Works in Progress:

Project DIMES- Diagnostic Instrument for Morphology of Elementary Students

A. Corinne Huggins-Manley
University of Florida

Amanda P. Goodwin
Vanderbilt University

Jonathan Templin
University of Iowa

Amber E. Benedict
Arizona State University

TaeYeon Kwon
University of Florida

Mingying Zheng
University of Iowa

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Proposed Work and the Needs We Serve

Project DIMES: Diagnostic Instrument for Morphology of Elementary Students is a Goal 5 (Measurement) funded project to develop a computer adaptive, diagnostic assessment of teachable morphological skills for students in Grades 3 to 5. We are creating this measure because the development of morphological skills is essential to students' literacy growth and, hence, to a host of positive student education and academic outcomes. It is crucial because knowledge of morphemes supports students' reading achievement (Carlisle & Goodwin, 2014) by influencing their ability to decode and access the meaning of multisyllabic words (Carlisle, 2004), which then supports their reading comprehension (Carlisle, 2000; Nagy, Berninger, & Abbott, 2006). The majority of words in academic texts are morphologically complex (Anglin, 1993; Graves, 2006; Nagy & Anderson, 1984; Nagy & Townsend, 2012), and 60% of these can be figured out by analyzing the component morphemes that makeup the word (Nagy & Anderson, 1984). In fact, the contribution of morphological knowledge to reading comprehension has been found to be significant when other variables have been controlled for (e.g., Jeon, 2011; Nagy et al., 2006; Roman, Kirby, Parrila, Wade-Woolley, & Deacon, 2009).

We are developing the assessment to serve two purposes. First, the assessment assists teachers in evaluating students' strengths and weaknesses in morphological skills so that they can identify underlying challenges to reading success and design instruction accordingly. Our assessment will help teachers identify and teach certain skills within morphological awareness that can support literacy skills. Second, the assessment provides researchers with a standardized tool for quantifying upper elementary students' morphological skills, thereby improving the validity and reliability of the measurement of these core outcomes in reading research. For example, our team has partnered with researchers in the IES funded *Project Coordinate* (Brownell, Benedict, & Kelcey, 2017-2020, R324A170135), who have indicated a need for our measurement tool in order to evaluate student-level outcomes of the professional development interventions they provide to teachers surrounding morphological instruction.

Planned Methods

Development of this assessment is guided by evidence-centered design (ECD) for principled assessment development, incorporating multiple iterations of validation methodologies that address content validity, response process validity, internal structure validity, criterion-related validity, fairness, and validity related to test use. Diagnostic measurement and computerized adaptive testing (CAT) will serve as the psychometric methods for assessment construction, administration, and scoring.

In Year 1, we are finalizing the domain of measurement that was developed through previous seed funding for the project, creating a large item bank, designing a static computerized version of the assessment, conducting a response process validity study, and preparing for a pilot of the items in Year 2. In Year 2 we are piloting the static computerized version of the assessment, analyzing the pilot data, revising the item bank, building adaptive algorithms, and preparing for a Year 3 field test of the adaptive assessment. In Year 3 we are field testing the fully adaptive computerized assessment, conducting a criterion-related validity study, working

extensively with teachers to develop the teacher reports produced by the assessment, and finalizing the diagnostic adaptive assessment, to be called CAT-DIMES.

Progress to Date and Feedback We Hope to Obtain at SREE

As three core, in-progress outcomes of our Year 1 work, we propose to present our student model, evidence models, and task models aligned with the principles of ECD (Mislevy, Steinberg, & Almond, 2003). These models are iteratively revised throughout assessment development (Braun, 2016; Mislevy et al., 2003), and hence they will need further refinement throughout the life of the project. We aim to present at SREE the models in their current version as of March 2020, and obtain feedback from SREE participants to assist in such continuous refinement.

For brief demonstration of what a subset of these models may look like for the conference, Figures 1, 2, and 3 show our evidence models to date. If accepted into the Works in Progress strand of SREE, we would present a host of figures representing the student, evidence, and task models for conference participants to review and provide feedback on (whereas Figures 1, 2, and 3 only show evidence models). While we are gathering multiple forms of formal data to evaluate the models throughout the three-year project, we hope to informally add the feedback from SREE participants to this data in order to make informed revisions to all of our ECD models throughout our project.

We will structure our poster in an electronic format that allows SREE participants to scroll through our different ECD models, and if they click on a model to provide feedback, the computer will provide them with a feedback form that they can use however they like. To facilitate this, each of the ECD models will provide instructions for reading the model (see example instructions on the left side of each of Figure 1, 2, and 3), and when clicked the participants will be routed to the form, with an example of such a form shown in Figure 4. The forms allow for open-ended feedback, but also guide the participants to provide us with content validity evidence of interest. For example, in Figure 4, the top two rows of the rubric are soliciting information about construct over- and under-representation (Messick, 1989) in the skills we are measuring, the behaviors we plan to observe, and the tasks we plan to use to elicit those behaviors (which are linked to the columns of the evidence models). Participants do not have to be familiar with construct or measurement theory in order to provide us with feedback that can inform our construct validity. Through this participant-selected feedback model, we hope to leave SREE with feedback from participants with a wide-range of expertise and perspectives on our in-progress measurement work.

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Evidence Model:
PREFIX ABILITY

Each full arrow path represents evidentiary logic connecting abilities to skills to observable behaviors to tasks.

An example of reading a full path is:

A student who is proficient in prefix ability can recognize prefixes, and hence can recognize the prefix when presented with a morphologically complex word in isolation, and hence when presented with a written word containing a prefix, the student can circle the prefix.

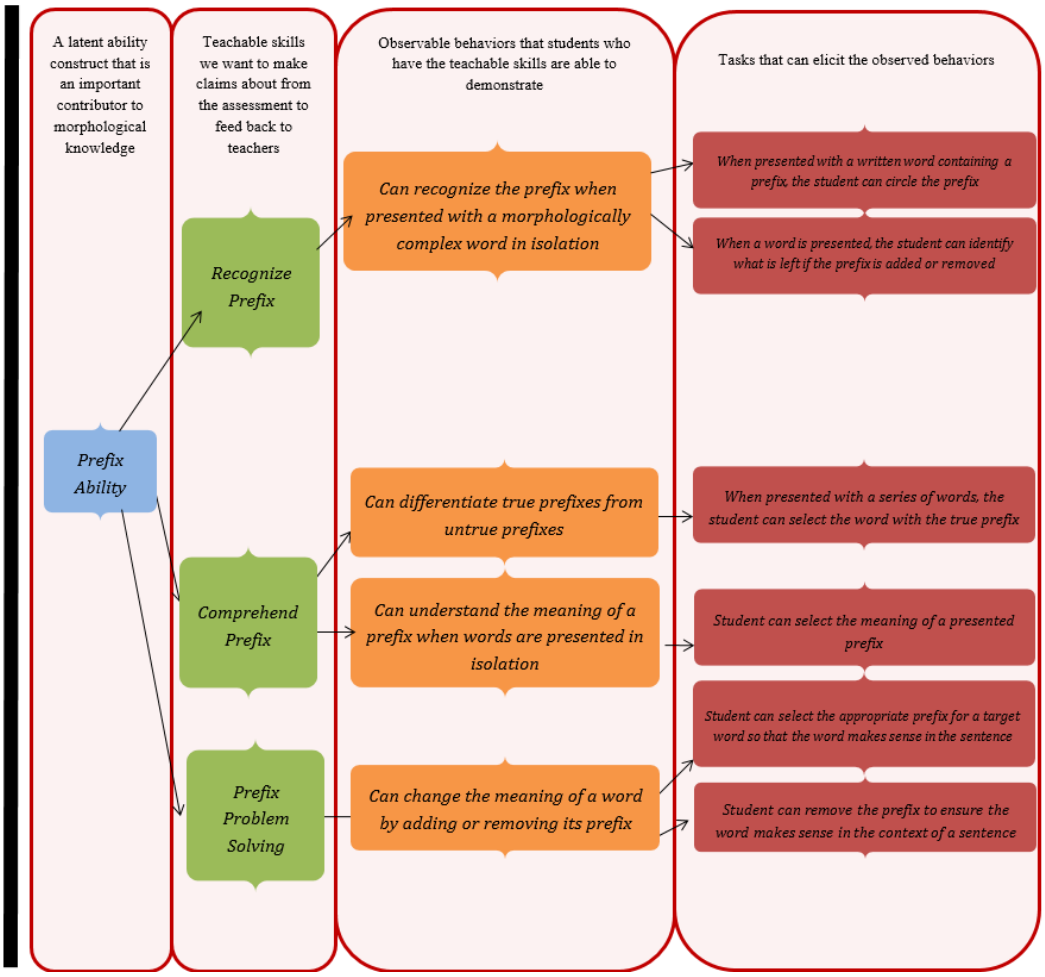

Figure 1. Prefix Evidence Model

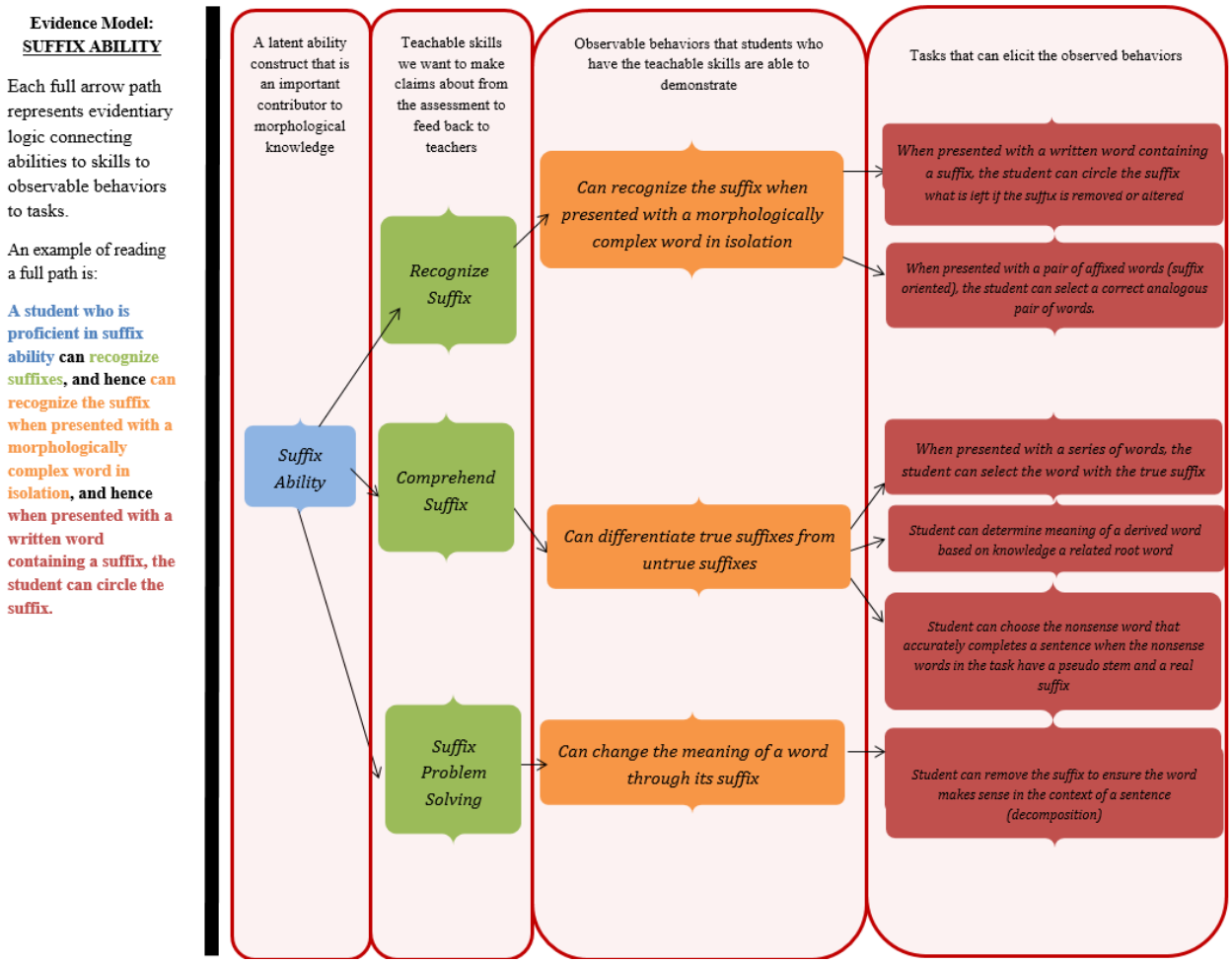

Figure 2. Suffix Evidence Model

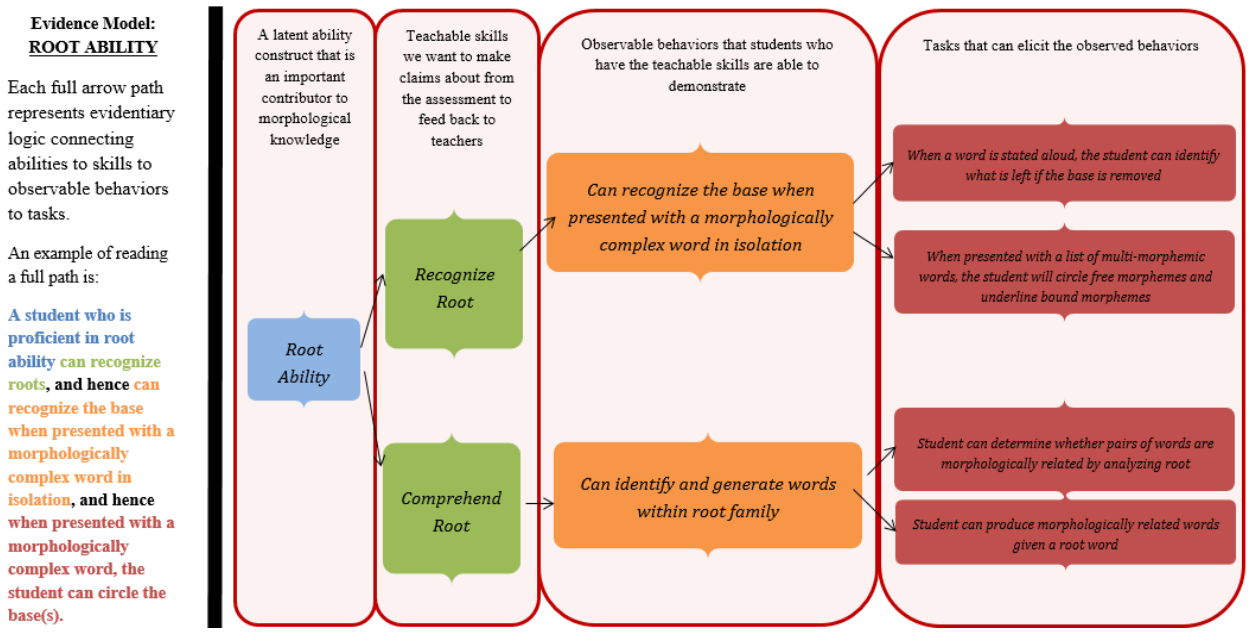

Figure 3. Suffix Evidence Model

Figure 4. Example of Feedback Format for SREE Participants- Appears if Prefix Evidence Model is Clicked

FEEDBACK PREFIX EVIDENCE MODEL

In reference to Teachable Skills	**In reference to Observable Behaviors**	**In reference to Tasks**
Is there anything you would add?	Is there anything you would add?	Is there anything you would add?
Is there anything you would remove?	Is there anything you would remove?	Is there anything you would remove?
Other comments:	Other comments:	Other comments: