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Zurich Conference on
"U n i v e r s a l   l a n g u a g e"

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1.) Goals and intents:

We are interested in a language which can be used as a text language and as a language for describing procedures translatable into machine programms.

2.) Without further specifications at this time there is agreement on what is ment by:

figures
characters
operators (standard arithmetic)

Wherever possible different symols are to be used to represent different concepts.

3.) There are 6 properties of the text language:

1. Readability.
2. Close to mathematical notation.
3. Both the semantics and syntax are concisely describable.
4. Translatable into a computer language.
5. Operational (as distinguished from descriptive).
6. The use of a natural language (english or machine language) is to be permitted in special cases for defining special operations, which may be possible (i.e. strictly speaking convenient) only outside the text language. We may consider this as broadening the definition basis of a language, i.e. introduction of new primitives. We postpone the description of the notation in which these special definitions are to be cast.

4.) We consider <u>statements</u> and <u>declarations</u> with the former to consist only of imparatives. Declarations, as sentences , or imparatives <u>to</u> the translater as distinguished from imparatives <u>for</u> the translater. Whereas the text lang. contains the ability to recursively define ever more complicated functions and consequent statements, it will probably not contain the ability to recursively define ever more complicated declarations. For the moment we postpone both the content and form of these declarations and concentrate first on statements.

5.) Components of the language

The components will be constructed from a finite set of distinguishable characters, which include e.g. decimal digits, roman letters A-Z, and certain standard characters which serve as delimiters (operators and punctuations).

Class	General class designator
letters	λ
digits	ξ
delimiters	
operators	ω
punctuations	τ

Numbers (Z) will be strings of decimal digits and at most one decimal point.
Identifiers (I) are strings of characters which have fixed meaning and do not include any delimiters, and begin with a letter.
Delimiters (δ) have a meaning which cannot be changed by declarations or statements.

6.) Identifiers

The descriptions which follow consist of a semantic part and a notation of form.

a. Simple variables V
Semantics: a name for a number
Form: Identifier

A declaration may be used for spedifying that certain simple variables take on only integral values. Unless so specified variables are representations of arbitrary real (floating point representation) numbers. The rules of arithmetic for handling mixed operands (i.e. floating and integer) will be specified in the section on arithmetic expressions.

b. Subscripted variables W
Semantics: a name for a particular number which is an element of an array; the particular number of the array being specified by the value of those expressions which constitute the subscripts. Any expression is understood to be in the arithmetic of its variables. The value of the number defined by the subscript should always be an integer, and in any case is that integer determined by the function "nearest integer to". Should the desired value of the subscript be "greatest integer in", this must be obtained by specific use of a function.
Form: Identifier followed by a punctuation, followed by the appropriate expressions (each separated from the other by punctuation), terminated by a punctuation. In many cases it may be desirable in the text language (though impossible in the machine lang.) to employ physical subscripts. There is feeling that , though this may be allowed, a single line form

for denoting subscripts in the text lang. is essential. The form: I ↓ (...,...) has been suggested. This has the virtue of introducing the special punctuation mark ↓ for this explicit purpose and thus identifying all occasions of subscripting.

c. Functions F
Semantics: Those procedures which act to produce a single number (real or integer) will be called functions. Procedures which produce values for more than one variable will be called subroutines or pseudoformulae or some like name. Only functions will now be discussed.
Form: I[..., ..., ...] where the qualities described in the parantheses, called parameters, may be any of:

a) an arithmetic expression
b) the name of a function
c) the name of a subroutine or pseudoformulae.

Notes: 1. The order in which parameters are listed in an instance of functions use must conform to the order of the parameters described in the definition of the function.
2. Those parameters which are the names of functions or subroutines etc. will be indicated by the form:
I[ ].

d. Identifiers which are names of statements will be discussed later.

7.) Expressions
An arithmetic or numerical expression A may be any of:

a) number
b) variable
c) function (consistently defined as above).

and combinations of these under the usual rules of arithmetic with the sequencing of the interpretation determined by:

1st) parantheses
2nd) order of precedence of operators employing the ordering: ↑ , · and / , + and -
3rd) left to right

Notes
1. a/b·c or a/b/c should not be used because of ambiguity in personal interpretation. However , their occurrence will be interpreted according to the above 3 rules.
2. The multiplication operator must always be explicitely given.
3. Superfluous parantheses are permitted. Numerically they are not meaningless, since expressions in parantheses are computed at some time as intermediate results.
~~4. If the operand(s) of an operator are of the same type -- (both) integer or (both) real valued -- the result will be of the same type.~~
~~5. If of different type, that one which is an integer will be converted to "real" form and then the result is determined as in 4.~~
6. It was agreed absolute value shall be specified as a function.
~~7. In exponentiation a↑b , the exponent b may be any allowable expression with the interpretation:~~

~~a. repeated multiplication of a, b times , if~~ the exponent expression is integral valued.
b. If otherwise, then $a \uparrow b$ means $\exp[\, b \cdot \ln[a] \,]$.
c. In the case of certain common exponents e.g. 2 or 3, it will be desirable in the text language to employ actual superscript notation. However it is recognized that the high likelihood of error in clerical transcription to the necessary single line notation makes it mandatory to have a single line notation for text. A recommandation has been the notation: $E \uparrow (\ldots)$.