# ULTRAACTIVE: Computerized Multimedia Expert AAC System

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AAC systems are based on two types of representation: pictorial (PIC pictograms and PCS line drawings), or linguistic (visual: sign language and Blissymbols; or phonic: ortographies based on the representation of sounds as the Japanese syllabaries and the Greco-Roman alphabet). Pictographic representation is analogic and isomorphic to its referent. The advantage is iconicity: the meaning tends to be clearly perceived across age barriers (pre-school children), IQ limits (mental retardation), and left-hemisphere lesions (aphasias). The disadvantage is the confinement of representation to the limits of what is pictorially imageable. Consequently, the range of representation tends to be limited to simple concrete relations among, or properties of, two to three items. Linguistic representation is generative and permits the precise representation of complex and abstract set of relations, whether imageable or not. The price for breaking the barrier of imageability is loss of iconicity. Linguistic symbols and signs are not formally related to their referents, and if communication is to happen, the sharing of a set of arbitrary conventions of use is required. Its disadvantage is the exclusion of the non-initiated, those who have not been introduced to conventions (children and foreigners) and those who have lost them due to illness (the brain damaged).

ULTRAACTIVE is a computerized multimedia expert AAC system based on both linguistic (in both visual and phonic modes) and pictorial representations. In terms of visual languages, it contains 1600 Blissymbols, 3000 AMESLAN and 3000 BRASLAN (Brazilian Sign Language) signs. In terms of phonic languages, it contains the whole universe of Portuguese ortography segmented at a syllabic level (since it contains all 2000 Portuguese syllables with diacritical pronunciation signs, which allow for the composition and decomposition of any word and non-word in Portuguese), as well as a subset of thousands of English, Spanish, French, Esperanto, etc, ortographies at a word level. It also uses the pictographic representations since it contains the 400 PIC pictograms, 1800 PCS line drawings, in addition to 8000 personalized real-life static and animated high resolution colored pictures to represent referents from the user's environment. It is designed to be used by the cerebral palsied, the aphasics, and the deaf, among others. It can be operated by users with severe motor impairments, even those who are able to emit only gross movements, groans, or changes in eye-gaze direction. It contains a number of digitized voice banks permitting the appropriate matching of digitized voice features (accent, prosody, etc) to the user's characteristics (gender, age, ethnic origin, etc).

ULTRAACTIVE is programmed in C++, Clipper, and Assembler, and runs on AT 486 computers with 2.5 Gb HD, digitized-voice card and any of a number of input peripherals such as mouse, touch-sensitive screen, groan-

sensitive or eye-gaze sensitive devices. It can be executed in computers linked to each other via networks, thus allowing for remote communication. It performs automatic translation in eight spoken and written idioms, thus allowing for communication among foreign AAC users. Besides spoken and written idioms, it contains a large sample of AAC symbols, pictograms, ideograms, line drawings, and sign language. Thus, it can be used by AAC users who are accustomed with either Blissymbols, PCS drawings, PIC pictograms, or with AMESLAN signs. Therefore, it allows for communication among users who comprehend different spoken-written languages, who use different AAC system items, who use different operanda, who have different functional motor systems, and finally who belong to different nosological categories. In its syllabic mode, it has proven to be an outstanding tool for increasing phonological awareness and for autonomous learning of Portuguese reading-writing abilities by cerebral palsied.

In terms of system layout and operation, the corresponding written word appears at the bottom of each item. Item selection produces its digitized speech in any of eight available idioms. Thousands of items represent referents organized in semantic categories. The selection of a category item from Window 1 (W1) results in the unfolding of that category into all its component items at W2. The selection of one of the component items from W2 results in its migration to a communication area at W3, which contains space for up to eigh items at a time. The items selected in succession from W2 are sequentially arranged at W3, thus resulting in an automatically-composed sentence with up to eight items. Once it has been composed, the sentence may be uttered with digitized voice, printed, sent to an AAC communication partner, or saved for ulterior use. The commands to perform all these operations are available from items at W4. Items from W4 also allow for operations such as one-touch retrieval of up to 24 previously saved sentences, verb tense inflection during sentence utterance or printing, and AAC item type (pictures, pictograms, ideograms, symbols, signs, words, syllables, etc).

A configuration screen allows for configuring ULTRAACTIVE for each specified user, communication dyad, or communication group in computer networks of AAC users. From among the options available are the following ones: system type (Blissymbols, PIC pictograms, PCS line drawings, AMESLAN or BRASLAN signs, real-life static and animated pictures, etc); operanda type (touch-sensitive screen, mouse levered to a body part, groan-sensitive device, etc); spoken-written idiom (Esperanto, Portuguese, English, Spanish, French, etc); voice gender (male, female) and age (elder, adult, youth, child); screening speed for indirect selection; animation speed of verbs; availability (for the literate user and the user who is learning to read) or not (for the illiterate or alexic user) of syllabic system; verb tense inflection; sentence saving, retrieval, printing; etc. Therefore, ULTRAACTIVE is a tremendously flexible AAC tool tailor-made for use in the Internet environment. It is our hope that international cooperation will support its use.

468