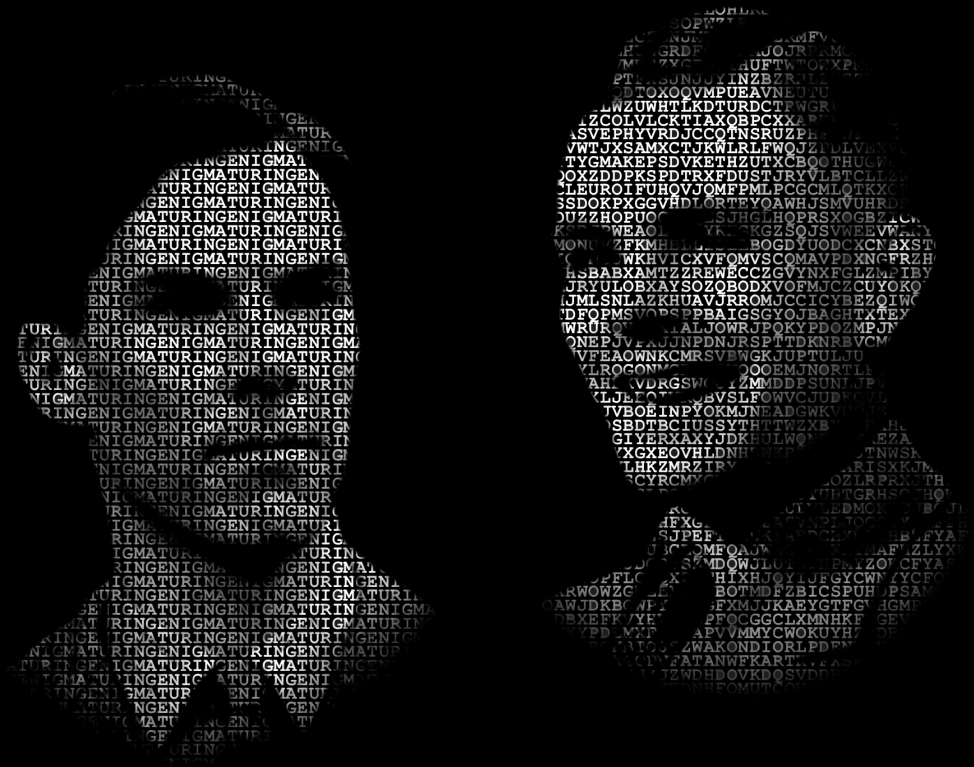


The Imagination Game

storia e fantasia
in The Imitation Game

Cap. 4:
Le altre macchine



Giovanni A. Cignoni

Le altre macchine

- La battaglia dei codici, dall'altra parte
- Lorenz vs Colossus
 - L'altro grande incontro disputato a BP
 - Meno epico, ma forse più interessante
- Le macchine di Turing
 - I calcolatori reali a cui lavorò
 - La Macchina di Turing (!)
 - Pensante? (!!)

Come cifravano gli altri

- Hagelin, M-209
 - Tattica, portabilissima
 - Violata dai tedeschi
- SIGABA
 - Sofisticata, mai violata (pare)
 - Brevetto concesso nel 2001
- Typex
 - L'Enigma inglese
 - Usata a BP come Enigma



I crittoanalisti degli altri

- Organizzazione teutonica
 - Deutsche Reichspost (DRP)
 - Forschungsamt, ricerca, al comando di Göring
 - Oberkommando der Wehrmacht (OKW), esercito
 - OKHeeres/FHO, fronte orientale
 - OKHeeres/FHW, fronte occidentale
 - OKWehrmacht/Abwehr, servizi segreti
 - Oberkommando der Luftwaffe (OKL), aviazione
 - Oberkommando der Marine (OKM), marina
 - B-Dienst, servizio di sorveglianza radio
 - xB-Dienst, servizio di decrittazione

L'altro grande incontro a BP

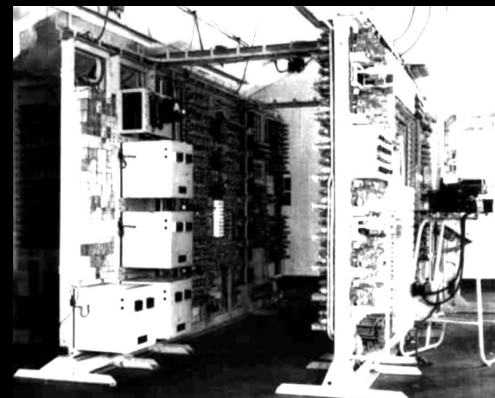
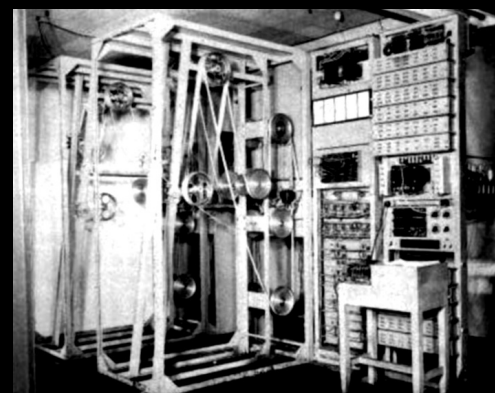
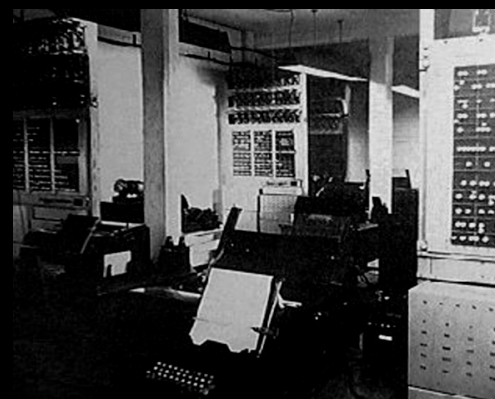
- Lorenz SZ 40/42
 - Cifrario Vernam
 - Trasparente
 - Su alfabeto ITA2
 - Comunicazioni strategiche
- Non la sola altra
 - Siemens T52,
per telescrivente
 - Siemens T43,
one-time pad
 - SG-41, derivata Hagelin



Giovanni A. Cignoni

All'altro angolo

- Newmanry & Testery
 - Max Newman, Ralf Tester
 - Bill Tutte & l'errore tedesco
 - Tommy Flowers
- Metodi
 - Turingismus, differencing, 1+2 break-in
- Macchine
 - Tunny Machine, Heath Robinson, Colossus



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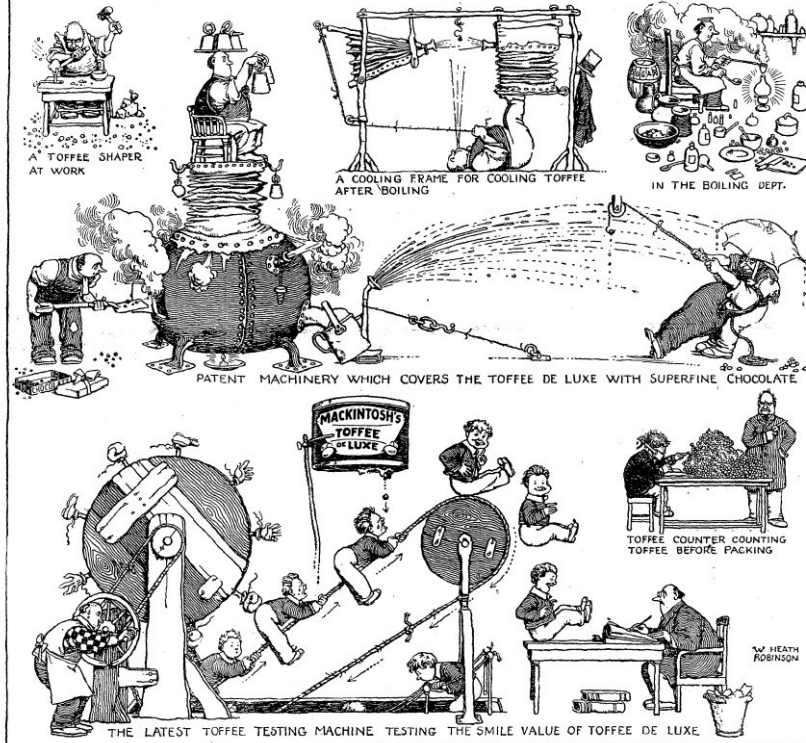


Heat Robinson

Famous artists' ideas of how Mackintosh's Toffee de Luxe is made. No. 1. W. Heath Robinson.

(This is the first of a series of humorous cartoons by famous artists, who have been asked to "imagine" how and where Toffee de Luxe is made.)

A HALF HOUR IN TOFFEE TOWN



The wonderful and fantastic inventions of W. HEATH ROBINSON give to his art a distinctive humour that needs no word of embellishment. But delightfully funny as his idea of Mackintosh's Toffee Factory is even to the uninitiated,—its humour is increased a hundredfold to those who know the real thing. We wish that every reader of this paper could visit Toffee Town—then they could contrast Mr. Robinson's quaint conception with the actual.

You would see his "Toffee Shaper" in the form of scores

of machines cutting the Toffee into the familiar squares at the rate of thousands of pieces per minute.

You would see the "Cooling Frame"—(not so acrobatic, but more effective!)—as row on row of burnished steel slabs, on which lie acres of Toffee, cooled from beneath by spring water and from above by cold air.

You would see the "Boiling Department" where the pans each hold five tons of Toffee.

You would see Chocolate de Luxe travelling on an endless

band—a veritable army of "chocolate soldiers," line on line, dozens abreast.

A "Toffee Counter" does not exist, for 7,000,000 pieces are made in Toffee Town in a single day, and therefore it would take 250 days (counting steadily at the rate of one piece per second for 8 hours per day) to "run up" one day's output. So we just weigh the Toffee! And although we have no "smile testing machines" in Toffee Town, we can guarantee that there are miles of smiles packed into every tin.

MACKINTOSH'S TOFFEE DE LUXE —the Quality Sweetmeat.

Made by JOHN MACKINTOSH & SONS, Ltd., at Toffee Town, HALIFAX—the largest Toffee Manufactory in the World.

Sold by Confectioners in every Town and Village in the Kingdom at 9d. per ½-lb. Also obtainable in every country in the World.



Giovanni A. Cignoni



Christopher 2.0



Giovanni A. Cignoni



L'eredità di BP (impugnata)



Giovanni A. Cignoni



Il progetto ACE

- Automatic Computer Engine
 - Al National Physical Laboratory
 - Progetto di Turing presentato nel 1946
 - In “corsa” con il First Draft di Von Neumann
 - Costruito come Pilot ACE nel 1950



Il Manchester Mk1

- Università di Manchester
 - Small Scale Experimental M., “Baby”, 1948
 - Manchester Automatic Digital M., “Mad’m”, 1949
 - Max Newman, Frederic Williams, Tom Kilburn
 - Turing, dal 1948, programmazione



Questioni da matematici

- Il programma di Hilbert
 - Trovare una formalizzazione della matematica completa, consistente e decidibile
 - Tutte le proposizioni vere sono dimostrabili
 - Non si possono dimostrare A e $\neg A$ (2/23 1900)
 - Si può decidere se A è vera/dimostrabile (1928)
- L'intervento di Gödel
 - $G \in T$, $G = \text{"G non può essere dimostrata in T"}$
 - Quindi T o è completo o è consistente

La Macchina di Turing

- Un'idea strumentale
 - Per parlare di numeri calcolabili
 - Per affrontare il problema di decisione
- Con Church
 - La MdT (e il λ -Calcolo) cattura l'idea di “effettivamente calcolabile” e di macchina universale
 - Tuttora una congettura

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A. M. TURING

[Nov. 12,

ON COMPUTABLE NUMBERS, WITH AN APPLICATION TO THE ENTSCHEIDUNGSPROBLEM

By A. M. TURING.

[Received 28 May, 1936.—Read 12 November, 1936.]

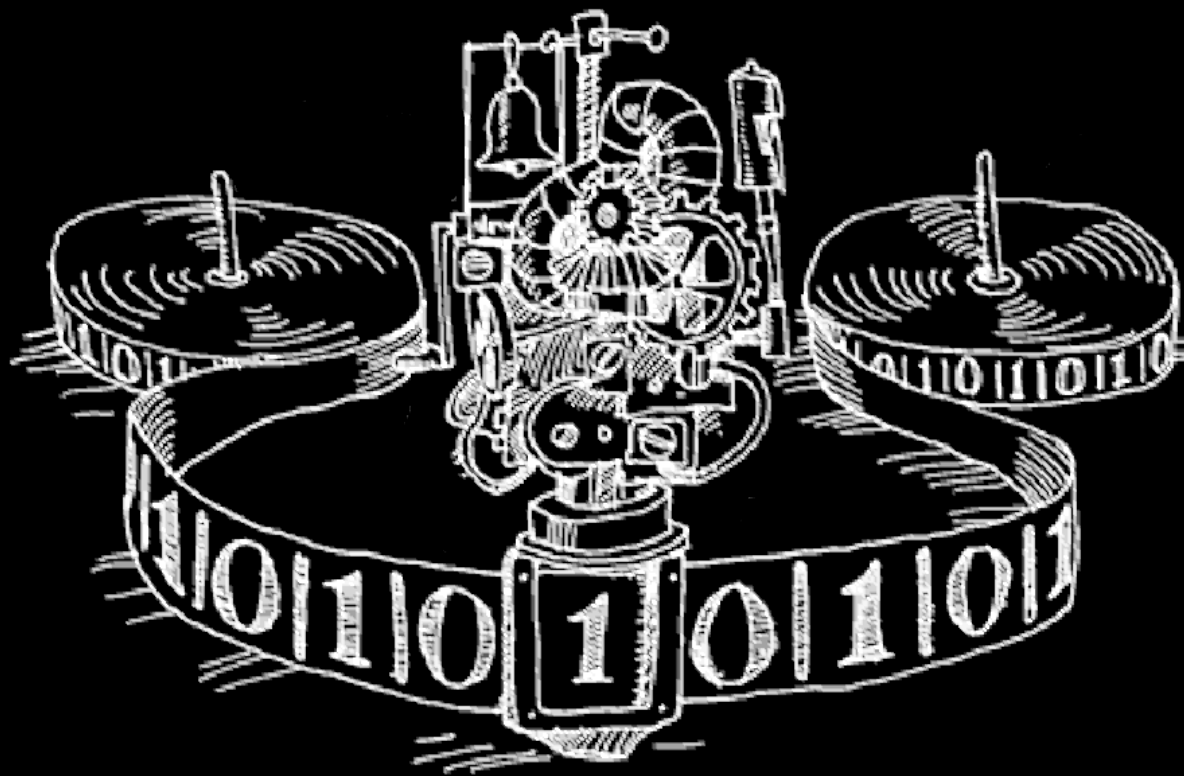
The “computable” numbers may be described briefly as the real numbers whose expressions as a decimal are calculable by finite means. Although the subject of this paper is ostensibly the computable numbers, it is almost equally easy to define and investigate computable functions of an integral variable or a real or computable variable, computable predicates, and so forth. The fundamental problems involved are, however, the same in each case, and I have chosen the computable numbers for explicit treatment as involving the least cumbersome technique. I hope shortly to give an account of the relations of the computable numbers, functions, and so forth to one another. This will include a development of the theory of functions of a real variable expressed in terms of computable numbers. According to my definition, a number is computable if its decimal can be written down by a machine.

In §§ 9, 10 I give some arguments with the intention of showing that the computable numbers include all numbers which could naturally be regarded as computable. In particular, I show that certain large classes of numbers are computable. They include, for instance, the real parts of all algebraic numbers, the real parts of the zeros of the Bessel functions, the numbers π , e , etc. The computable numbers do not, however, include all definable numbers, and an example is given of a definable number which is not computable.

Although the class of computable numbers is so great, and in many ways similar to the class of real numbers, it is nevertheless enumerable. In § 8 I examine certain arguments which would seem to prove the contrary. By the correct application of one of these arguments, conclusions are reached which are superficially similar to those of Gödel†. These results

† Gödel, “Über formal unentscheidbare Sätze der Principia Mathematica und verwandter Systeme, I”, *Monatshefte Math. Phys.*, 38 (1931), 173–198.

Un'idea semplice



Giovanni A. Cignoni



Macchine che pensano

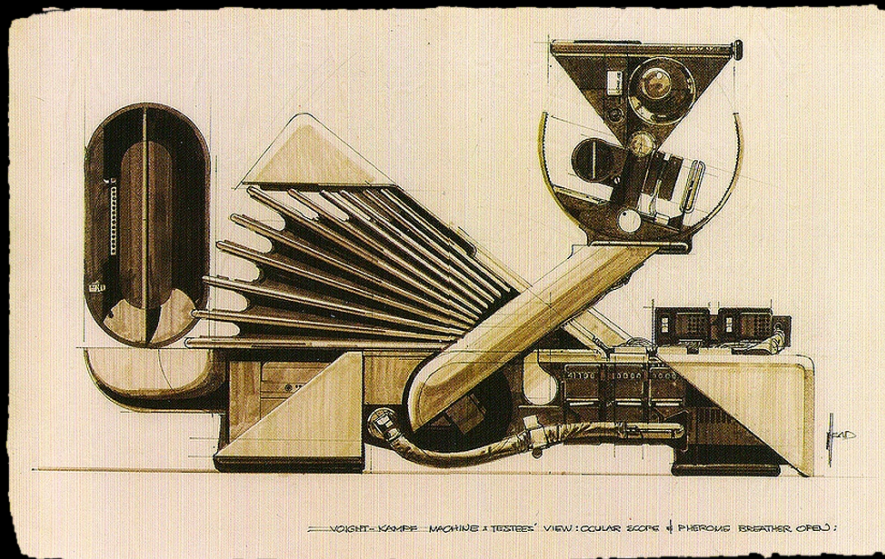


Giovanni A. Cignoni



The Imitation Game

- Il test di Turing
 - Dalle risposte discernere la persona dalla macchina
 - Se non si riesce...



VOL. LIX. No. 236.]

[October, 1950

MIND

A QUARTERLY REVIEW

OF

PSYCHOLOGY AND PHILOSOPHY

I.—COMPUTING MACHINERY AND INTELLIGENCE

By A. M. TURING

1. *The Imitation Game.*

I PROPOSE to consider the question, 'Can machines think?' This should begin with definitions of the meaning of the terms 'machine' and 'think'. The definitions might be framed so as to reflect so far as possible the normal use of the words, but this attitude is dangerous. If the meaning of the words 'machine' and 'think' are to be found by examining how they are commonly used it is difficult to escape the conclusion that the meaning and the answer to the question, 'Can machines think?' is to be sought in a statistical survey such as a Gallup poll. But this is absurd. Instead of attempting such a definition I shall replace the question by another, which is closely related to it and is expressed in relatively unambiguous words.

The new form of the problem can be described in terms of a game which we call the 'imitation game'. It is played with three people, a man (A), a woman (B), and an interrogator (C) who may be of either sex. The interrogator stays in a room apart from the other two. The object of the game for the interrogator is to determine which of the other two is the man and which is the woman. He knows them by labels X and Y, and at the end of the game he says either 'X is A and Y is B' or 'X is B and Y is A'. The interrogator is allowed to put questions to A and B thus:

C: Will X please tell me the length of his or her hair?
Now suppose X is actually A, then A must answer. It is A's

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Giovanni A. Cignoni



Le 9 obiezioni

- Le macchine non possono pensare perché
 - Il pensiero è funzione dell'anima (teologica)
 - È un'idea da paura (dello struzzo)
 - I limiti delle macchine sono provati (Gödel, Turing)
 - Non possono essere consapevoli (coscienza)
 - Non potranno mai fare x (disabilità varie)
 - Eseguono solo ordini (Lovelace)
 - Noi siamo analogici, non digitali (cervello continuo)
 - Sono deterministiche (comportamenti informali)
 - Non hanno sesti sensi (percezioni extrasensoriali)

L'ultima parola...

We may hope that machines
will eventually compete with men
in all purely intellectual fields.
But which are the best ones to start with?

Alan Mathison Turing

(Computer Machinery and Intelligence, Mind, 1950)

Giovanni A. Cignoni

