Bliss symbol-to-speech conversion: "Bliss-talk"

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II. SPEECH SYNTHESIS

A. BLISS SYMBOL-TO-SPEECH CONVERSION: "BLISSTALK"

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Abstract

"Blisstalk" is an electronic communication board on which Bliss symbols are selected by a magnet or by scanning, and their corresponding linguistic expressions are spoken by a built-in speech synthesizer (or written as text) in the chosen language.

Linguistic knowledge has been applied in a variety of ways in the realization of this device. A special phrase structure grammar has been written which marks clauses and phrases, referring to parts-of-speech information in a lexicon containing words corresponding to Bliss symbols. Phrase order is then inspected to determine sentence type. The speech synthesizer incorporates rules for pronunciation and prosody. Bliss-to-speech and Bliss-to-text programs have been developed for Swedish, English and French.

This paper discusses the development of Blisstalk, its structure and its modes of operation. The choice of natural language grammar is motivated and differences between this grammar and "Bliss grammar" explained and exemplified. An Appendix is included which lists possible verb phrase types in English and indicates their availability to Blisstalk users.

Introduction

Bliss symbols were developed by the Austrian, Karl Blitz, in the 1940's. He was deeply impressed by difficulties in communication among people who spoke different languages, or even the same language with different intentions. While in China, Blitz -- now calling himself Charles Bliss -- was inspired by the Chinese ideographs to develop his own set of characters. He hoped they could be used as the basis of a system of world-wide commonality of expression and understanding (McDonnell, 1980). This system was set forth in his nearly 1,000-page work, Semantography (Bliss, 1965).

In 1971, a special education teacher at the Ontario Crippled Children's Centre found a description of Semantography, and obtained a copy for a symbol communication project which had been instituted for non-vocal pre-reading children. The project staff, with consultation from Charles Bliss, developed vocabularies and procedures for use of the symbols which are now called Blisssymbols. An institute for the purpose of developing the Bliss system grew out of this work, being established in 1975. Located in Toronto, Ontario, Canada, it is called the Blissymbolics Communication Institute.
The use of Blissymbols in Sweden began in 1976 at two regional habilitation centers, one in Gothenburg and one in Linköping. In 1977, the Swedish Blissymbolics Resource Center was formed. Interest in Blissymbolics grew rapidly in all of Scandinavia, and the formation of the Nordic Bliss Communication Committee came about a year later, in 1978. According to the Swedish Institute for the Handicapped, there are about 800 children in Sweden who use Blissymbolics in some form; with many of them, it is their primary means of communication.

The groups concerned with speech synthesis and vocal aids for handicapped at the Royal Institute of Technology in Stockholm have, for some years, been interested in implementing a "talking Bliss system." This interest has been encouraged by the Blissymbolics Communication Institute and others concerned with voice output communication aids, VOCAs (McNaughton, 1980). This system was realized for Swedish in early 1981, and has since been developed for English and French (Carlson, Granström and Hunnicutt, 1982a). Bliss users interact with a 500-symbol Bliss board which includes a (multi-language) text-to-speech system developed by our speech synthesis group (Carlson, Granström and Hunnicutt, 1982b). This system presently contains a formant speech synthesizer implemented on a programmed signal processing chip and a powerful microcomputer. The Bliss-to-speech program transforms the symbol string indicated by the Bliss user to the corresponding well-formed sentence. Bliss-to-text programs have been developed, as well, which perform a similar transformation to well-formed written sentences. The user may intermix Bliss symbols and spelled words to produce the spoken or written message.

Linguistic knowledge has been applied in a variety of ways in the realization of this device. An algorithm for producing well-formed sentences employs a lexicon for pronunciation, part-of-speech and special feature information, a grammar to mark clauses and phrases, and morphological rules to produce correct inflectional endings. Words which are spelled using the board's alphabet squares are pronounced by the speech synthesizer according to grapheme-to-phoneme rules or an accompanying "exceptions" lexicon in the chosen language. A set of phonetic rules controls the language-dependent sound inventory, adjusting the realization of phonemes in quality, duration and pitch according to the linguistic context. (See Fig. 1.)
Fig. 1. The complete text-to-speech system with Bliss rules
Composition of the Bliss Board

The Bliss board, called "Blisstalk" (see Fig. 2), contains 504 squares, most of which are lexical items, arranged according to their part of speech. This arrangement corresponds to the standard Swedish Bliss chart. It is possible to reprogram the board to include any of the 1400 standard symbols (only 500 for French) by making substitutions. One can also reprogram a square with a word, such as a name, which is not included in the set of 1400 standard symbols. The standard Swedish chart contains approximately 200 nouns, 80 verbs, 70 adjectives and adverbs, 50 function words, 30 commonly used referents of persons (e.g., pronouns, "boy," "friend," "visitor"), and 10 common expressions (e.g., "hello," "yes").

Another group of symbols has a syntactic function. A user may indicate which tense a verb is to be realized in, and may indicate that a noun is to be realized in the plural.

Fig. 2. "Blisstalk". Nouns and pronouns may also be marked possessive. If it is desired to mark the part of speech of a word which is spelled using the board's alphabet squares, this can be accomplished by choosing a part-of-speech symbol after the word. These symbols are included in the 1400 (international) standard symbols, but do not appear on the standard Swedish chart.
Other special symbols are meant to aid in the formation of concepts other than those on the board. These are "combination," "the opposite of," "similar to," and "part of." They are simply spoken or printed at the point of insertion. It is desirable, but not possible at present, to give the user the ability to store words for symbol strings. This facility would allow words such as "cold" to be stored as the symbol string "opposite of" "hot.

Another group of previously unassigned squares is being used to implement special functions to accompany speech synthesis. These functions allow users to delete their last choice, to choose a second meaning (some squares have more than one single-word label, e.g., all/whole, string/thread), and to repeat, save and retrieve sentences they create.

Letters, numbers and punctuation marks are also present. When these symbols are used, the system automatically accesses the lexicon, the number rules and the text-to-phonetic rules of the text-to-speech system, thus allowing the synthesis of any word (or number) not appearing as a Bliss symbol (see Fig. 1). This facility permits a user to have speech output from the synthesis system in the same manner as if a terminal were used to input text.

The Lexicon

Each of the 1400 standard symbols represents a lexical item and corresponds to an entry in a lexicon. This entry gives the pronunciation for the item, its part of speech, and features such as inflection category. These features, as well as features introduced on the board (e.g., "plural," "past tense," "possessive"), and those provided as default values are incorporated as features of the part of speech. This information is then available to the parsing algorithm. At present, it is possible to enter only one part of speech. There are also a few symbols for which common alternate pronunciations are provided. One example is the word "neither."

Modes of Operation

The message can be pronounced (or printed) word by word or as a full sentence. In character mode, numeral and letter names are pronounced, and the BLISSSCII code of symbols is read off. In word mode, symbols are pronounced in uninflected form. When the user types a terminal punctuation mark in sentence mode, the complete grammatically well-formed sentence is spoken. If the deletion square is chosen, the last entry is deleted, and the string of words up to that point is pronounced to aid the user in making the correction. A sentence or other completed expression may be repeated, and may also be temporarily stored and quickly retrieved.
It is possible to reprogram the board so that any square corresponding to a lexical entry (one of the 1400 standard symbols) can be placed in any space reserved for lexical entries. One may also designate either 4 or 16 squares to have the same value so that larger (and fewer) symbols may be used for beginners. This design feature allows a great deal of flexibility in specifying the format of the board. Communication between the Bliss board and other parts of the text-to-speech system is accomplished via BLISSCII codes. It is possible to connect to any type of input or output device utilizing this code.

Loudness may be controlled by knob or command sequence, as may the speed of the speech. The speed of contact of the magnet may also be regulated, using a knob.

**Grammars**

There are three different "grammars" which are associated with the use of Blissymbols. One is the so-called telegraphic style. The other two are more proper grammars, one being Bliss syntax and the other being natural spoken language syntax.

**The telegraphic style**

The telegraphic style is employed by many Bliss users. It is the easiest, shortest style of Bliss communication, omitting function words and paying less attention to word order. It is often sufficient in conversation between the Bliss user and well-known persons, and allows a conversation to progress much more rapidly for users who experience a motor handicap. This style can be duplicated in Blisstalk by setting the board in word mode. In this mode, syntactic analysis, and therefore, word inflections are omitted.

**Bliss and natural spoken language syntax**

There are other Bliss users, however, who strive for grammatical perfection in their linguistic expression, either via Bliss syntax or natural language syntax. Bliss syntax, as described by its inventor, Charles Bliss, was meant to be simple. His symbol system was intended for use (mainly by adults) in situations in which there was no common natural language. His advice was to choose short effective symbol strings which gave the content of the message.
The main features of Bliss syntax are the following:

1) The order of a message is Subject-Verb-Object.

This ordering usually follows common natural language ordering for declarative sentences in Swedish, English and French, but not always. For example, very common Swedish declaratives beginning with an adverb or a definite pronoun cannot be expressed this way.

And common French declaratives with a pronoun as an object cannot be expressed as Subject-Verb-Object.

2) The negative element is placed before the verb.

In this case, all three natural languages differ to some extent. In Swedish declaratives, the negative element "inte" is placed after the first verb form in a main clause, and follows the Bliss syntax only in dependent clauses.

Main clause:

Han kommer inte.
Han ska inte komma.

Dependent clause:

Han säger, att han inte kommer.
Han säger, att han inte ska komma.

In English, an auxiliary verb precedes the negative element "not" — a form of the verb DO is inserted if no other auxiliary is used.

I will not go.
I do not know.

3) Modifying elements are placed before the words they modify except in the case of combinations which have an alternate grammar partially dependent upon focus and importance.

This ordering is followed for adjectives in English and Swedish, but not in French.
Adjective preceding:

He saw the red house.
Han såg det röda huset.

Adjective following:

Il a vu la maison rouge.

The ordering for non-sentential adverbs in all three languages is dependent upon whether the modified word is verb, adjective or another adverb. In English for example:

Preceding adjectives and other adverbs:

They were especially hungry.
They ate awfully fast.

Following verbs:

They ate fast.

And the same order is found in French:

Ils étaient particulièrement affamés.
Ils mangerent (tres) vite.

4) The question symbol, or another question word, is placed first in a question. The declarative order follows.

Swedish has no sentence type corresponding to the initial question symbol sentence, since all questions not beginning with a question word begin, instead, with a verb. French, however, has such a common form:

Est-ce que vous avez reçu une lettre?

It could be said that English also has such a form, in which a form of the verb DO precedes a declarative.

Did you receive a letter?

The main verb, of course, is no longer a past form. It is also possible in all three languages to say a declarative sentence with an intonation which makes it understood as a question. This is perhaps the form which best corresponds to the Bliss syntax form, even though there is no initial marking. It may also take the form of a declarative followed by a tag question.

You know what I mean?
Du vet vad jag menar?
Tu sais ce que je veux dire?

You're coming with me, aren't you?
Du ska gå med, vad?
Vous venez avec moi, n'est-ce pas?
The question word type sentence in which the subject is replaced by a question word is natural in all three languages:

Vem fick ett brev?
Who received a letter?
Qui a recu une lettre?

When the object, or part of the object is replaced by a question word, however, there is no such correspondence, and the correct word order is uncertain in Bliss syntax.

Which letter did you receive?
Vilket brev fick du?
Quelle lettre avez-vous recu?

Negative questions in Bliss syntax follow the same ordering convention as negative declaratives, i.e., the negative element appears before the verb. (Note distribution of "inte" and "aldrig" in Swedish in neg. section).

5) **Exclamations are prefaced with an exclamation mark.**

The only divergence from natural language for French, Swedish and English here is the placement of the exclamation mark — at the beginning rather than at the end. The word order is the same.

(Please) Read the book!
(Var snäll) (och) Läs boken!
(S'il vous plaît) Lisez le livre!

6) When place and time are identified, they are given first in a sentence: place first; then time.

In the garden tomorrow the plants will need water.
I trädgården imorgon ska plantorna behöva vatten.
Dans le jardin, demain, les plantes auront besoin d'eau.

This convention produces acceptable, but strange-sounding sentences in English and French, seeming to focus on place without any apparent need to do so. In Swedish, the subject-verb order is interchanged.

**Choosing a grammar**

The conversion of Blissymbols to speech was accompanied by a realization that the form of the output needed thoughtful consideration. Would a telegraphic style of speech be sufficient? Or would it be undesirable? When we watch a person point to Blissymbols, we combine the concepts in our own thoughts. If we form phrases or sentences to express these concepts, we ourselves as observers supply the inflections and word order corresponding to the grammar of our spoken language. When symbols are converted to written or spoken output, however, the requirements and expectations of the symbol user and the reader or
listener may change. From the listener's (or reader's) standpoint, his understanding may be inhibited by the presentation of stimuli inappropriate to the medium of perception. From the symbol user's standpoint, he may have to listen to inferior expressions of his thoughts, a rather frustrating experience.

These considerations point to a clear need for a programmed grammar. But what sort of grammar? Should it be a grammar which minimizes input? Such a grammar would minimize physical effort, and that is certainly desirable in many instances, but it would be quite restrictive in output capability.

One might, for example, have a list of sentences in which one or two words are left blank, and could be filled in by the user after choosing the desired sentence. Such a grammar would give access to quick correct speech and would cover certain cases. It may be seen, however, that it is quite restricted. Consider the possibility of making all unspecified nouns definite so that one less symbol needs to be chosen. To get "a car," one would indicate "a" and "car:" to get "the car," one would indicate only "car." This solution appears, at first glance, to be useful, but would, in fact, make the unspecified noun impossible. The sentence "Bread is the staff of life," for example, would read "The bread is the staff of the life." That is, some sentences would sound very strange, or produce an unintended meaning.

Assume, then, that we want to provide for a range of types of simple declarative sentences. A simple declarative sentence with only a determiner and noun or pronoun subject and object and three verb tenses would require 48 sentence types. Allowing an optional adjective in either the subject or the object noun phrase raises the required number of sentences to 192. With so many possible sentence types to choose from, the task of finding the desired sentence type becomes much more time-consuming than selecting more squares on the board, even if special selection algorithms are employed. We see, then, that this type of grammar would allow little flexibility in sentence type, although the vocabulary need not be especially limited.

Another possible avenue to flexibility is the use of transformations from one sentence type to another. It is possible, using these transformations, to construct a variety of syntactic forms with approximately the same meaning. Each syntactic form is derived from a base form using at least one of the stipulated transformations. Beginning with a base form "He sold the farmer a horse.," we could derive over twenty syntactic forms such as "He sold the horse to a farmer," "for a horse to be sold to a farmer by him" and "there being a horse sold to a farmer." We would, perhaps, be content with only one third of these possibilities, but, even so, seven numbers would have to be referenced for the transformational possibilities in addition to whatever was necessary to generate the original sentence "deep structure," that is, the original base form.

It seems better, therefore, to choose a grammar in which most of the words and the word order are specified by the user. This method
provides maximum flexibility for a sophisticated user without requiring reference to, or a knowledge of, anything except the vocabulary and grammatical symbols on the board itself. In particular, the user can rely on his or her (possibly passive) knowledge of order in the language, and need not refer to the rules of Bliss syntax.

The grammar of Blisstalk

The option that has been chosen for Blisstalk is to follow natural spoken language ordering. This ordering requirement promotes flexibility in use, not forcing input into prescribed sentence structures and permitting the most natural sounding speech output. As for less sophisticated users who may not require such flexibility, Eugene McDonald states in his book Teaching and Using Blisstalk, "When teaching sentence construction to young or mentally retarded children, the symbol instructor will probably find that the word order of English will be easier for the children to learn and to use than the word order of Bliss syntax."

The grammar of Blisstalk can be described as a determinate finite state phrase structure grammar. It allows unrestricted input from the Blissymbol lexicon (1400 symbols) and from the text-to-speech system for spelled words. The grammar proceeds by first introducing phrase markers, forming the input words into a single set of noun phrases and verb phrases (i.e., no choice is made among alternate phrase structures).

The phrase structure grammar

Noun phrases and verb phrases are initially delimited by recognition of which words can or must not appear in them. Noun phrases can then be further divided by recognition of ordering conventions within them into double objects, subject-object pairs, or both. These constructions may occur in declaratives, in questions and, in Swedish, in adverb-initial sentences. Verb phrases are split before a marked infinitive (one introduced by "to" in English, by "att" in Swedish). A prepositional phrase is considered to be a special case of a noun phrase.

The grammar's success in delimiting phrases is a direct consequence of the fact that lexical part of speech is, for the most part, predetermined by the Blissymbol input. Ambiguity results only if a Bliss user attempts to use a symbol in a function other than that determined by its place on the board. It would be possible to allow a user to change the part of speech of a word to one of those specifiable. This facility would be easy to specify in English noun-verb conversion since both the singular form of a noun and the infinitive form of a corresponding verb may be the same (e.g., simple roots such as "walk" and "sleep").
Swedish nouns on the Bliss board could be converted to verbs by the addition of a final "a" (e.g., "fisk(a)," "rygg(a)," "form(a)"). It should be noted, however, that only regular forms of tenses, number, etc. would result. In any case, the part of speech of any such conversion would be unambiguous, and could not complicate the grammar.

A comma is considered to introduce a new clause (there is no provision for lists as yet). A few words, such as "the relativizer" (realized as "that" in English, as "som" in Swedish and as "que" in French) any several conjunctions carry a comma preceding them in the lexicon. This comma produces a pause and phrase-final prosodics in the output speech and resets the grammar for a new clause.

**Phrase level analysis**

Once the phrase structure is established, sentence types and, subsequently, object and subject phrases are marked according to a transformation analysis. For Swedish, noun phrases containing a possessive are marked in order that the correct forms of adjectives and the head noun are realized. Reflexivization of a noun phrase (a pronoun) is implemented with the aid of a "self" square. In English, verb phrases containing a form of "to be" and another verb are marked passive or present progressive depending on the tense of the verb.

Referring to these phrase features, pronouns, nouns, verbs and (in Swedish and French) adjectives are given correct forms or inflectional endings and the correct pronunciations. A pronoun may be in subject, object or possessive form, and may be reflexive as well. French has pre-verbal and post-verbal forms for both accusative and dative, and has three possessive forms. Swedish has three possessive forms, and English has two (pre-nominal and stand-alone). Nouns may be singular or plural. In Swedish they may be marked real (non-neuter) or neuter if definite and in both Swedish and French, the form of preceding articles is determined by gender. A noun may also be possessive. Adjectives in Swedish and French must also be marked for number and gender. In Swedish, they must be marked for definiteness as well. A verb may appear as an infinitive, in the present, simple past of future tense, as an imperative, or in an imperfect or perfect past construction. English also allows for present progressive and for different forms of the present depending upon the subject (person). French has a single-word future tense, and different forms of all tenses dependent upon the subject. The correct pronunciation is specified for each of these forms according to inflection category. Irregular nouns, verbs, and adjectives, and all pronouns are entered in the lexicon in all their forms. Rules governing irregular forms choose the correct form from these multiple entries. Additionally, in English, the proper form (person, number, tense) of "do" is inserted in questions not beginning with a verbal element.

An example of the subject/object decision for pronouns is the recognition of subjects in questions. An initial noun phrase may or may not be the subject, dependent upon phrase type. In the question "May I
have an apple?", the first noun phrase is the subject, but in the question "Which apple may I have?", it is the second noun phrase which must be marked as subject in order to produce "I" rather than "me" in that position.

Using this procedure one can produce simple pronoun-verb expressions for young children and beginners, stand-alone phrases, which are very common in ordinary communication, and complete sentences. Such a grammar can be specified rather concisely for each language when the word order is supplied by the user. The size of the grammar is, of course, language-dependent. French requires many more rules because of the diversity of inflections to be supplied than does Swedish, and English requires still fewer.

**Indicators**

It might also be mentioned that the ordering of indicators, for plural nouns and past tense verbs, for example, has not been standardized, since in written Blissymbols, these indicators are incorporated in the symbol they modify. These indicators usually represent a word ending, an inflection. From a linguistic point of view, then, there is strong motivation for placing indicators after the word they modify in the languages under consideration. In consultation with teachers of Blissymbols, however, I understand that it may be more instructive to place some indicators before the word they modify. Students may be taught to use the plural symbol, for example, by first becoming accustomed to the symbol for "much, many" before a noun; they may be taught to use the past tense symbol by first becoming accustomed to the perfect tenses with "have" or "had" before the verb. It is generally agreed upon, on the other hand, that the possessive indicator is best chosen after the noun or pronoun it modifies.

An example of the symbol-to-speech transformation appears below in Fig. 3. (Special symbols for the auxiliary verb HAVE may, in the future, replace this non-standard usage.)
We find additional support for adopting natural spoken language order for Blisstalk in an article on children's acquisition of syntax, Roger Brown and Ursula Bellugi (1964) note that when young children imitate an adult's utterance, they preserve the word order of the model sentences. They also report that at 18 months, children are likely to begin constructing integral 2-word utterances with the prosodies of normal speech. All the major varieties of English simple sentences up to a length of 10 or 11 words are produced by the age of 36 months. We may assume that the sentences may not be morphologically standard, e.g., strong past tense verb forms may not all be present. But, given the correct word order and a grammar, many inflectional endings and function words can be supplied by the listener. And in the case of symbol-to-speech conversion, grammatically redundant forms can be supplied by rule. This conversion takes advantage of the child's ability to supply a rather advanced concept of order in his/her internal grammar to produce speech output.

There are, of course, many expressions which cannot be expanded by rule because of possible ambiguity. The expression "boy book," for example, might mean "The boy wants his book," or "Give the boy a book," and there are a number of other possibilities as well. The Brown and Bellugi study showed that the mothers of the children they reported on responded to their children's speech with expansions about 30% of the time. That is, the child might say "boy book," and the mother would expand with something like "We'll give the boy his book back." It was noted that the mothers' expansions, like the ones above, preserved the word order of the children's speech. We may therefore assume that in cases of reduced or incomplete expressions, the preservation of word order will aid communication in a natural way.

One might say that this approach is not faithful to the principles of Blissymbols — that the goal of international communication is not being kept in mind. Perhaps this is true. But spoken and written, as opposed to pointed language, has other requirements. Is it not more important that the individual user of a Bliss-to-speech or a Bliss-to-text device be able to communicate naturally with those who speak his own language? This seems to present a problem: should a user then learn two grammars, one for non-spoken Blissymbols and one for spoken Blissymbols? It is certainly possible to write "translation" programs for a limited grammar and with the limited vocabulary of BLISCALL-coded words. I would like to argue, however, that even though this might be an interesting project for multi-lingual use, it is unnecessary for a single language. Some Bliss users are taught only natural spoken language order. And those who learn Bliss syntax are certainly learning both grammars — one for Blissymbols and one that is internalized from listening to speaking users of his own native language. It has been noted by teachers whose students are using synthetic speech that these students' language capabilities are greatly enhanced by using synthetic
speech. We can expect that many Bliss users will go on to learn to read and write their own native language. Supporting this development is certainly important.

To add a further assurance that learning two grammars is not prohibitive, it can be noticed that a similar situation exists in the deaf community where two grammars are used, one for deaf sign language among sign language users themselves, and one for signed language which is normally spoken, i.e., signed Swedish, signed English, etc. There are some similarities in deaf sign language syntax and Bliss syntax, e.g., marking time of occurrence first and then dispensing with verb tense markers, leaving out articles, placement of modifiers (including negation). The building of compound symbols/signs also has some similar principles. In addition, the basic symbols, arrows and baselines of Blissymbols could be likened to the "dez", "sig" and "tab" of sign language.

There are, of course, many dissimilarities also, and different levels of development in various areas of the two communication systems. Since Bliss symbols have only been used for a little over ten years by non-speaking users, it is still in an early developmental stage for actual use. It is quite clear, however, that to intellectually normal non-speaking persons, learning two grammars for the same symbols or signs is quite feasible.

Concluding Remarks

This paper has been concerned with Blisstalk, a speaking electronic Blissymbol board. Blisstalk expects symbols to be chosen in the order of natural spoken language, and allows a user to compose many well-formed sentences with flexibility of expression. As a symbol board with a "voice," it makes its users heard -- communication is not so highly dependent upon the willingness of a "listener" to watch, and to interpret the symbols for himself.

A system similar to and contemporary with Blisstalk is the Sahara II, developed in France for the French language (Emerard, Graillot, Cyne and Lucas, 1979/1980). It also uses a 500-symbol Bliss chart, and allows output in either speech or print. Sahara II's lexicon contains root morphs in phonetic or orthographic form, their lexical category and reference to rules applying to conjugations. Permitted syntactic structures are defined by a "precedence grammar" that controls which constructions can precede, follow, or be in the same construction with other constructions. It also allows co-ordination at the level of nouns, verbs, phrases (which Blisstalk does not yet accomplish) and relatives. Synthesis is based on (about one thousand) diphones (Emerard, 1977).
References


Appendix: Examples of Verb Phrases

The verb phrases of a language usually offer a great deal of diversity to its expression. They allow us to express our intentions in finely-graded detail. To exemplify the flexibility of the talking Blissymbol device in this regard, categories of verbs from A Concise Grammar of Contemporary English (Quirk and Greenbaum, 1973) will be presented below. We find that most of the categories mentioned are available to users of Blisstalk. Those which are not available are marked with an asterisk (*) in the verb forms or categories, and before sentences when examples are given. Descriptions of verb categories have, in a number of cases, also been taken from A Concise Grammar of Contemporary English.

A. Lexical Verb Forms

Lexical verb forms may be used alone in a verb phrase, and usually have the five forms listed below.

(1) base
   (a) all the present tense except third person singular (language-dependent)
      Ex: I/you/we/they swim each day.
   (b) imperative
      Ex: Swim around it!
   (c) subjunctive (tied to particular verbs)
      * Ex: She demanded/requied/insisted that he swim.
   (d) the bare infinitive
      Ex: He can swim.
   (e) the TO-infinitive
      Ex: He wants her to swim.

(2) the -s form
   (a) third person singular present tense
      Ex: He/she/it swims each day.

(3) past
   (a) simple past tense
      Ex: We swam yesterday.
(4) present participle (-ing form)
   (a) progressive aspect
      Ex: He is swimming at the gym today.
   (b) in participle clauses
      * Ex: Swimming early, I have the gym to myself.

(5) past participle (-ed form)
   (a) perfective aspect (HAVE + verb + -ed)
      Ex: The boy has drunk the water.
   (b) passive voice (BE + verb + -ed)
      Ex: We were surprised.
   (c) in participle clauses
      Ex: Surprised by the news, he dropped his bread.

B. Auxiliary Verb Forms

Auxiliary verb forms are used together with another verb in a verb phrase. (The verb phrase may be split by a noun phrase in a question. These forms are available for the user of Blisstalk except for the contracted negative.

(1) Primary auxiliaries: DO, HAVE, BE
   (a) non-negative
      Ex: Did you guess?
   (b) uncontracted negative
      Ex: You did not guess.
   * (c) contracted negative
      * Ex: Didn't you guess?

(2) Modal auxiliaries: CAN, MUST, WILL, WOULD, COULD, *SHOULD, etc.
      Ex: Must you go now?

(3) Marginal modal auxiliaries: NEED, *USE, *DARE, etc.
      Ex: They need to go now.
C. Tense, Aspect, Mood

It is possible to categorize verb forms by tense (present, past, future), by aspect (progressive, perfective) and by mood (subjunctive, modal past). All tenses are available in Blisstalk, although the word "shall", used primarily in Britain, has not been included. One aspect (perfect progressive) of the past tense is unavailable. Subjunctive mood, as previously noted, is also unavailable.

(1) Present Tense

(a) Timeless (simple present)
- used for habitual action and universal statements

Ex: I (always) drink milk with my food.
Ex: Babies drink milk.

(b) Limited (present progressive)
- indicating a change
Ex: I am drinking milk again.
- indicating incompleteness
Ex: I am cooking.
Ex: The bus is stopping.
- habitual action with emotional coloring
Ex: He is always drinking milk!

(c) Instantaneous (simple or progressive)
- simple
Ex: Now you see it, now you do not!
- progressive
Ex: I am dropping the stone in the water.
- sports commentary
Ex: He catches it, but he drops it.
- performative declarations
Ex: I choose you.
(2) Past Tense

(a) at a point
Ex: I sang yesterday.

(b) over a period to the present
Ex: I have sung each day.

(c) over a period in the past, and completed then
Ex: I sang with them for many years.

(d) over a period in the past, and not completed then
Ex: I was singing when they came.

(3) Future Tense

(a) "will" and "shall"
Ex: Your friend will come tomorrow.

(b) "be going to" + infinitive
Ex: We are going to have a new teacher tomorrow.

(c) present progressive
Ex: He is driving home later today.

(4) Aspect

(a) present progressive
Ex: I am writing.

(b) past progressive
Ex: I was writing.

(c) past perfective.
Ex: I have written.
Ex: I had written.

(d) past perfect progressive
* Ex: Having been writing all morning, he wanted to sleep.
Ex: I had been writing all morning.

(5) Mood

* (a) subjunctive

(b) modal past
Ex: I thought you would want to go now.