A more general method, which has a much larger domain of convergence, may be formed by imposing a success criterion. The usual criterion employed is the minimization of $f^2$.

It is ensured that each step gives rise to an improvement (i.e. reduces $f^2$) by multiplying the step by a suitable scalar in those cases where the direct application of the algorithm does not give rise to an improvement. The imposition of such a criterion ensures convergence over a large domain but does not impair the final convergence rate.

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References


To the Editor,
The Computer Journal.

"An impossible program"

Dear Sir,

I do not know whose leg Mr. Strachey is pulling (this Journal, January 1965, p. 313); but if each letter in refutation of his proof adds to some private tally for his amusement, then I am happy to amuse him. May I offer three independent refutations?

(i) He defines a function $T[R]$. Any subsequent "proof" that $T$ cannot exist is then idle; the function exists by definition.

(ii) If $T$ does not exist, then $P$ does not exist, since $T$ is essentially involved in the statement of $P$. So $P$ is not a program. So $P$ is not an acceptable argument for $T$.

(iii) If one accepts Mr. Strachey's reasoning up to the point "In each case $T[P]$ has exactly the wrong value", the appropriate deduction is not "this contradiction shows that the function $T$ cannot exist" but "this contradiction shows that either the function $T$ does not exist or that $P$ is not a program". Since the non-existence of $T$ itself implies that $P$ is not a program, the most that can be concluded is that in any event $P$ is not a program.

I am, of course, being careful not to claim that Mr. Strachey's initial assertion (that it is impossible to write a program which can examine any other program and tell, in every case, if it will terminate or get into a closed loop when it is run) is false. But what is manifest is that his proof of the far stronger assertion (that $T[R]$ does not exist) is invalid; both in its final step (see (iii) above) and in its assumption that a set of statements in CPL—or any other language—necessarily constitutes a program. (If anybody doubts my counter assertion that $P$ is not a program, let him try compiling $P$ in—any—machine language!)

Yours faithfully,
H. G. ASPIMON.

22 Stafford Court,
18 February 1965.