The Turing Test

Alan Mathison Turing (1912-1954), logician and coding theorist, is also regarded as the founder of artificial intelligence by many computer scientists. In a landmark paper, Computing Machinery and Intelligence *Mind*, October 1950, 59: 433-460, Turing turned to the question *Can machines think*? Rather than being caught in a web of definitions of 'machine' and 'think' (as many android epistemologists do), he chose to focus on an operational translation of this question and formulated a brilliantly simple and unambiguous test, described in the form of a game.

The Imitation Game : H, C and R denote a human, a computer and a human interrogator respectively positioned in separate rooms. R interrogates the occupants of Room X and Room Y via a teleprinter. R does not know which room contains the computer. We can assume that the content of all teletyped questions and answers is visible to H, C and R (a teletyped conference call!). Each round of the game ends with R declaring which room contains the computer. The objective of H is to get R to make the correct choice and the objective of C is just the opposite.

Turing had already formulated an abstract model of a universal digital computer (*the Turing Machine*, see next article). Thus the question "Can machines think?" is replaced by an un-ambiguous one: Will there ever be a digital computer that makes the interrogator R choose wrongly about half the time?. Turing pointed out that the game actually favoured man over machine since it is possible that machines 'think' in a different way from man. Clearly, if a man were to try to pretend to be the machine, he would be given away at once by slowness and inaccuracy in arithmetic. So if a machine passes this biased test, it will be all the more reason to believe that machines can think. Turing was confident that "in about fifty years' time it will be possible to program computers, with a storage capacity of about 10^9, to make them play the imitation game so well that an average interrogator will not have more than 70 per cent chance of making the right identification after five minutes of questioning". He was also in favour of approaching the quest for an intelligent machine in two stages. First program a "child machine" and then make it 'learn'.

Imagine the following exchange:
R: Do you play chess?   X: Yes.
R: I have K at my K1, and no other pieces. You have only K at K6 and R at R1. It is your move. What do you play?
X: (After a pause of 15 seconds) R-R8 mate.

This example of an exchange in the imitation game was given by Turing to demonstrate how a chess playing computer might respond (Turing had actually programmed such a machine). In the second game of the recent chess contest between Kasparov and Deep Blue played on May 4, 1997 in New York (see Anjaneyulu's article in this issue), some commentators have claimed that Deep Blue passed the Turing test in the world of chess. Kasparov had played a game of closed positions, a strategic game where sheer combinatorial enumeration has little advantage, a game favouring a human grandmaster. Yet Kasparov lost and one grandmaster said that he didn't know where Kasparov went wrong. Deep Blue seemed to have learned strategy from its programmed strength in tactics.

But this was only in a game of chess. As Turing put it, "We can only see a short distance ahead, but we can see plenty there that needs to be done".

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