Letters

Dear Editor:

The following comments and criticisms are based upon the admittedly preliminary report (February 4, 1960) of Peter Naur, but it is presumed that the final report will differ only in detail.

The present writers share, along with the majority of the computing community, an enthusiasm for the development of a reference language in which to express algorithms for ultimate execution by computing machines. We are therefore concerned about certain features of ALGOL 60 which we believe will greatly reduce its acceptance. Our criticism is concerned with first, the relationship between the reference language and the publication language, and second, the related problem of the *role* of the reference language and its relationship to the implementation language.

The reference language should provide an idealized, well-defined notation in which to express and transmit algorithms. In fact, one should view as an ultimate goal the use of this same language for publication, as well as direct translation into machine language programs. A reference language was designed by the ALGOL committee which could be translated directly to present-day machines, but at the same time they expressed their dissatisfaction with this language by providing a separate language for publication. The latter contains some familiar mathematical notation, but it also contains many notational innovations due to its intended use. Unfortunately, this places a burden on the reader of algorithms thus transmitted of being familiar with two languages (since he *must* understand the one language—the reference language—which is well-defined, consistent, and the accepted standard). It seems obvious this two-language burden more than offsets the slight advantage of a little bit of additional mathematical notation, and that algorithms should be transmitted in the *reference language itself*. Nothing is gained by maintaining a separate publication language when the reference language must be understood as well.

Individual authors may very well choose to modify some of the reference notation for their own purposes, but it will obviously be to their advantage to conform to the accepted reference language to the extent that their algorithms can be understood—*without* the use of transliteration rules—by people familiar with the reference language.

Regarding the relationship between the reference language and the implementation language, it is clear that the reference language should be algorithm oriented. That is, the reference language should explicitly contain all of those elements which are *necessary* to implement the algorithm on a digital computer (having finite storage and capable of operations involving numbers of several types). It should *not* contain elements which merely *facilitate* the translation of algorithms to machine code, whereas an implementation language for a specific machine may need information of this nature.

The proposed block structure of ALGOL 60 (excluding the necessary delimiting of procedure definitions) and its accompanying global-local designation of identifiers is an example of such facilitative information. Using conventional notation, identifiers are generally uniquely assigned for the scope of the entire algorithm, and assignment into blocks with the attendant isolation of statement identifiers only serves to obscure the process being described. To be sure, the block structure simplifies translation in that it greatly reduces the symbolic equivalences that must be maintained, but this is hardly justification for its inclusion in the reference language.

Another example is the distinction being made—by means of a declaration (!) between the values and names of formal identifiers in procedure definitions. It is no bar to understanding or implementing the procedures being defined to treat all of the formal identifiers as names. Again it may be *convenient* (particularly in the case of recursive procedures) to handle values, but these cases can be analyzed, understood, and implemented without the declarative information.

If facilitative information is eliminated from the language, it may be impossible on some machines to construct translators from the reference language. To the extent that such additional information is required, the implementation language will differ from the reference language. However, the use of the reference language as an ideal is generally accepted; computer users will strive to produce translators which do not require extraneous information in the statement of the algorithm.

The acceptance of ALGOL as a reference language cannot be dictated but must be accomplished by persuasion. The language must be sufficiently general to allow the concise expression of algorithms, and sufficiently unencumbered by non-essential notation to be readily understandable and preferable to the present divergent notations. The present ALGOL committee is to be commended for producing a language as close to these goals as ALGOL 60 indicates. However, if the ALGOL effort is to be a success, i.e., if the language is to be representative of the desires of the entire computing community, it should be thoroughly reviewed! Is it not better to continue the effort so well begun than to prematurely declare it "the standard" and watch it fade from the scene through lack of acceptance?

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Dear Editor:

The first regional meeting of the Working Group for Better Education was held in a morning and afternoon session on Saturday, March 26, at the Massachussetts Institute of Technology, Cambridge, Mass. Nineteen people were present,—3 from Connecticut, 2 from New York, 2 from New Jersey, 1 from Mexico City (Dr. Sergio Beltran, director of the Computing Center, National University of Mexico), and the remainder from Massachusetts.

W. Eugene Ferguson, chairman, Department of Mathematics, Newton High School, talked on new developments in secondary mathematics courses and distributed a guide to them. Norton Levy, chairman, Department of Mathematics, Concord High School, talked on the use of community resources in Concord, consisting of some 80 professional people who have helped in the teaching of mathematics and in the pursuit of mathematical projects by students. Dr. Robert B. Davis, of Syracuse University and the School Mathematics Study Group at Yale, talked briefly on their programs. Dr. Sergio Beltran talked on the thirst for education in Mexico, the lack of means for fulfilling it, and the tremendous energy going into the task.

At the end of the morning session, certain resolutions were discussed and passed unanimously:

1. That membership in the WGBE should not be restricted to only members of the Association for Computing Machinery but that membership should be open to all seriously concerned, academically or technically trained persons, such as members of the IRE or AIEE or teachers of mathematics in secondary schools, etc.

2. That the WGBE therefore could not ask the Association for Computing Machinery to pay its costs, but that it should have membership and dues.

3. That dues should be $2 a year, for the present.

4. That there be two officers, an Acting Treasurer and an Acting Secretary. For Acting Treasurer, Frank Verzuh was elected; for Acting Secretary, Edmund C. Berkeley was elected.

5. That there should be some simple bylaws. For bylaws committee, the two officers were elected.

6. That the WGBE should be a "permissive and enabling" organization, permitting and helping good work to get done with a minimum of formality.

It was agreed that six working subgroups should be started; a list of them (with members as of March 26) follows:

1A. Teaching computers and data processors to high school and college students: R. V. Andree, Walter Taylor

1C. Automatic teaching machines: Frank Verzuh, Ed Berkeley, Loren Bullock, Robert B. Davis

2C. Logic and reasoning: Werner C. Rheinboldt, Sheldon Rifkin (both of Syracuse)

3A. Verifying the quality of education produced: Ed Berkeley

6B. Use of community resources in professional people: Norton Levy

7C. Better education in Mexico: Sergio Beltran, Ed Berkeley

For the afternoon session, 17 people reassembled. News of the Los Angeles WGBE group, and of the Syracuse WGBE group, was reported. For the last hour and a half an open discussion took place based on agenda of 16 topics put together by those present.

EDMUND C. BERKELEY
Acting Secretary, WGBE

Dear Editor:

I would appreciate views and information on the organisation of any American computing laboratories associated with part-time education. During the past four years I have been concerned with a scheme to extend limited opportunities already existing for full-time post-graduate Numerical Analysis diploma courses to the part-time day category for students with an academic ability ranging from the general school certificate (advanced level) in Mathematics, to general degree standard. One of the major problems of the part-time students would appear to be access to the college equipment (the amount of ancillary equipment would normally be small). It would seem that, compared with the open shop basis on which college computers are often run, this would detract from the final independence of the students and would demand a higher staffing ratio in the computer laboratory; however, it would ensure that the completion rate and complexity of programs coincided with the theoretical progress of the Numerical Analysis classes. Courses so far started run for an initial period of one year, with the option of two further years at one day a week, or two years only, for graduates. The topics included are Mathematics and Programming, with specialisation in Numerical Analysis or Statistics,—the whole course to be geared to the use of high-speed computers as everyday tools.

I would be extremely interested to know the size of classes, the allocation of time to theoretical and practical programming, and the staffing and equipment complement of the computing laboratory in any American institution running comparable schemes.

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