Online Reading Comprehension Assessment Project:
Statistical Design and Analysis

Opportunities for NISS Postdoctoral Fellow – 2011-2013

High-dimensional Data Analysis and Cognitive Process Modeling

The objective of this multi-institution project is to define reading comprehension measures for online reading and to ascertain the relationship of online reading comprehension to standard fixed text reading comprehension. Assessment of online reading requires partitioning the reading process into subprocesses: locating information, evaluating relevance and accuracy, synthesizing information from multiple locations and finally communicating information. New assessments are being developed ab initio that will be administered in an online setting to middle school students in three states. Extensive detail data will be recorded to capture the sequence of each student’s work and interactive processes in addition to recording assessment responses. This will allow modelling of the cognitive processes. Coupled with data on state reading test results and other administrative records, the complex data base will be used to identify relationships between reading online and fixed text reading and to identify the roles of the subprocesses in reaching/not reaching full comprehension. Both analysis of assessment performance for three levels of online access and of extension/concordance with traditional reading tests, and modelling of the cognitive process via the four subprocesses will require strong statistical data analysis and modelling skills.

The first phase of the project is the construction of three parallel versions of computer-based tests, one in standard test format, the second in an open environment and the third in a closed (closely mimicked) online environment. Assessments are designed for efficiency using a testlet, computer adaptive approach. Data bases for these versions will be designed for automated data capture. The psychometric properties of these versions will be evaluated by a medium-scale two-state study.

The second phase of the project is the administration of the scaled tests constructed during the first phase to middle school students in a cross-section of educational environments (varying levels of computer access and computer experience) in three states. Test data will be combined with administrative data from state reading tests and other records for full analysis of the online reading assessment results for the full population and for subsets of particular interest. The second phase will also include cognitive process modelling for the four subprocesses that comprise online reading comprehension.

The ORCA project is now in its second year; and initial versions of the assessments have been constructed. The next step, the initial phase of test validation, will establish psychometric properties of these new, completely computer-based and interactive, assessments.

Statistical challenges include defining data extracts from the complete time course for the test, modelling of data from two different sources (ORCA test data and administrative records) and analysis of subgroups (e.g., English as a second language) for overall performance and for subprocesses.
Position Requirements:

A PhD or DSc in statistics or a related field is required, with all degree requirements completed and official approval of dissertation prior to appointment as NISS Postdoctoral Fellow.

Essential expertise: High-dimensional statistics and data analysis, Statistical computation, Theory and methodology of statistical inference, strong oral and written communication skills.

Desirable expertise: GLM and/or Hierarchical Bayes modeling, Applied statistics/collaboration experience, IRT theory and/or psychometrics.

Application:

Applications are open; and review of applications will begin on 1 February 2011; applications will remain open until position is filled.