

CHIS Linguistic Modification of Survey

Questions: A Summary Report

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CHIS Linguistic Modification Process

The California Health Interview Survey (CHIS) will collect data on important health issues such as public health and access to health care. Due to the extreme value of the CHIS data, it is imperative that the survey tools be examined carefully for any cultural and/or language biases. The process of language modification of the survey tools is particularly important in California, a truly multilingual state. Many different groups with different cultural and language backgrounds live in California. The process of involving many different language groups in the review process should help to simplify and clarify the English survey. Hence, reducing the language load of the instruments will help to obtain valid and reliable data. The purpose of language modification of CHIS surveys is to reduce major sources of measurement errors such as unnecessary linguistic complexity.

Research has identified several linguistic features that appear to contribute to the difficulty of a text; they slow down the reader, make misinterpretation more likely, or add to the reader's cognitive load and thus interfere with concurrent tasks. In addition, certain linguistic variables have been found to correlate with difficulty and may serve as convenient *indexes* for the actual causes of the difficulty.

In assessment of students' academic achievement, minor changes in the wording of content-based test items can raise student performance (Abedi, Lord,

& Plummer, 1995; Abedi, Lord, and Hofstetter, 1997; Abedi, Hofstetter, Baker, and Lord, 1998; Cocking & Chipman, 1988; Cummins, et al. 1981; De Corte, Verschaffel, & DeWin, 1985; Cummins *et al.*, 1988; Hudson, 1983; Garcia, 1991; LaCelle-Peterson & Rivera, 1994; Larsen, Parker & Trenholme, 1978; Spanos, Rhodes, Dale & Crandall, 1988; Riley, Greeno, & Heller, 1983).

According to De Corte, Verschaffel, and DeWin (1985), rewording a verbal problem can make the semantic relations more explicit without affecting the underlying semantic structure; the reader is then more likely to construct a proper problem representation and consequently to solve the problem correctly. What textual characteristics contribute to the relative ease or difficulty with which the reader constructs a proper problem representation?

Indexes of language difficulty include word frequency, word length, and sentence length. An additional index of difficulty for word problems is length of item. There might be other linguistic features that may cause difficulty for readers; these include passive voice constructions, long noun phrases, long question phrases, comparative structures, prepositional phrases, sentence and discourse structure, clause types, conditional clauses, relative clauses, and concrete vs. abstract or impersonal presentations.

In surveys, literature suggests that the linguistic complexity of the questions may create unnecessary burden on respondents and may cause

confusion and consequently result in unreliable responses particularly for non-native speakers of English.

To provide valid survey tools for all residents of California including non-native English speakers, a language modification process was adopted. In this process, efforts were made to eliminate or reduce the unnecessary linguistic complexity in the CHIS survey instruments. This process was guided by the results of a series of study by UCLA/CRESST researchers (Abedi, Lord, and Plummer, 1995; Abedi, Lord, and Hofstetter, 1997; Abedi, Hofstetter, Baker, and Lord, 1998). Fourteen linguistic features that were identified in the CRESST studies were used to identify the possible sources of unnecessary linguistics complexity in the CHIS survey questions.

Following is a brief discussion of the fourteen linguistic features that are the basis for linguistic modification process for the CHIS survey questions.

Word frequency/familiarity. Word frequency was an element in early formulas for readability (Dale & Chall, 1948; Klare, 1974). Words that are high on a general frequency list for English are likely to be familiar to most readers because they are encountered often. Thus, frequency is a useful index for familiarity of the word and concept. Readers who encounter a familiar word will be likely interpret it quickly and correctly, spending less cognitive energy analyzing its phonological component (Adams, 1990; Chall, et al., 1990). Word frequency has been identified as a primary factor in resolving ambiguities in text (MacDonald, 1993). The student's task is more difficult if his attention is divided

between employing math problem-solving strategies and coping with difficult vocabulary and unfamiliar content (Gathercole & Baddeley, 1993). On a test with math items of equivalent mathematical difficulty, 8th grade students scored higher on the versions of items with vocabulary that was more frequent and familiar; the difference in score was particularly notable for students in low level math classes (Abedi, Lord, & Plummer, 1995).

Word length. Readability formulas also use word length to compute level of difficulty (Flesch, 1948; Klare, 1974; Bormuth, 1966). As frequency of occurrence decreases, words tend to be longer. Accordingly, word length can serve as an index of word familiarity (Zipf, 1949; Kucera & Francis, 1967). Additionally, longer words are more likely to be morphologically complex, so word length also serves as a convenient index for morphological complexity — that is, the number of meaningful units packaged together in a single word. In one study, language minority students performed better on math test items with shorter word lengths than items with longer word lengths (Abedi, Lord & Plummer, 1995).

Sentence length. Sentence length has been identified as an index of difficulty and is used in readability formulas (Dale & Chall, 1948; Flesch, 1948; Klare, 1974; Bormuth, 1966). Sentence length serves as an index for syntactic complexity and can be used to predict comprehension difficulty; linguistic definitions of complexity based on the concept of word depth correlate with

sentence length (Bormuth, 1966; MacGinitie & Tretiak, 1971; Wang, 1970; Yngve, 1960). The impact of shorter sentence length was also demonstrated with language minority students on math test items (Abedi, Lord & Plummer, 1995).

Length of item. Students appear to find longer problem statements more difficult. A study of algebra word problems found a correlation between the number of words in the problems and problem-solving time (Lepik, 1990). Another study found a significant correlation between length of prompt and number of correct responses (Jerman & Rees, 1972).

Passive voice constructions. People find passive verb constructions more difficult to process than active constructions (Forster & Olbrei, 1973) and more difficult to remember (Savin & Perchonock, 1965; Slobin, 1968). Passive constructions occur less frequently than active constructions in English (Biber, 1988). Children learning English as a first language have more difficulty understanding passive verb forms than active verb forms (Bever, 1970; de Villiers & de Villiers, 1973).

Furthermore, passive constructions can pose a particular challenge for non-native speakers of English; passives in most languages are used much less frequently than in English, and in more restricted contexts (Celce-Murcia & Larsen-Freeman, 1983). Also, passives tend to be used much less frequently in conversation than in certain types of formal writing, such as scientific writing (Celce-Murcia & Larsen-Freeman, 1983). For these reasons, non-native speakers

may not have had much exposure to the passive voice and may not be able to process passive sentences as easily as active sentences. Adolescent native speakers, as well, may have difficulties with the passive voice because of lack of exposure to this structure. In one study, 8th grade students (native and non-native English speakers) were given equivalent math items with and without passive voice constructions; students in average math classes scored higher in the versions without passive constructions (Abedi, Lord, & Plummer, 1995).

Long noun phrases. Noun phrases with several modifiers have been identified as potential sources of difficulty in math items (Spanos *et al.*, 1988). Long nominal compounds typically contain more semantic elements and are inherently syntactically ambiguous; accordingly, a reader's comprehension of a text may be impaired or delayed by problems in interpreting them (Halliday & Martin, 1994; Just & Carpenter, 1980; King & Just, 1991; MacDonald, 1993). Romance languages such as Spanish, French, Italian, and Portuguese make less use of compounding than English does, and when they do employ the device, the rules are different; consequently, students whose first language is a Romance language may have difficulty interpreting compound nominals in English (Celce-Murcia & Larsen-Freeman, 1983).

Long question phrases. Longer question phrases occur with lower frequency than short question phrases, and low-frequency expressions are in general harder to read and understand (Adams, 1990).

Comparative structures. Comparative constructions have been identified as potential sources of difficulty for non-native speakers (Jones, 1982; Spanos, *et al.*, 1988) and for speakers of non-mainstream dialects (Orr, 1987, but see also Baugh, 1988).

Prepositional phrases. Students may find interpretation of prepositions difficult (Orr, 1987; Spanos *et al.*, 1988). Languages such as English and Spanish may differ in the ways that motion concepts are encoded using verbs and prepositions (Slobin, 1996).

Sentence and discourse structure. Two sentences may have the same number of words, but one may be more difficult than the other because of the syntactic structure or discourse relationships among sentences (Freeman, 1978; Finegan, 1978; Larsen, Parker, & Trenholme, 1978).

Clause types. Subordinate clauses may contribute more to complexity than coordinate clauses (Hunt, 1965, 1977; Wang, 1970; Botel & Granowsky, 1974).

Conditional clauses. Conditional clauses and initial adverbial clauses have been identified as contributing to difficulty (Spanos *et al.*, 1988; Shuard & Rothery, 1984). The semantics of the various types of conditional clauses in English are subtle and hard to understand even for native speakers (Celce-Murcia & Larsen-Freeman, 1983). Non-native speakers may omit function words (such as *if*) and may employ separate clauses without function words (Klein, 1986). Separate sentences, rather than subordinate *if* clauses, may be easier for

some students to understand (Spanos *et al.*, 1988). Statistically, languages of the world prefer conditional clauses in iconic order — that is, preceding main clauses rather than following them. In fact, some languages do not allow sentences with the conditional clause in last position (Haiman, 1985). Consequently, sentences with the conditional clause last may cause difficulty for some non-native speakers.

Relative clauses. Since relative clauses are less frequent in spoken English than in written English, some students may have had limited exposure to them (in fact, Pawley & Syder, 1983, argue that the relative clauses in literature differ from those in spoken vernacular language). They are acquired relatively late by first-language learners. Languages differ with respect to marking structures and word ordering for relative clauses (Schachter, 1983), so they may be difficult for a non-native speaker to interpret if his first language employs patterns that are different from those of English.

Concrete vs. abstract or impersonal presentations. Studies show better performance when problem statements are presented in concrete rather than abstract terms (Cummins *et al.*, 1988). Information presented in narrative structures tends to be understood and remembered better than information presented in expository text (Lemke, 1986).

From the studies discussed above, we identified features of ordinary English which may contribute to the overall difficulty of a mathematics problem

statement. Then we surveyed NAEP math items to identify which of those features were present in the items and could be modified without changing the math content of the items. We included the features in a rubric for rating the complexity of a problem statement, and we were guided by them in making modifications to existing math items.

Methodology

A Language Review Advisory Committee (LRAC) was formed to supervise the language modification process. The LRAC consisted of the project director, project coordinator, two senior research staff members (experts in the area of language modification of cognitive test items and survey questions) and adaptation leaders. A Language Review Team (LRT) was formed to review the surveys. Members of LRT were selected from a list of experts in linguistic modification of cognitive and non-cognitive tests items and survey questions. The list was compiled by ARDAC based on the reports from the nationwide language modification conducts. The process for language modification of CHIS surveys is based on the findings from studies by Abedi, et al., (1995, 1997, 1998) plus findings of other researchers that were summarized in the literature review section of this report.

A package for the members of Language Review Team (LRT) was prepared and was express mailed to them. The package included: (1) a cover letter that explained the review process, the purpose of the survey and a short instruction for the review (see Appendix A); (2) a linguistic review rubric which

has been developed by Abedi and Lord (1999) and uses a five-point Likert scale to review and rate different features of linguistic complexity, (3) a short description of linguistic features, and (4) the actual questionnaire items to be reviewed. The package also included a detailed instruction for the language modification along with the rating sheets (see Appendix B).

Language reviewers were asked to rate each question in each of the three CHIS surveys (Adult, Adolescent, and child) using a 4-point Likert-type rating scale: (1) problematic items, (2) weak items, (3) adequate items, and (4) exemplary items (see Appendix B for definitions of these four categories). In addition to rating each survey question in scale of 1 to 4, the reviewers were instructed to provide comments on how they arrived to the decision. They were also asked to provide suggestions of how to improve the wording of the questions particularly for those questions that were rated as “weak” and

A total of 10 linguistic review experts reviewed all the questions in the three CHIS surveys. We set a deadline of one week (5 working days after receiving the package) for the review. Six of the reviewers returned their ratings and comments on time. The remaining reviews were received a few days after the deadline.

Ratings and comments of the six reviewers that were received on time were summarized (see Appendix D). The Language Review Advisory Committee (LRAC) and the UCLA/CHIS research team met and discussed the

comments and suggestions made by the reviewers and prepared the linguistically modified version of the surveys. In addition to the joint meetings of LRAC and UCLA/CHIS, LRAC met and further discussed the comments and reviewed and discussed the new responses that were received shortly after the deadline. Linguistically modified surveys were submitted to the UCLA/CHIS research team.

The linguistic modification process was based on the CHIS Adult Survey Version 2.1, Adolescent Survey Version 2.0, and Child Survey Version 2.0.

Results and Discussion

As indicated earlier, the linguistic reviewers assigned ratings of 1 (problematic question), to 4 (exemplary questions). The results of linguistic review of the CHIS surveys suggest that in general, the survey questions were in good shape in term of linguistic characteristics of the questions. The wording of the question for most of the CHIS survey questions is clear. Most of the questions in the three surveys were judged by most of the raters as “4, exemplary a few cases, raters found complex language, difficult and unfamiliar vocabulary and complex sentence structure. They provided suggestions on how to improve the wording of these questions. The reviewers’ ratings and comments are summarized in Appendix C. Information in Appendix C helped to modify the language of some of the survey questions that were judged to be linguistically complex. Some of the main points raised by the language reviewers will be elaborated.

Reviewers provided comments concerning the format and language of the questions. Since the format of questions impact the level of linguistic complexity of the questions, we will discuss both, format and language. First, issues concerning the format will be discussed and then a few linguistic modification cases will be presented.

Format

Skip-patters. Some of the reviewers expressed concern over the skip-patterns of the questions. However, since the skip-patterns were not finalized in the surveys, comments regarding skip patterns were ignored. It was indicated in the joint meeting of CHIS/ARDAC that when all the survey questions were finalized, then the skip-patterns will be carefully reviewed and corrected.

Question format. Since the survey questions were from different sources, they had different format. In some cases, the interviewers were instructed to define the technical terms, if needed. For example, in question B22a (Adult form), for the term “cholesterol”, the interviewer is instructed to: [IF NECESSARY SAY: Blood cholesterol is a fatty substance found in the blood]. However, in some other questions the technical terms were not defined. For example, in question D41 (Adult form), terms “osteopenia”, and “osteoporosis” are not defined. Language reviewers suggested providing clarifications in such cases too.

Response patterns. The response patters are different with some questions. For example, in response to the questions of “how often...”, sometimes the respondents were ask to provide “number of times per week/per month” as in a

series of questions in page 23 (Adult form) such as: “How often did you have French fries, home fries, fried potatoes, or hash browns?” Respondents are supposed to indicate the number of times “_____ time per day/per week/per month”. In other questions, however, in response to “how often” several alternatives were provided. In question B20b (Adult form), for example, in response to question: “During the past 12 months, how often have you had symptoms of asthma such as coughing, wheezing, shortness of breathe, chest tightness and phlegm production?” the following alternatives were given as response options: “No symptoms in the past 12 months”, “1 or 2 times a month”, “More than 2 times a month but not every week”, “Every week, but not every y night or almost every night”. Since the format and language of the questions interact, consistency in the question format helps to better understand and follow the questions. Thus, language reviewers suggested consistency in the response pattern to the extent possible.

Multi-purpose questions: Some questions may introduce two or more issues with the expectation of a single response. For example, question B15 in the Adult survey asks: “During the PAST 4 WEEK, how much o f the time has your PHYSICAL HEALTH OR EMOTIONAL PROBLEMS interfered with your social activities like visiting with friends, relative etc?” Respondents who had only *physical health* problem or only *emotional problem* or *both* may answer the same. It would be more productive if this question is divided into two, one question

Long question phrases. Some of the question phrases were long. See for example Adult form, questions F6a, p. 30, I29, p. 60, I32, p. 61.

Sentence and discourse structure. In some questions, sentence and discourse structures were complex. See for example, question B7 Adult, P. 6. “During the past 4 weeks, did you NOT do your work or other activities as well as usual because of emotional problems such as feeling depressed or anxious?”. This

question can be revised as: “During the past 4 weeks, did your work or other activities was affected by emotional problems such as feeling depressed or anxious?”

As another example, question B6, in the Adult survey (P. 6) can be mentioned.

“During the past 4 weeks, did you accomplish LESS than you would have liked to have accomplished because of any kind of emotional problems?” It was suggested to revise this question as: “During the past 4 weeks, dif you do LESS than you wished to do because of emotional problems?”. Another example is question B23a (Adult form). “About how long has it been since you last had your blood cholesterol checked?”. This question can be revised as: ago your blood cholesterol checked”

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Appendix A. Cover letter to language reviewers

Dear colleague,

The California Health Interview Survey (CHIS), a collaboration between the UCLA Center for Health Policy Research, the California Department of Health Services, and the Public Health Institute, is conducting a telephone interview survey on health issues such as public health and access to health care. There are three CHIS surveys: an adult questionnaire (73 pages), an adolescent questionnaire (24 pages) and a child questionnaire (20 pages).

Due to the importance and sensitive nature of the CHIS data, the survey tools must be examined carefully in order to remove any unnecessary linguistic complexity and any language biases. The survey instruments should, however, retain the conceptual and technical quality.

We are inviting you to be a part of our team of survey reviewers. Your job as a reviewer involves, as previously discussed, checking the survey questions for any language complexity and/or language biases.

Please find enclosed a package that includes the three survey questionnaires (adult, adolescent, and child) and instructions for participating in the linguistic review.

Please rate the linguistic difficulty/bias of each question using the attached rating sheets on a scale from 1 to 4 as follows:

- [1] Problematic: Substantial amount of linguistic complexity/bias exists.
Question needs to be re-written.
- [2] Weak: Significant level of complexity/bias exists in the questions.
Modifications are needed.
- [3] Adequate: There might be minor linguistic complexity/bias.
Minor changes may be needed.
- [4] Exemplary: No linguistic complexity/bias exists.
No change needed.

Definitions for these four categories and instructions for rating the questions are provided below. Please use the rating sheet to rate each question. Please make sure that you rate ALL questions in ALL three instruments. For questions that fall under categories [1] (problematic), [2] (weak) and possibly [3] (adequate), please provide advice and suggestions on how to improve the wording of the items to make it clear and concise for respondents from different cultural,

educational and socio-economic backgrounds. Please write your suggestions on the questionnaire booklet.

Please return the completed materials along with the three questionnaire booklets with your comments and suggestions by Thursday, April 20, 2000. We would like to thank you in advance for your assistance. If you have any questions, please feel free to call us at (310) 268-0349 or email Fery Hejri at "ardacresearch@usa.net".

Sincerely,

Fery Hejri, Ph.D.
Project Coordinator

Appendix B. Instructions for language reviewers

The following is an example of an unfamiliar word (from Rea and Parker, *Designing and Conducting Survey Research*, 1997, 2nd edition):

In a question asking for information about the use of illegal drugs, the following alternative questions might be asked:

- 1a. Have you or any member of your family been engaged in substance abuse during the past year?
- 1b. Have you or any members of your family used illegal drugs during the past year?

Question 1a uses the term “substance abuse,” which may not be familiar to some respondents with different language and cultural backgrounds.

Generalized Item Scoring Guide

<u>LEVELS</u>	ITEM QUALITY LEVEL
<u>4</u>	EXEMPLARY ITEM <ul style="list-style-type: none">• Familiar or frequently used words; word length generally shorter• Short sentences and limited prepositional phrases• Item is concrete and in a narrative structure• No complex conditional or adverbial clauses
<u>3</u>	ADEQUATE ITEM <ul style="list-style-type: none">• Familiar or frequently used words; short to moderate word length• Moderate sentence length with a few prepositional phrases• Item is concrete• No complex conditional or adverbial clauses
<u>2</u>	WEAK ITEM <ul style="list-style-type: none">• Some words are seldom used or are not familiar• Long sentence• Item contains abstract concepts• Sentence has complex conditional or adverbial clauses
<u>1</u>	C <ul style="list-style-type: none">• Many words are seldom used or are not familiar• Long or complex sentence, passive structure• Abstract item, presented in expository text

- | | |
|--|----------------------------------------------------------------------------------------------------------|
| | <ul style="list-style-type: none">• Sentence has difficult conditional or adverbial clause |
|--|----------------------------------------------------------------------------------------------------------|

CHIS Survey Rating
Language Review

Reviewer Name: _____

Date of review: _____

Directions:

Please circle the appropriate number according to the enclosed item scoring guide descriptions. If an item has two or more "problems" consider giving it a 1 or a 2. If an item is adequate but has small or minor problems that can be corrected easily, give it a 3. If there are no problems with an item, it deserves a 4 as an exemplary item. If you rate an item 1 or 2, please describe the problem in the last column and write your suggested corrections on the questionnaire booklet.

For example, the question on "substance abuse/illegal drug" that we used earlier can be used here to illustrate ratings. This question may be rated as a "problematic, 1" since the term "substance abuse" may not be familiar for the entire group of respondents. We therefore mark this question as "1 problematic" and write our suggested changes on the booklet.

RATING SHEET

1 = Problematic, 2 = Weak, 3 = Adequate, 4 = Exemplary

#	1	2	3	4	NOTES/PROBLEMS
1a	X				

Note: Change question 1a: "Have you or any member of your family been engaged in substance abuse during the past year?" to 1b. "Have you or any members of your family used illegal drugs during the past year?"

Appendix C. Reviewers' ratings and comments

This appendix has been sent as a separate attachment