AB45.4.5

The Translation of Algol 68 into Chinese.

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I obtained a copy of the report of ALGOL 68 at the end of 1972 and decided to translate it into Chinese. It was because the Chinese computer scientists should be aware of the latest progress in their field. By the end of 1973, the work was finished and the book was published at the beginning of this year. But, over a year ago, I was told that the revised report on ALGOL 68 had appeared. I soon found the issue of ACTA INFORMATICA that carried it and began to translate the new version. This work was completed in 1977.

During the translation, I had to make some inflections in the Chinese version against the English one so as to keep both the structure of the report and its mnemonic character. In addition, the translated version must be faithful both to the report and to the Chinese language. This article will report the main changes which have been made. At the beginning of every paragraph some words from section 1.1.5 of the revised report are quoted.

I. To what degree the translation must be done.

"The originals contained in each production tree of T may be different protonotions obtained by some uniform translation of the corresponding production tree of D."

Taking into consideration that every protonotion, which is a notion, has its meaning in English, it was decided to translate all the notions into Chinese. I did even more - all the symbols were also translated. But the metanotions were left untranslated because most of them were not English words.

II. Introducing Chinese characters.

"Different syntactic marks {1.1.3.1.a} may be used {with a correspondingly different metaproductions rule for 'ALPHA'}."

In order to express the notions and symbols in Chinese (according to I.), it was necessary to introduce Chinese characters. On the other hand, the English letters were saved because they were still needed in describing the syntax.

There are following changes:

1. To the right side of the metaproduction rule ALPHA a hypernotion 'bold-faced Chinese characters' was added.

2. 'bold-faced Chinese characters' was also included in "small syntactic marks" in 1.1.3.1.a).(i).

3. At the end of 1.1.3.1.g, the following subsection was added:

"When the term 'bold-faced Chinese characters' appears in a metaproduction rule, it represents all the bold-faced Chinese characters, uniformly arranged according to some fixed order, and separated by semi-colons; when it appears in 1.1.3.1.a).(i), it means

the same except that the Chinese characters are separated by commas; when it appears in a production rule, it means the same except that the Chinese characters are not separated at all."

III. How to save the mnemonic character.

"The method of derivation of the production rules and their interpretation may be changed to suit the peculiarities of the particular natural language."

In order to follow the Chinese grammar, it is necessary to rearrange the relative positions of metanotions and other elements within the hypernotions.

For example, the following original text of 4.2.1.a of the revised report:

a) NEST mode declaration of DECS{41a}:
   mode{94d} token, NEST mode joined definition of DECS{41b, c}.

was translated as follows (according to the order in Chinese):

a) DECS of NEST mode declaration{41a}:
   mode{94d} token, DECS of NEST mode definition joined{41.b.c}.

IV. How to avoid ambiguities.

"In a highly inflected natural language, it may be necessary to introduce some inflections into the hypernotions."

The problem of ambiguity relates mainly to the translation of modes. Because of the difference between Chinese and English, some previously unambiguous mode names become ambiguous during the translation.

1. The Chinese translation of

union of reference to integral real mode

and

reference to union of integral real mode

would be the same, i.e.

reference to integral real union mode.

2. The following would be alike for the Chinese translation:

reference to row of integer

and

row of reference to integer.

Both would be

reference to integer row.

3. In Chinese,

reference to procedure yielding integer

and

procedure yielding reference to integer

would be the same, i.e.

reference to integer procedure.

In order to avoid these ambiguities, there must be some forms of parentheses. In the Chinese translation, 'from' and 'union mode' were used as parentheses (like the English parentheses 'union of' and 'mode') for UNION; 'one' and 'mode' as parentheses for 'ROWS of mode'; 'without parameter' and 'procedure' as parentheses for 'procedure yielding MOID'.

Thus the six modes above would be translated as

a) from reference to integer real union mode.

b) reference to from integer real union mode.

c) reference to one integer row.

d) one reference to integer row.

e) reference to without parameter integer procedure.

f) without parameter reference to integer procedure.

V. On the equivalence of modes.

"A more elaborate definition of 'equivalence' between protonotions".

In order to test the equivalence of MODEs, the revised report splits every MODE into two parts, i.e. HEAD and TAILETY. But this is not sufficient for the Chinese translation. A MODE must be splitted into three parts, i.e. HEAD, TAILETY and APPENDIXETY. It was decided to make this inflection because there were three HEADs, i.e. 'PREF', 'FLEXETY ROWS of' and 'procedure with', which must be splitted into two parts in the translation, one placed before TAILETY, the other after TAILETY. This fact aroused a lot of changes in the corresponding section. Below a list of these changes is given.

1. The first statement of the second paragraph of Chapter 7 is now

"Modes are composed from the primitive modes, such as 'boolean', with the aid of 'HEAD's, such as 'structured with', and 'APPENDIXETY's, such as 'procedure', and they may be recursive."

2. 7.1.1.A was changed to

A) PREF :: without parameter; REF to.

3. In 7.3.1 following changes were made:

B) HEAD :: PLAIN; PREF{71A}; structured with;
   FLEXETY one; with; from; void.

C) TAILETY :: MOID; FIELDS mode; PARAMETERS yielding MOID;
   MOODS union mode; EMPTY.

D) APPENDIXETY :: ROWS mode; procedures; EMPTY.

b) ....
   WHETHER (HEAD3) is (HEAD4) and (APPENDIXETY3) is (APPENDIXETY4)

   where SAFE3 HEAD3 TAILETY3 APPENDIXETY3 develops from SAFE1 MOID1{c}
   and SAFE4 HEAD4 TAILETY4 APPENDIXETY4 develops from SAFE2 MOID2{c}.

c) WHETHER SAFE2 HEAD TAILETY APPENDIXETY develops from SAFE1 MOID{b,c}:
   where (MOID) is (HEAD TAILETY APPENDIXETY),
   ....

   WHETHER SAFE2 HEAD TAILETY APPENDIXETY develops
   from MU has MODE SAFE1 MODE{c};
   ....

   WHETHER SAFE2 HEAD TAILETY APPENDIXETY develops from SAFE1 MODE{c}.

4. From line 7 in the pragmatic of this section (p.105), the text was changed as follows:

.... and split into its 'HEAD', its 'TAILETY', and its 'APPENDIXETY', e.g. 'without parameter MOID procedure' is splitted into 'without parameter', 'MOID' and 'procedure'.
   If the 'HEAD's and 'APPENDIXETY's differ, then the matter is settled (rule b); otherwise the 'TAILETY's are analysed according to their structure (which must be the same if the 'HEAD's and 'APPENDIXETY's are identical). In each case, except where the 'HEAD's were 'from', ...

VI. On predicates.

"Descendents of those production trees need not be the same if their originals are predicates."

Since the bold-faced Chinese characters were also introduced as small syntactic symbols, there must be corresponding changes for the predicates. In fact, the production rule 1.3.1.j was changed to:

j) ....
   WHETHER (ALPHA1) coincides with (ALPHA2) in
   (abcdefghijklmnopqrstuvwxyz bold-faced Chinese characters){k,1,-}
   ....

VII. On paranotions.

"Different inflections for paranotions". "Some pragmatic remarks {1.1.2} may be changed."

In the Chinese translation we need not be worried about the inflections of paranotions when they appear at the beginning of a statement or in the plural from. There is no difference between "capital" and "small" Chinese characters. Nor is there need to add "s" at the end of a name. Besides, hyphens are also not needed. Thus, all sub-sections dealing with this theme were deleted from the revised report (p.28, from line 14 till line 28).

VIII. On the terminal symbols.

"T defines the same reference language {9.4} and the same standard environment {10} as D."

By translating the terminal symbols into Chinese the mnemonic character of these symbols were taken into account. It was somewhat difficult to translate the 'bold to symbol', which is used in the revised report both in the to-part of a loop clause and in go-to-option of a strong-MOID-NEST-jump. There is no Chinese word having the meaning of both. Hence in the Chinese version there are two terminal symbols corresponding to 'bold to symbol', one of which is 'bold end value symbol' (used in loop-clauses), the other is 'bold to symbol' (used in go-to-option). They have the same representation.

IX. On metaproductions.

"Additional means for the creation of extra metaproduction rules".

A new metaproduction rule for APPENDIXETY is introduced, while some other metaproductions are modified. In fact, we know this already from the discussion above.

AB45.4.6   ALGOL 68 and Algebraic Manipulation.

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The decade has seen research into algebraic manipulation by computer progress to the point where the majority of computer users have access to at least one algebraic manipulation system. The growth of these systems has not however been accompanied by a corresponding growth of reports of their applications. A number of reasons have been put forward by users and potential users to explain this disparity, of which the two that occur the most are:

1)   The user interface for a number of present systems is poor, manipulations on algebraic expressions being expressed in a non-natural way, usually by means of a series of subroutine calls, or in a language which, although well suited to the construction of such systems (eg LISP), tends to be alien to the programming experience of the average scientist or engineer that make up the potential user community. ABC ALGOL and its derivatives (1) and SAC (2) are examples of systems to which this criticism can be applied, while even (3), the only previous attempt to write an algebraic manipulation system in Algol 68 could have this criticism levelled at it.

2)   The majority of users do not wish to perform algebraic manipulations in isolation, the manipulations being just one stage in what may be a large program in which numerical or even other symbolic processes may take a dominating part. A number of systems, CAMAL (4) and REDUCE (6) for example, while having excellent facilities for algebraic