Minutes of the Meeting of the Braille Authority of North America

Ramada O'Hare Inn Rosemont, Illinois April 4, 1977

ATTENDANCE

Sponsor	Representative(s)
American Association of Workers f/t Blind	Harold G. Roberts
American Council. of the Blind	Floyd Cargill
American Foundation for the Blind	Loyal E. Apple
American Printing House for the Blind	Ralph E. McCracken
Association for Computing Machinery	Robert A. J. Gildea
Association for Education of the Visually Handicapped	James E. Haralson
Canadian National Institute for the Blind	E. G. Brown Darleen Bogart
Clovernook Home and School for the Blind	Martin F. Droege
Library of Congress, DBPH	Richard Evensen
National Braille Association	Mrs. William Epstein Mrs. Irvin F. Richman
National Federation of the Blind	Rami Rabby

(Mr. Apple joined the meeting at 11:15 a.m.)

The meeting was called to order by Mr. Roberts at 10:07 a.m. The minutes of the meeting of December 2, 1976 were approved as circulated.

REVIEW AND ADOPTION OF PROPOSED BYLAWS

Each section of each Article was considered in order and accepted as submitted or revised.

GC Article I: No changes

Article II

GC Section 1: No changes

GC Section 2: Substitute "hand" for "volunteer" in the last line.

Article III

GC Section 1 No changes.

GC Section 2: No changes

GC Section 3: Substitute "participating organization" for "member" in the last line. Add at end of the section, "The National Board shall elect another of its members to complete the unexpired term."

GC Section 4: Insert "National Board" before "Chairperson" in line 3. Add at end of the section, "Members of technical committees need not be members of a participating organization."

GC Section 5: Revise lines 7-11 to read, "After consideration and acceptance by the National Board, such findings and recommendations for change shall be submitted to chairpersons of all other technical committees. Their findings and recommendations will be submitted to the National Board which, in turn, shall arrange for any additional field review and testing."

Article IV

GC Section 1: Substitute "in" for "and" in line 6.

MSC Section 2: It was moved by Mr. Apple that the following language be added to this article. I have numbered it as section 2 and renumbered the following sections. The motion carried unanimously. "Written notice of the time and place of all meetings shall be mailed no less than thirty (30) days in advance of the meeting."

GC Section 3: Change "members" to "organizations" in line 2. Change "member" to "participating organization" in line 4. Change "suspended" to "dropped" in line 6.

GC Section 4: No changes

GC Section 5: In line 2, place a period after "National Board", delete "and", and capitalize "Membership".

GC Article V No changes

GC Article VI No changes.

MSC Mr. Gildea moved the adoption of the revised Bylaws. The vote was unanimous.

GC Mr. Evensen and Mr. McDaniel were authorized to incorporate the requirement of an audit and the bonding of the Treasurer into the Bylaws if this should be required to obtain incorporation.

MSC Mr. Brown moved that we seek incorporation as a not-for-profit corporation in the District of Columbia. The motion carried unanimously.

GC Mr. Gildea asked that a note of commendation be sent from the National Board to the members of the Bylaws Committee.

Mr. Evensen said that Maxine Dorf was willing to send copies of the minutes and reports of the Braille Authority of the United States to the secretary of BANA.

During the discussion of the Bylaws, Mr. Gildea suggested that BANA place notices in the various braille magazines when a code change was under consideration. The notices would contain the name and address to which comments would be sent.

REVIEW AND ADOPTION OF MEMORANDUM OF UNDERSTANDING WITH FLORIDA STATE UNIVERSITY

The following changes in the draft of the memorandum were made by general consent.

Page 1, line 4: Replace "represents" with "consists of representatives from".
line 20: Replace "Handicapped Children" with "Education of the Handicapped".
Page 2, #3): Replace "will not duplicate" with "does not plan to duplicate".
#4): Replace "approval and adoption" with "consideration and action".
#5): Replace "will assume" with "has"; "those" with "all". Place a period after "codes" and delete the remainder of the sentence.

The secretary was directed to send a copy of the revised memorandum to Dr. Gideon Jones, and following the approval of the memorandum by Florida State University, to forward a copy to Mr. John E. Davis, Project Officer; Bureau of Education of Handicapped Children.

MSC Mr. Apple moved the approval and adoption of the Memorandum of Understanding with Florida State University as revised. The motion carried unanimously.

Mr. Roberts reported on his meeting with Dr. Jones and Miss Hooper at FSU. They indicated that they would be willing to add members from BANA to their technical committees. The Mathematics and Scientific Notation Committee and the Music Committee have been fully formed. All of the members of these two committees were members of the former committee under the Braille Authority of the United States.

Mathematics and Scientific Notation Committee: Bernard Krebs, Chairman; Mrs. F.J. Mann, Dr. Abraham Nemeth, Miss Donna Pastore, Mrs. Ruth M. Peters, and Mrs. Barbara Taffet.

Music Committee: George Bennette, John di Francesco, Mrs. Paul DeGarmo, Mrs. Edward Krolick, Miss Sandra Walberg, William Watkins.

Computer Notation: This committee is not complete at present. The current members are Robert Hanes and Dr. Abraham Nemeth. Harry Bossier, Mrs. F.J. Mann and Bernard Krebs are under consideration as members.

There is no plan to appoint a Textbook Format Committee at this time.

It was noted that the grant to FSU expires on September 30, 1979.

Mr. Apple suggested that there should be Canadian representation on the FSU Technical Committees. Mr. Brown commented that Miss Hooper had invited Canadian participation. Mr. Roberts suggested that BANA recommend qualified individuals to the FSU project. Mr. Brown was directed to send the secretary a list of the names and addresses of potential Canadian members for these committees. He was to include a resume of there qualifications. Mr. Apple and Mr. Gildea were appointed a committee to identify potential members for the FSU Technical Committee on Computer Code. They will submit a list of approximately six names directly to Dr. Gideon Jones.

GC It was agreed that BANA can recommend members of its National Board for service on the FSU Technical Committees.

PROPOSED PROJECT ON REVISION OF LITERARY CODE TO ACHIEVE COMPUTER COMPATIBILITY

Mr. Gildea distributed print and braille copies of an unsolicited proposal from Mr. Peter Duran, Director of the ARTS Service Bureau for the Protestant Guild for the Blind, Inc.

GC It was agreed that BANA does wish to pursue the goal of making literary braille computer compatible. Mr. Roberts will write Mr. Duran notifying him that the proposal has been received and that we are studying it. Mr. Gildea will obtain copies of the Proceedings of last June's workshop on this subject and distribute them to the members of the National Board. Each of us will write a critique of Mr. Duran's proposal and circulate it to the other members of this Board.

FINANCIAL REPORT

Mr. Droege reported that BANA has $5,707.54 on hand. He has placed $3,207.54 in a checking account and $2,500.00 in a savings account.

NEXT MEETING

The next meeting of BANA will take place in the middle of June in the Chicago area.

The meeting was adjourned at 3:58 p.m.

Respectfully submitted,

Mrs. Irvin F. Richman, Secretary

UNSOLICITED PROPOSAL
SETTING STANDARDS FOR
BRAILLE PRODUCED BY COMPUTER

By
Peter Duran, Director
ARTS Service Bureau
Protestant Guild for the Blind, Inc.

NTRODUCTION

What is computer-produced braille? How can it benefit the blind in our country and around the world? What are the ramifications of its eventual wide-spread use?
Computer braille is created by having a computer "translate" symbols of the English language into symbols of the English Braille code (while accounting for special rules and contractions), and by embossing the resultant translation. It eliminates the need for stereotypists (a highly skilled and dying breed), and replaces them with ordinary typists who need have no knowledge of braille.

It makes possible the "short run" of a translation; that is, just one or only a few copies of a particular text. Using the traditional braille press, it was not economically feasible to produce a small number of copies. People who did not need thousands of copies of their material were unable to get it brailed. This severe limitation has been solved by the advent of computers. Computers can economically supply one copy of virtually anything--recipes, children's books, brochures, etc. And because of their great speed, translations can be produced in hours or days, as opposed to weeks or months.
In short, computers have the capacity to voluminously increase the supply of braille material available at prices much lower than currently possible.

The problem arises in that while able to translate and emboss virtually unlimited materials, computer-braille producers now run across more diverse symbolic and formatting situations; situations which the current braille code is unequipped to handle. Since there are no standard practices, each translation program deals with these problems in its own way. The obvious outcome is that there are numerous variations on the-existing code; none of them official. Pity the poor reader.

What follows is a synopsis of the basic factors involved in computer braille production.

COMPUTER BRAILLE TODAY

There are three main steps in using a computer for producing braille. The first step is to enter the material into the computer; this step is known as "inputting". The second step is to contract and format the material according to accepted English Braille rules; this step is known as "translating". The third step is to emboss the

translated material; it is known as "outputting".

Inputting

Putting material into a computer for brailing can be done in several ways. The most common way is by typing it. A typist sits at a computer terminal and types from a print copy. What is expected of the typist greatly determines the desired nature of the braille code for computers. For example, if no rearranging of text is to be expected, and then special symbols and abbreviations are typed in the order they appear in print.

Materials already put into a computer-readable form by publishing houses, companies, or other agencies are immediately accessible for brailing. Magnetic or paper tapes containing the information to be brailed are read into the computer. This encoded information has already been proofread and corrected for spelling, typing and formatting errors. Although this method of inputting is thousands of times faster than typing, a problem arises concerning the formatting procedures. To use these materials unaltered, printing practices have to be closely followed. For example, publishers indicate italics in print by prefixing and suffixing a special symbol to the text to be italicized. This is done no matter whether there are one, two, three, or more words to be italicized. The braille practice for the same situation is dependent on the number of words affected.

A potential method of putting material into a computer is by using "Optical Character Recognition" equipment. This equipment scans a print page and interprets it character by character. These characters are then directly input into a computer. There are still technical difficulties involved in recognizing various type fonts and styles, but if and when "OCR's" become practical and reliable input devices, the cost of producing braille by computer would drop to little more than the cost of paper and computer time.

Translating

The translation of material is receiving the most attention by computer programmers. It is usually viewed in isolation from the other two steps of computer braille production, but this is not practical. There are many decisions that have to be made while inputting or made not at all. For example, a single letter followed by a period may or may not be an initial. The decision whether a single letter is or is not an initial determines two alternative translations. A typist is able to make this determination, but a braille translation program is not in the writing of good translating programs for the current English Braille code is intrinsically difficult because of the many ambiguous rules. That is, braille as a historical writing system (like other writing systems) has many exceptions, ambiguities, and inconsistencies. In order to write a translating program, a programmer has to decide which exceptions to obey, which ambiguities to adopt as standard, and which inconsistencies to ignore. Unfortunately, no two programmers make the same decisions, and thus no two translating programs do exactly the same thing.

Outputting

The outputting step is usually viewed exclusively as an engineering problem. It is true that the development and manufacture of embossing devices is primarily a technological problem, not directly bearing on English Braille. However, the manner in which the braille is presented to the user physically determines the format of the braille itself. Traditionally, for example, braille has been embossed on two dimensional pages, which have physical tops and bottoms. However, "strip" braillers are coming into common use. They emboss braille on a one-dimensional continuous strip of paper, rolled or

folded. What does that do to the concept of lines? How could you tell when you were starting a new paragraph?

Still other output devices are being manufactured which display a portion of a braille line by raising pins or by vibrating crystals. These paperless output devices display braille in two ways: statically and dynamically. In the static case, a portion of a line is displayed, examined, and then replaced by the next portion to be examined. In the dynamic case, the braille passes under the reader's fingers in a continuous stream while the fingers stay motionless. This would also have an effect on braille formatting procedures because there would be no need to hyphenate words; the end of a line would never come.

For both types of devices, the formatting of the braille is quite different from that of the two-dimensional page embossers. Each output medium has its own formatting options and boundaries that will in turn affect the format of the Braille produced.

OTHER CONSIDERATIONS

The above discussion deals with the computer's "needs". However, potential braille users also have needs: They must be able to learn and read braille effectively and efficiently. What factors make braille learnable and readable? There are a multitude of opinions on these two subjects, but little concrete empirical evidence is offered to support them. There are several sources of data, which bear on these considerations. Many millions of dollars are spent on cryptology the encoding and decoding of written information. Many factors are known which contribute to learning and reading of codes. Also, there is a great deal of on-going research in print reading. Some of this research is generally applicable--for example, the influence of spelling on readability. Whatever data that exists and bears on these considerations are guides for the development of computer braille.

There is no doubt that the braille code is improvable so that learnability and readability are increased. If the existing exceptions, ambiguities, and inconsistencies eliminated, both would be increased.

ASSUMPTIONS

Many assumptions concerning computer braille production are possible. The ones listed here represent a conservative estimate of the potentials of computer braille production. They are based on a comparison of standard and computer production methods.

Inputting

It is far easier to train a typist to use a computer terminal than to train a stereo typist to use a stereograph. It takes about a week to train a typist and about a year to train a stereotypist. The typist needs to know little braille, if any. The stereo typist needs to be an expert.

Typists are readily available; stereotypists are not. There are potential sources of volunteer typists; there is no source of volunteer stereotypists. Using computers, material already available in other computers is directly transferable; using stereographs, material already available in other computers has to be retyped.

Translating

If a translating program makes errors, they are predictable; if a stereotypist makes errors, they are not. It is easier to catch consistent errors than variable ones. A translating program can proceed faster than a stereotypist. How much faster depends on the size of the computer used

and on the complexity of the braille code adopted.

Outputting

Using a computer, initial proofreading can be done via print or braille; using a stereograph, only braille can be used. Proofreading for typing, spelling, and other errors is faster with print than with braille. Output from computers can be used for small and large numbers of copies; for economic reasons, plates from stereographs can only be used for large numbers of copies. Stereographs that can be used with computers are now being manufactured.

Learning

Braille is too difficult to learn because of exceptions, ambiguities, and inconsistencies. These anomalies are removable with changes in some rules. Some rules are unnecessary; they only take care of exceptional cases, which can be eliminated.

Reading

Many rules are present to insure readability but may or may not actually do so. Till the factors enhancing readability are isolated, these rules are not assessable.

Reading speed is increasable by making use of more uniform rules. It is also increasable by eliminating infrequently used or obscure contractions.

Braille users are reading a larger variety of literary material: advertisements, brochures, manuals, etc. Although these materials do not contain any special signs or symbols, the braille code is inadequate for translating them. This situation is mutable by extending some of the rules.

OBJECTIVES

There is one main objective: the revision of the braille code according to logical and educational principles. This goal has several components, which are pursuable jointly or separately.

Inputting

While inputting, no rearrangement of text should be necessary. This would reduce training time of typists, permit immediate transfer of material from other computers, and eliminate a major source of error and time consumption. While inputting, any necessary reformatting should proceed according to precise rules, algorithms, so that typists or programs are able to accomplish the alterations without intervention.

Translating

While translating, all contracting should proceed according to precise rules, which are not dependent on external factors such as the latest edition of a particular dictionary. If there are remaining ambiguous situations, the translating program should find them for the user rather than vice versa. The rules governing the translating should take account of every possible situation that occurs. Presently, only the most common situations are covered by many resident.

Outputting

The format of the translated material should be appropriate to the output device. If it is a two-dimensional display, tabbing, line spacing, etc. have to be invoked. If it is a one-dimensional display, tabbing, line spacing, etc, have to be discarded for more appropriate conventions.

The content of the translated material should be appropriate to the output device. If it is a two-dimensional display, running headings, braille page numbers, etc. are appropriate. If it is a one dimensional display, running headings, braille page numbers, etc. have no significance; instead, another indexing system is required.

Learning

The braille rules should be made simpler and their number reduced. This is possible as analysis indicates.

All exceptions to rules should be eliminated. This is possible and practical, and is necessary if translating programs are to be independent of external factors such as changing spelling and pronunciation.

Braille should foster learning in other areas-not hinder it. For example, it is extra learning to remember that special signs follow numbers in print but precede them in braille, but not in all instances.

English Braille, as the base code, should be compatible with other codes when possible. For example, there is no logical reason why the symbols for parentheses should be different for English Braille, textbook formats, and Nemeth code.

Reading

All materials only using the signs covered by braille should be translatable. Currently, this is not the case. For example, expressions containing punctuation marks within them are not covered by any rules.

Those factors revealed by research enhancing readability should be inculcated into the braille code, if not already present, and those factors detracting from readability presently in the braille code should be removed.

ARTS SERVICE BUREAU EXPERIENCE WITH COMPUTER BRAILLE PRODUCTION

There are two distinct requirements for creating an adequate translation system: a thorough understanding of current English Braille and a thorough appreciation of computers and their programming. Proficiency in one area but not the other makes it virtually impossible to create an adequate translation system. Inexperience with braille leads to programs, which "ignore" details of rules, special circumstances, etc. Inexperience with computers leads to large, slow, and cumbersome programs.

The ARTS Service Bureau has gained extensive facility in both areas.

An in-house translation system has grown out of three years of effort. This effort has resulted in a small and efficient translating program requiring little intervention during translation. It has been in use for over a year in braille production.

The ARTS translation system is used by persons who have little knowledge of braille. Its operation is detailed in the accompanying brochure. (Braille copies are available on request.) It runs on a mini-computer and requires 8K of core memory. It makes very few errors on literary material and meets Library of Congress certification standards for transcribers--although these standard do not and

should not apply to translating programs.

Two other results of these efforts are a detailed analysis of the braille code as a syntactic system and an understanding of its programming limitations. Some of these insights are summarized in two papers to appear. (Braille copies are available on request.) The current ARTS translation system does about as well as a translation system is able without correcting and augmenting the braille code.

Presently, the ARTS Service Bureau is the only installation with long-term production experience using a mini-computer braille translation system. It is in a production setting that the inherent limitations of the braille code and extant translating programs are truly appreciated. Without production experience, it is virtually impossible to anticipate the problems and advantages of computer braille production as it is currently manifested.

ANALYSIS OF ENGLISH BRAILLE

Braille Standards

Many groups are presently writing braille translating programs. No doubt, they are going to satisfy the basic rules and conventions of English Braille. However, there are many points at which they are sure to differ since many braille rules are ambiguous or incomplete and may be interpreted in several ways.

No doubt computer produced braille and hand-transcribed braille are also going to diverge. For example, programmers are likely to ignore hyphenation at the end of lines whereas stereotypists are likely to follow the current dictionary in vogue.

A multitude of variant braille codes has numerous disadvantages. The most important are a degredation of learnability and readability. Even without the introduction of diverse translating programs, there are too many incompatible braille codes. English Braille, textbook format braille, and Nemeth code differ on points on which there is no need to be different. If a common basic braille code is evolved, everyone, especially the braille user, is sure to benefit.

A basic code is derivable from current English Braille. The current braille code needs redefinition, improvement, and augmentation rather than total reconstruction. The two main problems with English Braille are its inprecise specification and its vague scope of application.

As an example of inprecision, consider the rule: "Contractions forming parts of words should not be used where they would obscure the recognition or pronunciation of a word. "Although laudable, this rule is not really executable as stated.

Obscurity is a matter of previous experience, and in many instances transcribers are likely to disagree. Translating programs are totally unable to incorporate the notion of obscurity. There are dozens of rules that, like this one, are just not programmable. All rules have to be restated in grammatical (syntactic) terms rather than in the semantic terms of meaning, pronunciation, obscurity, etc. For example, the rule "Only put one space between sentences." is not programmable as stated since translating programs are unable to recognize a sequence of words as a sentence, phrase, etc. This rule is, however, restatable in terms of syntactic notions: "If two spaces are present after a punctuation mark, eliminate one of them."

In short, two descriptions of English braille are needed: one for programmers and one for transcribers. The version for programmers has to be wholly in syntactic terms, algorithmic, etc. The version for transcribers has to be mostly semantic, easily stated, etc. Both versions, however, are to be exactly equivalent with respect to the braille produced (in the two-dimensional case).

What types of literary material are transcribable into braille? The general answer is: "Any materials only containing signs represented by English Braille are transcribable." These signs include the alphabet, numbers, and various punctuation marks. The ARTS Service Bureau has, in the last year, come across dozens of expressions and phrases that do contain only these signs but are still not translatable. For example, ".txt" (a period followed by the letters "txt" used as a label) has no correct translation.
As another example, the "Harvard Radcliffe Student Time Sharing System" is abbreviated as "hrsts". If this is considered a common abbreviation, the letters "is" in the middle of the abbreviation are contracted. In that case, "hrsts" and "hr/s" appear the same in braille.

Braille Syntax

A complete syntactic analysis of the braille rules governing contractions is proposed. In outline, this analysis involves:

1. a review of the ink-print signs represented and their representations
2. extension of the signs represented to include all of ASCII (the Standard Code for Information Interchange in the computer industry)
3. analysis of each rule into its simplest components
4. replacement of each semantic subrule by a syntactic equivalent
5. generalization of each incomplete subrule
6. correction of each inconsistent subrule by replacing it with a consistent alternative
7. elimination of each unnecessary subrule

Several benefits acrue from this analysis, which is intended to improve and augment the existing braille code, rather than to drastically change it. The braille code will be simplified and corrected, thus increasing learnability and readability. It will be easier to program since it is stated in syntactic terms amenable to encoding. A uniform braille code which is acceptable to both hand transcribers and computer programmers will be established.

The Braille code will become more efficient in several ways. A simpler and condensed braille code is sure to shorten the training time required of potential braille users. Since one of the common complaints about braille is its difficulty, a diminution in required training is likely to encourage more trainees. Simplification and consistency also implies shorter and easier-to-write translating programs. It is anticipated that if the programming effort is substantially reduced, numerous groups are likely to write their own in-house translating programs; and the Affirmative Action Act is probably going to encourage this practice among businesses.

Braille Format

A complete analysis of the braille rules governing format is proposed. In outline, this analysis involves:

1. surveying the formatting commands and conventions used by phototypesetters
2. analyzing the formatting conventions used in the braille code
3. elaboration of a formatting system compatible with printing and brailling practices
4. elaboration of formatting conventions compatible with one-dimensional embossing and display devices

Bringing phototypesetting and brailing format practices together is of vital importance. Once accomplished, an enormous wealth of material is immediately available for brailing.

Presently, the limiting step in computer braille production is inputting via typing. This step is very time consuming and costly. It, in turn, necessitates proofreading of the output because typing errors are bound to occur. Proofreading is another laborious, time consuming, and costly step. Proceeding directly from phototypeset copy eliminates both the need for inputting and the subsequent proofreading. Even if the phototypeset copy has to be corrected, it is still a much less troublesome task than the other two steps would be.

EVALUATION OF ENGLISH BRAILLE

Three types of evaluation of the analyses are proposed. Braille experts are to advise on the proposals in light of their experience with the current braille code and its development. Computer programmers are to review the programming efficiency of the suggested alterations. Educators are to empirically compare the changed braille code with the current braille code with respect to learnability and readability.

Evaluation by Braillists

At the outset, the results of the American Foundation for the Blind conference on Computer Braille Production (June 1976) are to be assessed. Those ideas and concepts of merit are to be inculcated into the revision and augmentation of English Braille. A cursory review of the conference proceedings indicates that a great deal of consensus prevailed.

Two braillists are to advise on the analyses. An expert in English Braille is to evaluate the suggested changes. In many instances, more than one alternative to a subrule is possible; the one chosen is a matter of enlightened preference, rather than logical necessity. An expert in Nemeth braille is to evaluate the upward compatibility of English braille with math braille and other codes. The potential for extending the ability of translating programs beyond literary materials is certainly desirable; to what degree it is possible remains to be determined.

Evaluation by Programmers

Once the analyses are assessed by the brailists, a proposed braille code is to be prepared. It is then to receive scrutiny by programming experts. They are to establish: the syntactic clarity of subrules, the ease with which subrules can be programmed, and the compatibility with phototypesetting software. All programming modifications of the proposed braille code are then to be reviewed by the braille experts before being inculcated into the proposed braille code. No

doubt, there are going to be divergence of opinions between braillists and programmers. These differences are to be settled by the next evaluation procedure.

Evaluation by Educators

Once the braillists and programmers assess the proposed braille code and their findings are inculcated, the various alternatives to subrule changes are to be tested empirically. The most important criteria for accepting or rejecting any alteration in the braille code are its effect on learnability and readability. Training materials are to be created by the educators and embossed on the ARTS system, embodying the proposed braille code in all its likely variations. Educators are then to administer these materials to a sample of potential braille users, measure the learning and reading factors, and statistically assess the alternative subrules.

The final proposal for a braille code is to be based on the results of this evaluation.

Evaluation by BANA

Once BANA reviews and sanctions a version of the proposed braille code, detailed plans for programming and teaching this code are to be developed. The programmers involved in the evaluation are to prepare a comprehensive explanation of the programming of the code for others to use and are also to prepare detailed documentation of the "software" for the code. The educators involved in the evaluation are to prepare a comprehensive explanation of the teaching of the code for others to use and are also to prepare detailed documentation of the "courseware" for the code. Together, the software and courseware descriptions are to be sufficient for setting up a brailling installation.

PROJECT PLAN

To summarize the preceding two sections, this proposal has three main components. An analysis and synthesis of English Braille is to be made. Next, the resulting braille code is to be evaluated in three ways--braille standards, programmability, learnability and readability. Finally, the braille code sanctioned by the BANA is to be implemented in software and courseware. These three components are distinct and separate. The first two steps are necessary for an adequate development of a braille code acceptable to braille users, transcribers, and programmers. The third step is necessary for promoting wide distribution and use of computer braille.

The ARTS staff to participate on the project are selected. They are to carry out the analysis and synthesis of the braille code. In addition, they are to coordinate and supervise the other two phases of the project.

The braille expert and to participate on the project are selected. They are to work on parts one and two. They and the ARTS staff are to meet at regular intervals at a mutually acceptable place.

Programming consultants are to be recruited from the local area after the completion of part one. In addition, those persons who have already written translating programs are to be asked to review the anticipated changes; previous experience although biasing during the creative process, is helpful in evaluation.

While carrying out part one, educators in reading research and courseware design

are to be recruited and oriented to the project. The design of test procedures, evaluation protocols, statistical procedures, etc, are to be ready at the end of part one.

PROJECT STAFF

The ARTS staff participating on the project are Peter Duran and Alane Gertner. Duran is the principle investigator and director of the project. Gertner is to assist in literature searches and preparation of project results and reports. All materials are to be generated in print and braille on the ARTS system, thus providing computer versions of all project information.

Bernard Krebs and Abraham Nemeth are participating as braille experts on the project. These two gentlemen are the most appropriate individuals to serve on the project as they have complementary points of view. Krebs is primarily concerned with braille as it applies to literary materials and general uses. Nemeth is primarily concerned with braille as it applies to technical materials (in the sense of being highly symbolic) and specialized uses. If the resulting braille code is to be as simple as possible in the literary case and applicable in specialized cases, each point of view has to be inculcated into the proposed code.

Both gentlemen recognize that braille is certainly improvable and are willing to make the necessary changes. They have an appreciation of the potential benefits to braille users if braille is efficiently produced by computer.

The computer aspects of the project are to be done by consultants expert in word processing software; that is, programs for rearranging and altering textual data. Previous experience with translating programs is undesirable for several reasons. Such individuals are likely to bring preconceptions and prior programming strategies into the evaluation and are likely to prefer the familiar code rather than be impartial to the possible alternatives. One of the factors to be assessed is the ease of programming of the proposed code; prior experience is likely to obscure the initial encoding difficulties faced by most programmers. The goal is to prescribe a braille code that programmers with a modicum of word-processing experience are able to successfully encode without knowledge of braille.

The evaluation of learnability and readability is intrinsically a difficult task. The required expertise to isolate those factors correlate with learning and reading include: test and protocol design and statistical analyses (factor analysis, multi-dimensional scaling, etc.). Members of an education department of a university are the best choices for conducting this type of evaluation. The required procedures are, for the most part, extant and only have to be modified for the particular evaluation format required by this project. If long-term research is required, graduate theses are an inexpensive source of research effort.

To adequately conduct this evaluation, experience with braille is not a prerequisite. The techniques to be employed apply in all such analyses and across sense modalities.

It is, in fact, desirable that the evaluation group does not have prior exposure to braille. The goal of the evaluation is to obtain an unbiased analysis of those factors influencing braille learning and reading. Since long-held opinions are to be scrutinized, perhaps rejected, those holding such views are likely to find it difficult to divorce themselves from biases. As a point of fact, the braille experts participating at the American Foundation for the Blind conference on Computer Braille Production are already,

implicitly or explicitly, decided on the nature of readability. It is unlikely that any of us are able to be as objective as required by a competent scientific investigation.

Reading research groups are presently being contacted and interviewed. The group already most able to meet the needs of the project is to be selected as a subcontractor.

PROJECT TIME FRAME

The following time estimates are based on the ARTS staff's prior experience performing similar research. The estimates for programming and testing are only approximate since they depend on the outcome of the two analyses and on the braille and programming evaluations.

Project Time Schedule

2 months for the necessary literature searches and reviews
6 months for the analyses (syntax and format) and braille evaluation of these analyses
6 months for the programming evaluation and reading research design
3 months for conducting the learning and reading tests of the proposed code
6 months for completing the braille code and all documentation

Staff Time Requirements

Estimates only for the first year of the project given. The required efforts for the next phase depend on the outcome of the initial research. all time commitments are based on a 40-hour workweek

Duran	40%
Gerlner	40%
Krebs	15%
Nemeth	15%

Consultant Time Requirements

One programming consultant is sufficient. The reading research group requires at least a supervisor and two graduate students.

programmer	20%
supervisor	25%
student	40%
student	40%

FIRST YEAR BUDGET

DIRECT COSTS:

<u>Salaries</u>			
Duran	(.40*24,000)	9,600	
Gertner	(.40*9,000)		3,600
Nemeth	(.15*12,000)	1,800	
Krebs	(.15*12,000)	1,800	
Programmer	(.20*12,000)		2,400
supervisor	(.2514,000)		3,500

student	(.403,000)	1,200	
student		(.40*3,000)	1,200
fringe for ARTS (.15*13,200)		1,980	
total		27,080	

Supplies

punch tape (10 cartons)	600
brailler paper (15 cartons)	450
printer paper (6 cartons)	72
computer time (16 hr/wk)	1,872
calls to Krebs (20 hr)	456
calls to Nemeth (20 hr)	431
mailing	40
duplicating	60
total	3,981

Supplemental funds are required for travel for project participants. Depending on how often and where BANA wishes the project members to convene, the travel allowance and per diem will be different.

The fringe benefit rate (15 percent) has been accepted by several funding sources as an approved rate.

INDIRECT COSTS:

(Total ARTS salary*.10)	1,518
Total Direct Costs	31,061
Total Indirect Costs	1,518
TOTAL AMOUNT REQUESTED	32,579

Memorandum of Understanding between the Braille Authority of North America and Florida State University

The purpose of this memorandum is to set forth the basis for cooperation and collaboration between the Braille Authority of North America and Florida State University with respect to the standardization of braille codes.

The Braille Authority of North America, which consists of representatives from the following agencies and organizations, is the recognized authority for approving and adopting changes in all existing braille codes in use both in the United States and Canada.

American Council of the Blind
American Association of Workers for the Blind
Association for Computing Machinery
Association for Education of the Visually Handicapped
American Foundation for the Blind
American Printing House for the Blind
Canadian National Institute for the Blind
Clovernook Home and School for the Blind
Library of Congress, DBPH
National Braille Association
National Federation of the Blind

Florida State University (Visual Disabilities Section, Division of Professional and Clinical Programs, College of Education) has been awarded a grant by the U.S. Office of Education, Bureau for Education of the Handicapped, to conduct a project entitled "Braille Codes Standardization Project." Dr. Gideon R. Jones, Professor, Coordinator, Visual Disabilities, is the Project Director, and Miss Marjorie Hooper is the Major Investigator. The project was formally initiated on October 1, 1976 and its completion is scheduled for September 30, 1979.

During discussions held in Tallahassee, Florida on January 17 and 18, 1977, the participants (Dr. Jones and Miss Hooper representing Florida State University, and Mr. Harold G. Roberts and Mr. Durward McDaniel representing the Braille Authority of North America) reached the following agreement:

1. Recognizing their mutuality of interest in better meeting the needs of blind persons by improving and expanding existing braille codes, FSU and BANA agree to coordinate their respective activities.
2. BANA will serve as a source of advice and consultation to FSU regarding all aspects of

its Braille Codes Standardization Project, including the composition of its Technical Committees.

3. BANA does not plan to duplicate the work of the Technical Committees established by FSU in revising the mathematics, computer and music codes.
4. FSU will submit its proposed code revisions to BANA for consideration and action.
5. BANA has responsibility for reviewing and revising all braille codes.