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## TREACHEROUS TERABYTES

The impossible does not happen at once. The impossible is a moving target. The impossible has a sly and surreptitious nature: it materializes in an underhand way. Declared to be impossible by university professors, rocket flight developed steadily, even in a vacuum. Equally declared impossible by many a philosopher, computer chess developed unrelentingly, even when still handicapped by the vacuum tube. It has now found its niche. Three reports on championships in computer chess in this issue force our editorial attention to focus on what has been achieved.

Let us tackle a deep, even an impossible question by a shallow but numerate analysis. At a generous estimate, there are no more than 500 human players who can consistently beat the best program on Mega-hardware. This is telling enough in itself, but what is even more telling is that the best programs on microcomputers will now consistently succumb to no more than an estimated 50,000 human beings. That represents just one in a thousand of the world's human chess-players, which, crudely, we estimate to number 50 million souls.

One reading of this figure is that an affordable computer program can beat 99.9 per cent of all human players. It might be argued from this datum that in pragmatic terms the conundrum *Can computers play chess?* has been solved: *Yes, they can.* The philosophers, as always, are unimpressed by the pragmatic success and relegate the question to the vast realm of the undecided.

Yet, the times are past when an astounding move by a program was shrugged off as a typical howler. The times have come when, in the words of one contributor to this issue, it is the human opponent who may be surprised indeed by the subtlety and wit in such a move. The times have changed and our notion of the impossible has changed to keep pace. When we cast our minds back over the short span of six years, when this Journal was already in its tenth year of publication, we found the field of computer programs in a state of jagged inequality. A few thoroughbreds stood out and would easily outrun the humdrum pack. Nowadays our reporters are unanimous in finding a great levelling. Even the lesser programs are remarkably well-

matched in strength, none of them outpacing their competitors by more than a metaphorical nose. To substantiate this bold statement, we offer the evidence of an ever-increasing proportion of draws in the computer-chess championships, be they global or national.

This, as we view it, points to a welcome widening of the high level of the art of computer chess. Expertise is now spread far and wide. Almost the same improvement can be found in the increasing depth evidenced pragmatically in the analysis of board positions; whence the subtlety which we have taken the liberty of dubbing wit. Nor should all this growth which, we argue, is in depth as well as in width, be disparaged as due to no more than an improvement in hardware. Admittedly, the pace of the field has increased furiously: with apologies to Gilbert and Sullivan, the tempo indication which read *As fast as possible* changed, a few bars later, to *Even faster*. Such a speed perforce makes for greater depth, if only by allowing a deeper burrowing in the search tree. But the evidence is loud and clear, that tree is now traversed with greater finesse.

One is sometimes inclined to wonder, with the hardware performance going up by leaps and bounds, whether those bounds are bounded themselves. The plain man's answer seems to be *not for a long while yet*. We cannot adduce a proof of this statement which again we must regard as moderately bold. Yet it is indicative that Ken Thompson now confidently states that *all* six-man endgames are within comfortable reach. While Ken may be privileged, unique in making light of a handful of Gigabytes, his singular equipment will be commonplace in a few years' time.

Let us not be too solemn in this festive season and, for argument's sake, grant ourselves access to a few Terabytes. In harmony with thoughts now becoming prevalent, let us use this riches for a deep purpose: modelling our opponent's strategy in order the better to confound him. Now let our program be scheduled to meet the hypothetical Dr. Frishnick, one of the world's top players with a career well-documented in the opulent databases of the time.

An interesting question then arises: our computer, DT (standing for a Dozen Terabytes), knowing it will be opposed by Dr. Frishnick, is bound to trounce him soundly due to a deep strategic analysis of Frishnick's recorded games. But consider: has Dr. Frishnick a right to privacy? In other words: can he insist that he is to play DT anonymously? Then the chances are that it will be Frishnick who spans DT, safe in his anonymity from being treacherously identified.

We leave this question of privacy as an exercise to our readers and we submit that, though more lighthearted, it is in the same vein as the eternal query whether computers play chess. It is soluble pragmatically as soon as the time is ripe, but fated to remain perennially open to philosophers.

Bob Herschberg  
Jaap van den Herik