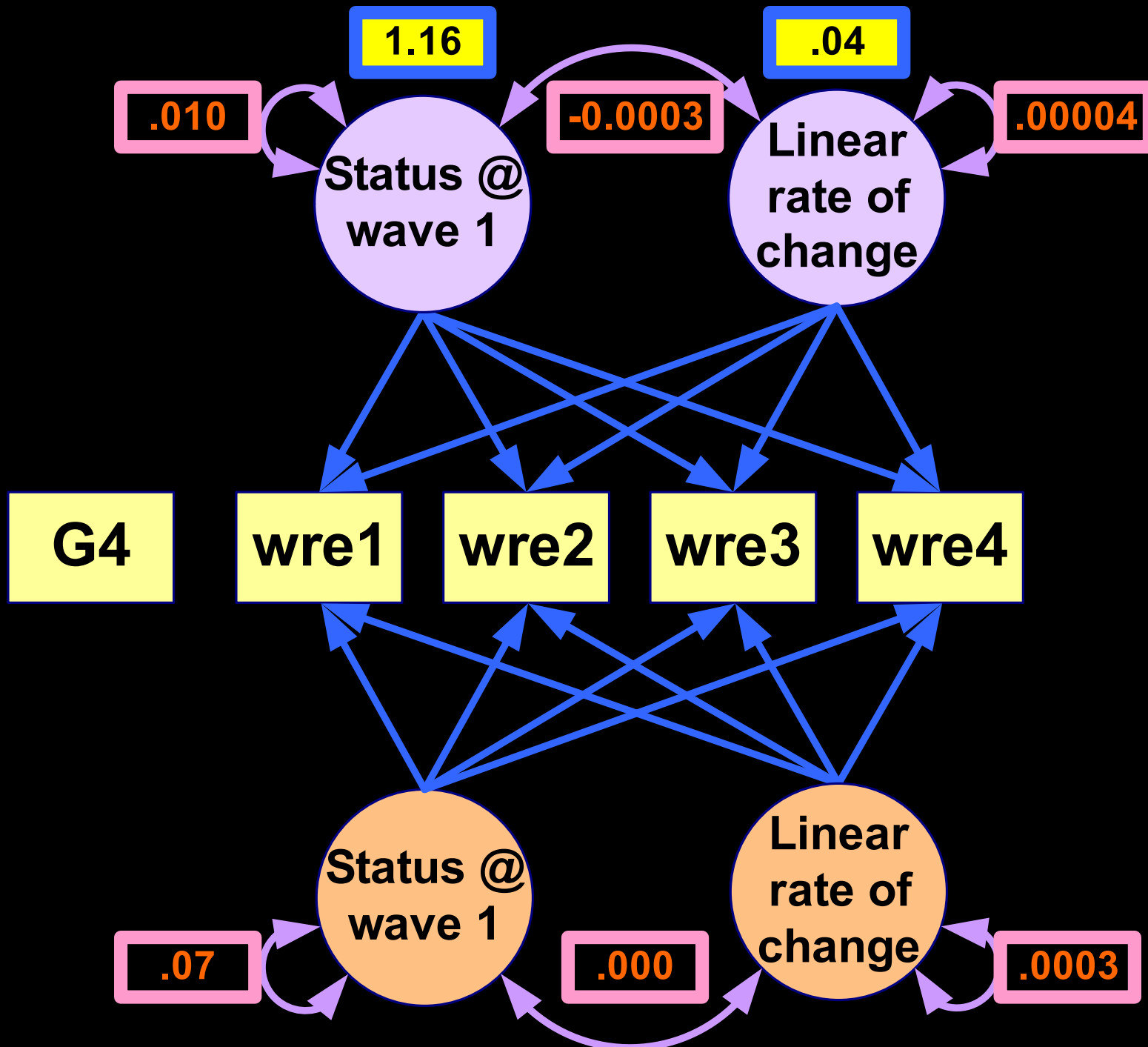
Within-Group Growth Model

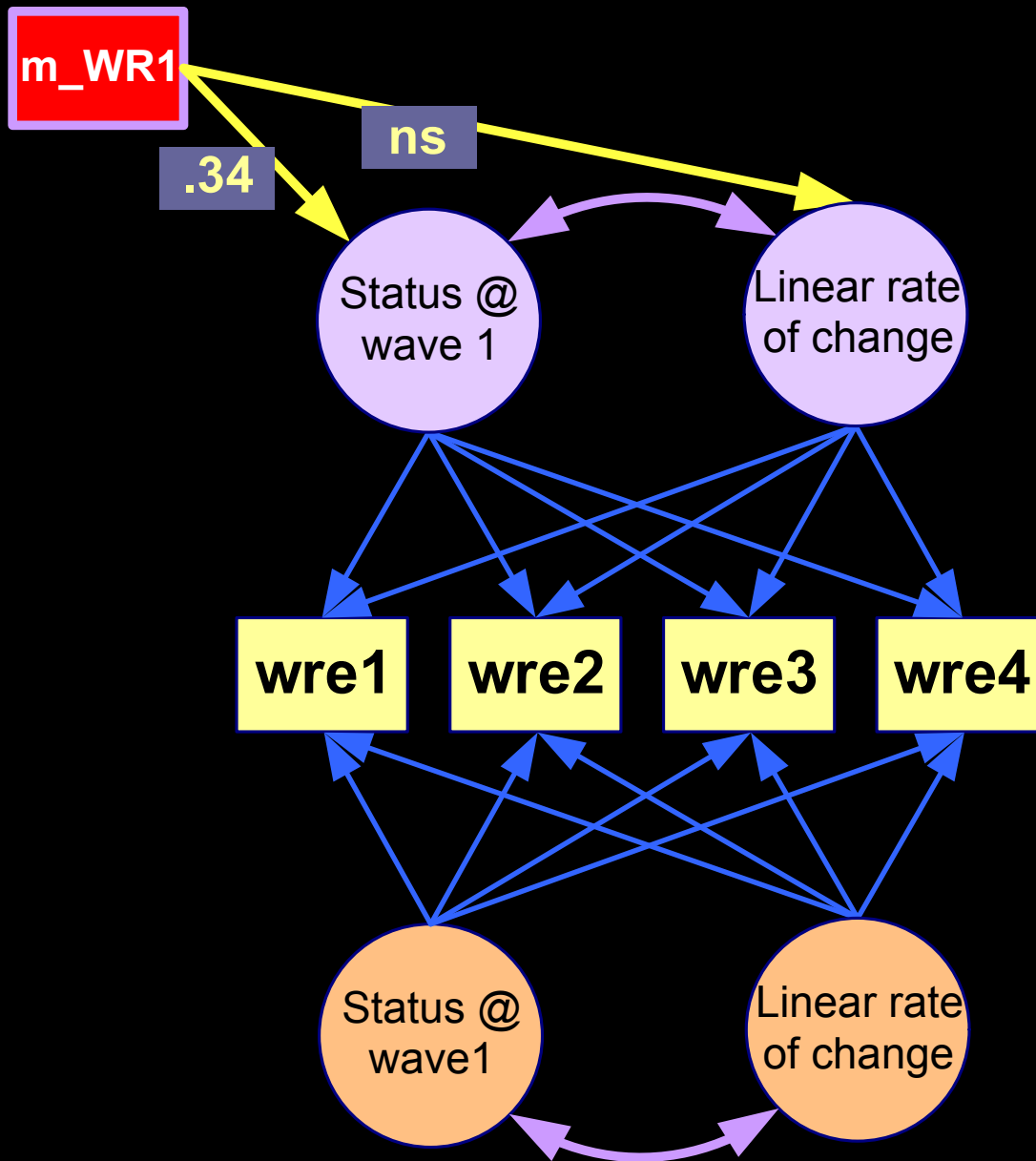
- Within-classroom individual-differences in status at wave 1
- Within-classroom individual-differences in linear rate of change
- Correlation b/w status & linear change
- Residual or Unexplained variance



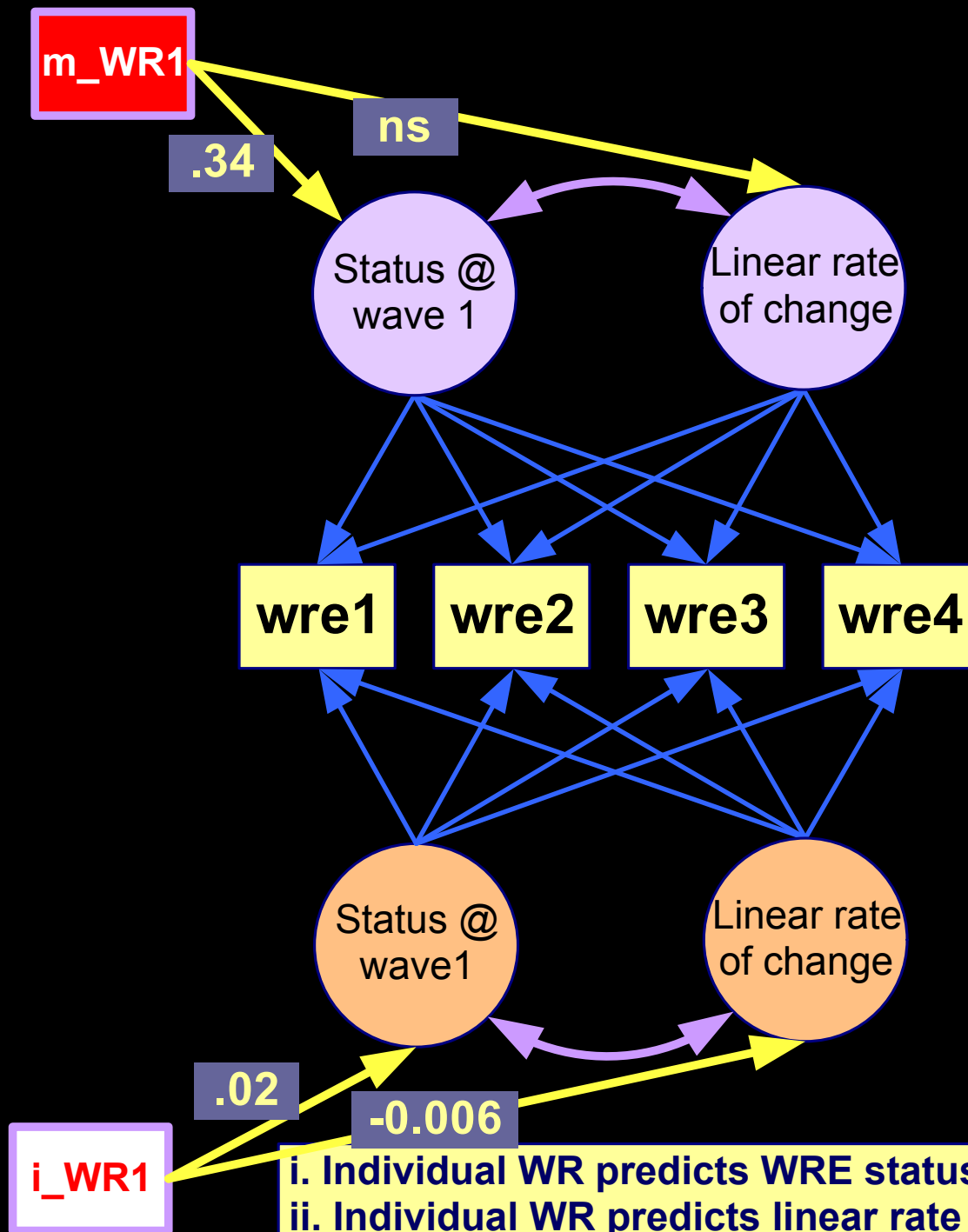
Between-classroom model of change

Within-classroom model of change

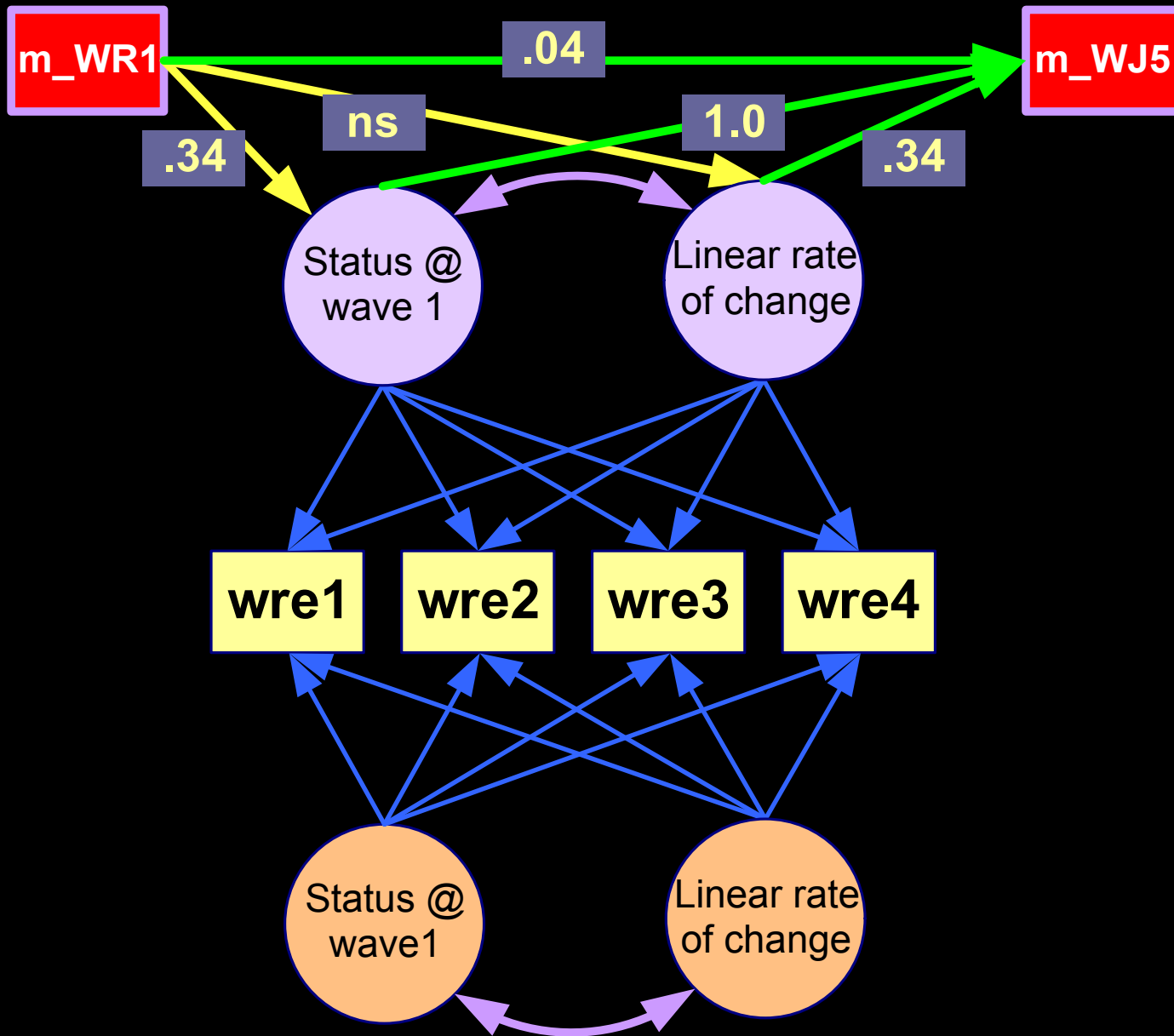


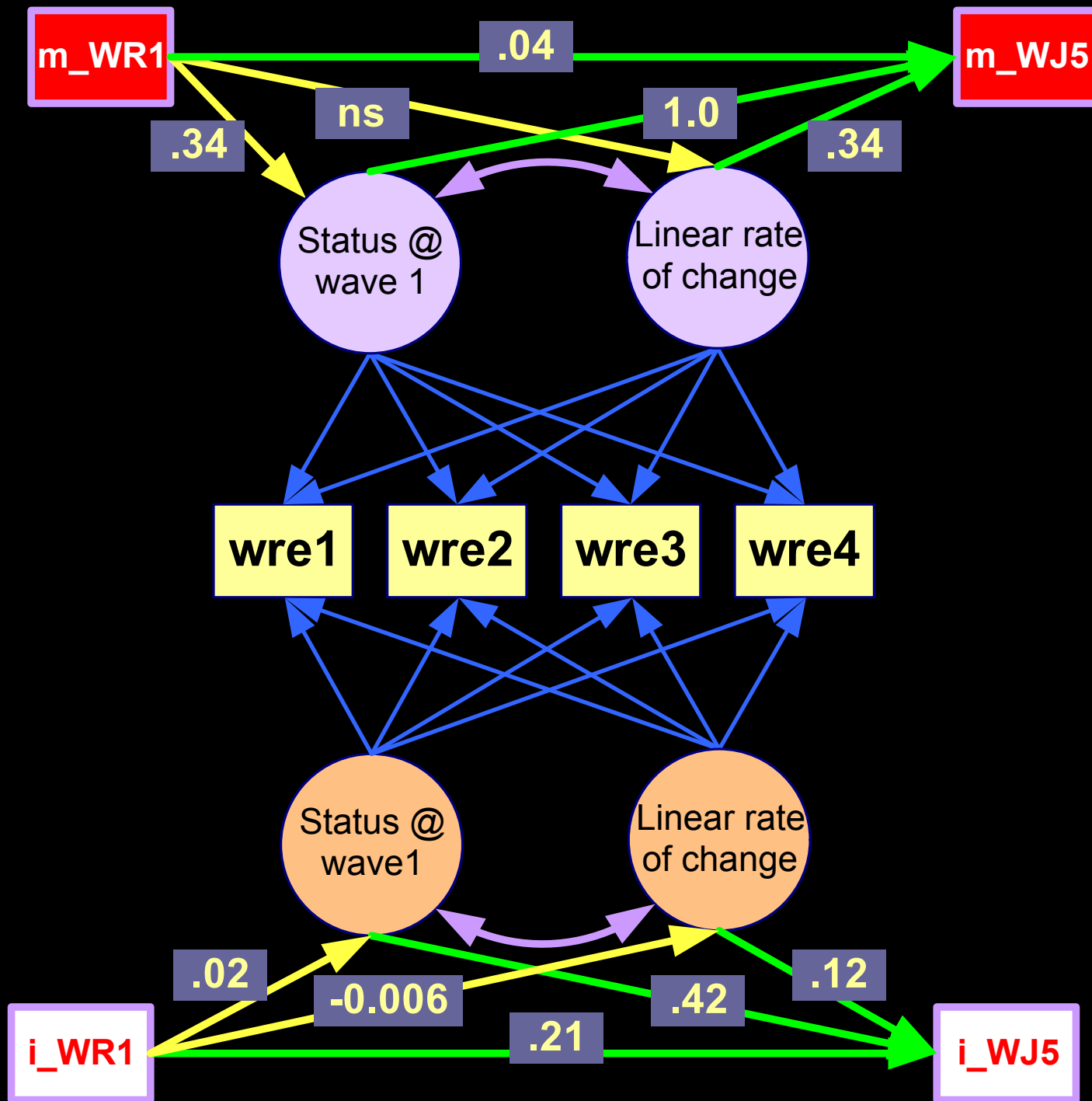


- i. Classroom-mean WR predicts WRE status at wave 1
- ii. Classroom-mean WR does not predict linear rate of change



- i. Individual WR predicts WRE status at wave 1
- ii. Individual WR predicts linear rate of change (plateau)





Future Directions

- Create latent variable for word reading efficiency with IRT model of words in story:
 - untimed word list (for story placement)
 - record reading of words in text
 - determine time to read each word
 - calculate accuracy and speed variable
- Embed IRT model in longitudinal, multi-level analysis of reading comprehension