Alan Mathison Turing 2004: A celebration of his life and achievements

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Editors:
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Abstract

Alan Turing is well known for his Turing test in artificial intelligence, but the full range of his contributions in a wide variety of disparate disciplines is perhaps not so well appreciated. Hence the impetus for this conference - the only one in the UK in 2004 to mark the fiftieth anniversary of Turing's death - to attempt to provide an overview that encompassed this remarkable man's pioneering work in several diverse fields.

The conference comprised five in-depth presentations covering Turing's

- life and work (Dr Andrew Hodges)

and Turing's leading role in the following key areas:

- logic (Professor Barry Cooper);
- computing (Dr David Anderson);
- artificial intelligence (Professor B. Jack Copeland), and
- biology (in particular morphogenesis) (Dr Jonathan Swinton).
Full Synopsis

Only three of the five conference papers are available on this eWic site. Interested parties are directed towards the following Turing Festschrift: Teuscher, Christof (2004) Alan Turing: Life and Legacy of a Great Thinker, Springer: material on Turing and morphogenesis by Dr Jonathan Swinton, and on Turing and Artificial Intelligence by Professor B. Jack Copeland can be found there.

The three papers below contain important new research and are a stimulating contribution to the corpus of material on Turing.

Andrew Hodges’ paper "Alan Turing: the logical and physical basis of computing" has as its key question whether the bounds of computability have fundamentally shifted since Turing's landmark 1936 paper "On computable numbers, with an application to the Entscheidungsproblem". Hodges starts by focussing on computable numbers themselves, introducing here a new line of research as to whether a paper in 1933 by Turing's friend David Champernowne on normal numbers might have stimulated Turing's interest in computable numbers. There follows a detailed examination of computable numbers which are presented as being of interest not only in the realms of number theory, but also as having a very practical application in terms of Turing's universal machine. Turing's actual involvement in early computing is considered next, and claims that he is the father of modern computing questioned.

Hodges then goes on to study the 'physical embodiment of computation', emphasizing the paramount position of the brain in Turing's conception of how humans would actually use computers. In the discussion around the discrete nature of the brain's activity, Turing's treatment of random effects is touched on, which then leads to a study of his views on the interplay between quantum theory and computing. The paper finishes with a look at the current debate on "hypercomputation", and in conclusion Hodges posits: "[i]t is not just the relationship between the integers and the reals that is involved: far more subtle features of the complex numbers and analytic functions seem to enter in an essential way into physical reality, for reasons which are far from clear."

Barry Cooper's "The Incomputable Alan Turing" starts by contemplating the unusually close connection between Turing's life and work, delineating how his struggle to come to terms with the death of his childhood friend Christopher Morcom led him to tackle deep issues such as computability, the universe as information, and quantum uncertainty. Reflections on Turing's 1936 paper, the universal machine and Hilbert's programme develop into a consideration of the place of incomputability within both the natural world and the sphere of pure mathematics, setting out exemplars of incomputable sets that occur 'naturally'.

Cooper then revisits Turing's 1939 paper which introduced oracle machines and reviews recent debates over "hypercomputation" and "recursion theory". On Turing's 1950 paper on Computing machinery and intelligence, Cooper comments that "[D]espite what some people think, he did not ask "is the human mind a Turing machine", and still less did he answer, or even imply, "yes" to such a question." The wide scope of issues that Turing touched on whilst addressing such topics as incomputability and the mechanistic conception of mind still resonates today, and has produced what Cooper describes as "the Turing Renaissance".

In his paper "Was the Manchester Baby conceived at Bletchley Park?" David Anderson examines the role played by a group of mathematicians and former Bletchley Park code-breakers under the leadership of
Max Newman in the development of the world’s first electronic digital stored-program computer: "the Baby". The group comprised Newman himself, Jack Good, David Rees and (latterly) Alan Turing. Based on an extensive re-examination of the primary source material and archival recordings, Anderson identifies and confronts a number of key myths underlying the dominant historical account of the period. He considers the extent to which there is evidence to support the contention that the Manchester Baby actually owed a significant intellectual debt to work, carried out under conditions of the strictest secrecy during the Second World War, at Bletchley Park.

This leads him to reject the "Two project myth" the central claim of which is that the Baby was developed, without significant outside assistance, by the engineer F.C. Williams and his research student T. Kilburn. Anderson argues that the notion that no significant financial support for the building of the Baby was provided by Newman is a "Financial myth" and provides evidence for the first time that despite the general constraints of secrecy under which the Bletchley Park code breakers had, in general, to operate, Newman was officially sanctioned in transferring knowledge gained during the wartime development of the Colossus machine from Bletchley Park into the civilian world thus challenging the "Myth of secrecy". This opens the way to arguing that Turing's insights on the theory of computation may, through Newman's agency, have been more significant in the early development of British computing than has generally been supposed.
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Barry Cooper (Leeds)
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Papers:

Andrew Hodges  Alan Turing: the logical and physical basis of computing
http://dx.doi.org/10.14236/ewic/TUR2004.1

Barry Cooper  The Incomputable Alan Turing  http://dx.doi.org/10.14236/ewic/TUR2004.2

David Anderson  Was the Manchester Baby conceived at Bletchley Park?
http://dx.doi.org/10.14236/ewic/TUR2004.3