

# The Reading Strategy Assessment Tool (RSAT): Assessing Processes that Support Comprehension

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## Background

The majority of comprehension assessment tools suitable for adolescent and young adult populations use a multiple-choice format, where the text and questions are available to students at the same time. Although there are advantages to this testing format, in many instances, this approach does not adequately assess the products and processes specified by discourse theory, those deemed critical for deep comprehension. Part of the problem is that the multiple-choice testing format does not afford assessment of comprehension processes as they occur *during* reading, because questions are answered only after the test passages are read. Additionally, students can adopt strategies such as reading the questions first and search the text for the answers. Perhaps more important, the items that typically comprise these tests are not constructed to assess comprehension products and processes specified in theories of discourse comprehension. For example, we have discovered that several items on the Nelson-Denny test, a widely used reading comprehension test, require that test-takers verify word meanings, rather than inferences required for comprehension. Moreover, the questions formulated to assess inferences were the easiest to answer, and least correlated with independent comprehension assessments.

## The Reading Strategy Assessment Tool (RSAT)

As yet in its early stages, we are developing a new approach for assessing comprehension: the Reading Strategy Assessment Tool, or RSAT. We are exploring the viability of developing computer-based systems that analyze verbal protocols produced *while* a student is actually reading. RSAT, a computer-administered test, assesses a student's level of comprehension -- and the processes that support it -- *while the student reads*. Users are offered two types of open-ended questions, indirect and direct. *Direct questions* are "wh-" ones (e.g., why, what), which focus on the text to assess a reader's comprehension. *Indirect questions* require readers to report their thoughts as they try to understand the sentences in their context. Specifically, participants are instructed to provide answers to questions that are akin to thinking aloud. These answers provide assessments of the processes that support comprehension. RSAT targets three types of processes: *bridging*, defined as making inferences connecting the current sentence to information contained in the prior discourse; *elaboration*, or basing inferences on world knowledge; and *paraphrasing* the current sentence (see Table 1 for examples).

The crux of RSAT is that it identifies the person's thoughts, by comparing typed inputs to a variety of information. The indirect protocols are initially compared to both the current sentence and the prior discourse context to determine if the person is paraphrasing or bridging, respectively. We are assuming that content from the protocols that does not come from those information sources reflects elaboration. Student responses are compared to ideal answers when assessing performance on the direct (or "wh-") questions. Both direct and indirect answers are analyzed via word-count algorithms (literal matching and Soundex) to detect and count only content words (nouns, pronouns, verbs, adverbs, and adjectives).



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Table 1. Example Indirect Protocols for the Sentence “A message within each receptor cell becomes activated.” From “How Cancer Develops.”

Student	Clause	Protocol	Strategy
1	1	After it is activated it	Paraphrase
	2	becomes lethal to the human body.	Elaboration
2	1	The growth factor attaches to the cell and	Bridge
	2	a message is activated.	Paraphrase
3	1	Cells influence their surroundings.	Bridge
	2	They transmit signals: for example growth signals.	Bridge
4	1	I am wondering how they can use this information	Elaboration
	2	to find a cure for cancer.	Elaboration

### Initial key findings

Although research continues on its validity and reliability, the substantial amount of data garnered thus far indicates RSAT’s viability. The RSAT approach successfully predicts measures of comprehension comparable to standardized tests, which demonstrates convergent validity between comprehension scores and other well-established measures of comprehension (Magliano et al., under review). Moreover, the processing measures (i.e., bridging, elaboration, and paraphrasing scores) correlate with standard measures of comprehension, validating the underlying cognitive model that provides the basis for RSAT. Finally, our research demonstrates respectable convergent validity, in that the RSAT scores highly correlate with human judgments of the verbal protocols; Pearson correlations range from .48 to .78, whereas the correlations between human judges ranged from .89 to .92. (Magliano, et al., under review). The lowest correlation typically occurs for the measure of elaboration, which has proven the most difficult inference to detect with computer-based assessment.

### Conclusions

We do not see RSAT as an alternative to multiple-choice tests, but rather as a formative assessment, one which would aid practitioners in assessing students and helping them to read effectively. However, more work needs to be done before a useful version of it is available.

First, we emphasize that early versions were developed and tested on college freshman. Although we suspect RSAT would be appropriate for high school students, that essential research has yet to be conducted.

Second, we need to develop psychometrically sound approaches for scoring responses, and for providing this salient information to practitioners, enabling them to competently assess and help their students become better readers.

Finally, we need to develop a support network for RSAT, so teachers and practitioners can use the new tool to their best advantage.

### Further Reading

Gilliam, S., Magliano, J. P., Millis, K. K., Levinstein, I., & Boonthum, C. (2007). Assessing the format of the presentation of text in developing a Reading Strategy Assessment Tool (RSAT). *Behavior Research Methods, Instruments, & Computers*, 39, 199-204.