

# Turings Test der maschinellen Intelligenz – revisited

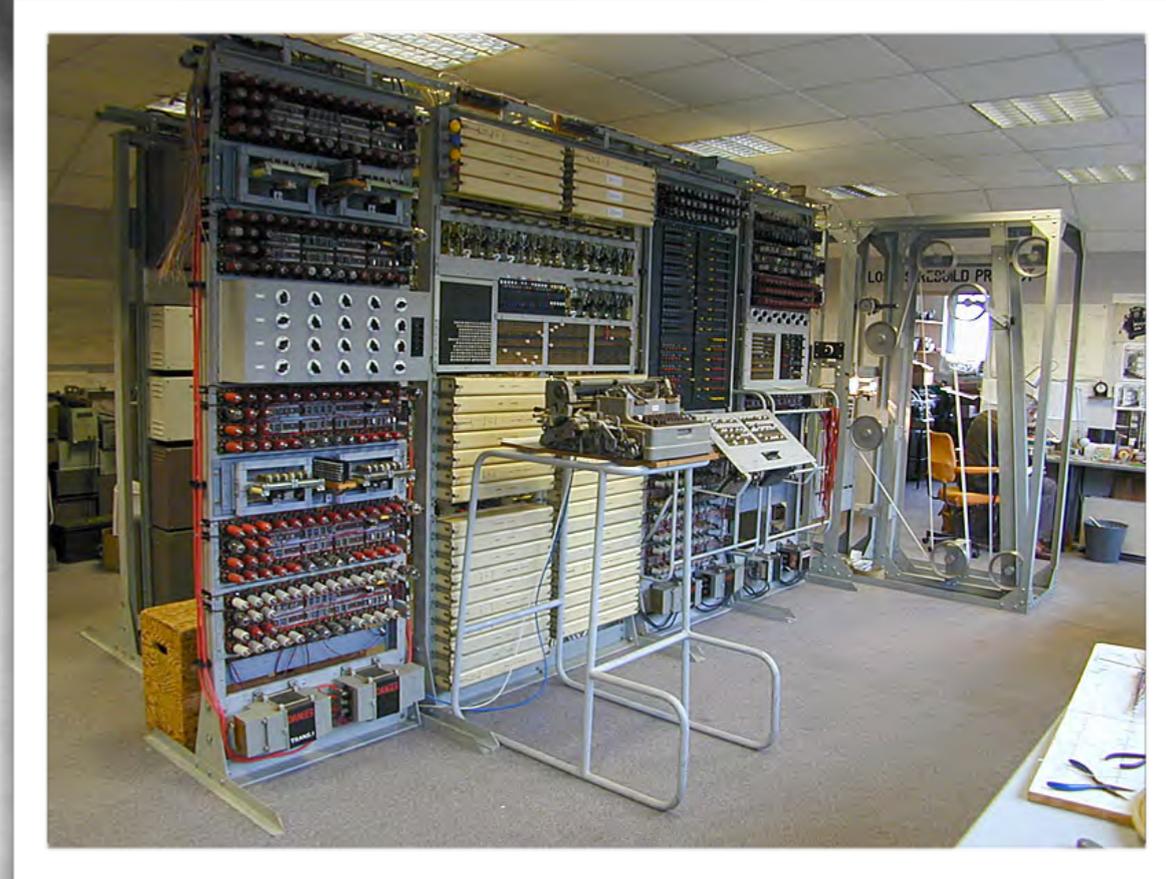
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12TH LEIBNIZ CONFERENCE OF ADVANCED SCIENCE

KOGNITIONSTECHNOLOGIEN 2011  
THEORIE UND PRAXIS

Berlin 7.12.2011

# Enigma & Colossi



1 ENIGMA | Chiffriermaschinen Aktien-Gesellschaft [Cipher Machines Stock Corporation] | 1923 | \$150 | encryption

# Alan M. Turing's Paper Machine

Speicherband



Lese-/Schreibkopf  
mit internem Zustand

Programm

|          |   |  |   |          |
|----------|---|--|---|----------|
| <b>A</b> |   |  | ⇒ | <b>A</b> |
| <b>A</b> |   |  | ⇒ | <b>B</b> |
| <b>B</b> | + |  | ⇒ | <b>B</b> |
| <b>B</b> |   |  | ⇒ | <b>B</b> |
| <b>B</b> |   |  | ⇐ | <b>C</b> |
| <b>C</b> |   |  | ⇐ | <b>D</b> |
| <b>D</b> |   |  | ⇐ | <b>D</b> |
| <b>D</b> |   |  | ⇐ | <b>E</b> |

# Rechnen-Logik-Denken

Logik

Binärkode

Rechnen

Algorithmus

Universal Machine

Instructions/Programm

$$2^6 + 2^2 + 2^0 = 69$$



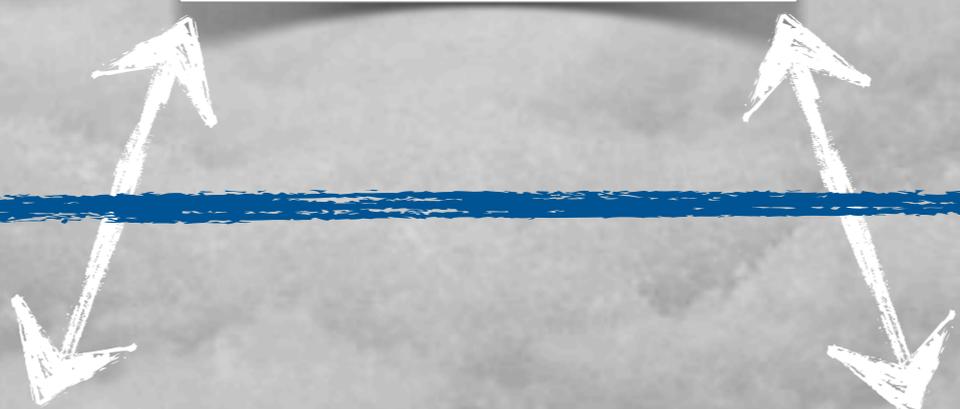
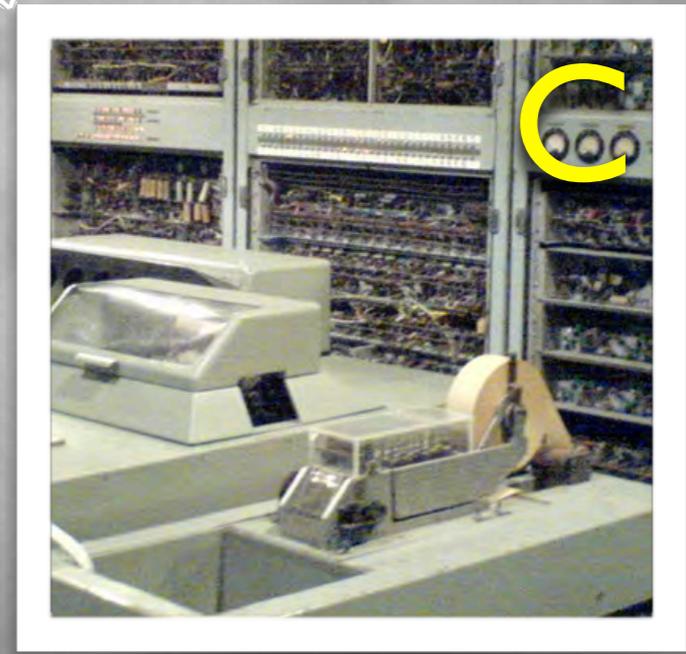
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- Ist Logik = Rechnen?
- Ist Sprache = Rechnen?
- **Can a Machine think?**

# Turing's Imitation Game



# Turing's Test aus der Nähe...



# *Turing's Test (Turing's Imitation Game)*

I believe that in about fifty years time it will be possible to programme 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.

The original question, ›Can machines think?‹ I believe to be too meaningless to deserve discussion. Nevertheless I believe that at the end of the century the use of words and general educated opinion will have altered so much that one will be able to speak of machines thinking without expecting to be contradicted.

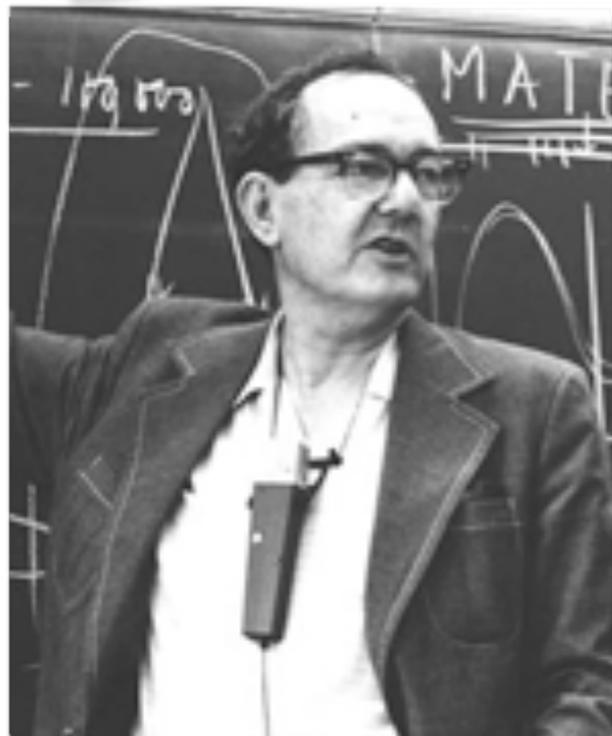
# »Artificial Intelligence«<sup>8</sup>

## Dartmouth Conference 1956

- John McCarthy

- Marvin Minsky

- Herbert Simon



# KI: Ausgangspunkt Formale Logik

- Formalising *common sense*
- Nicht-monotone Logik
- Beweissysteme
- Brettspiele
- Textverstehen
- Mustererkennung, Schrifterkennung
- »Expertensysteme«
- Suchen
- Planen
- Heuristiken
- Maschinelles Lernen
- ...



# Eliza

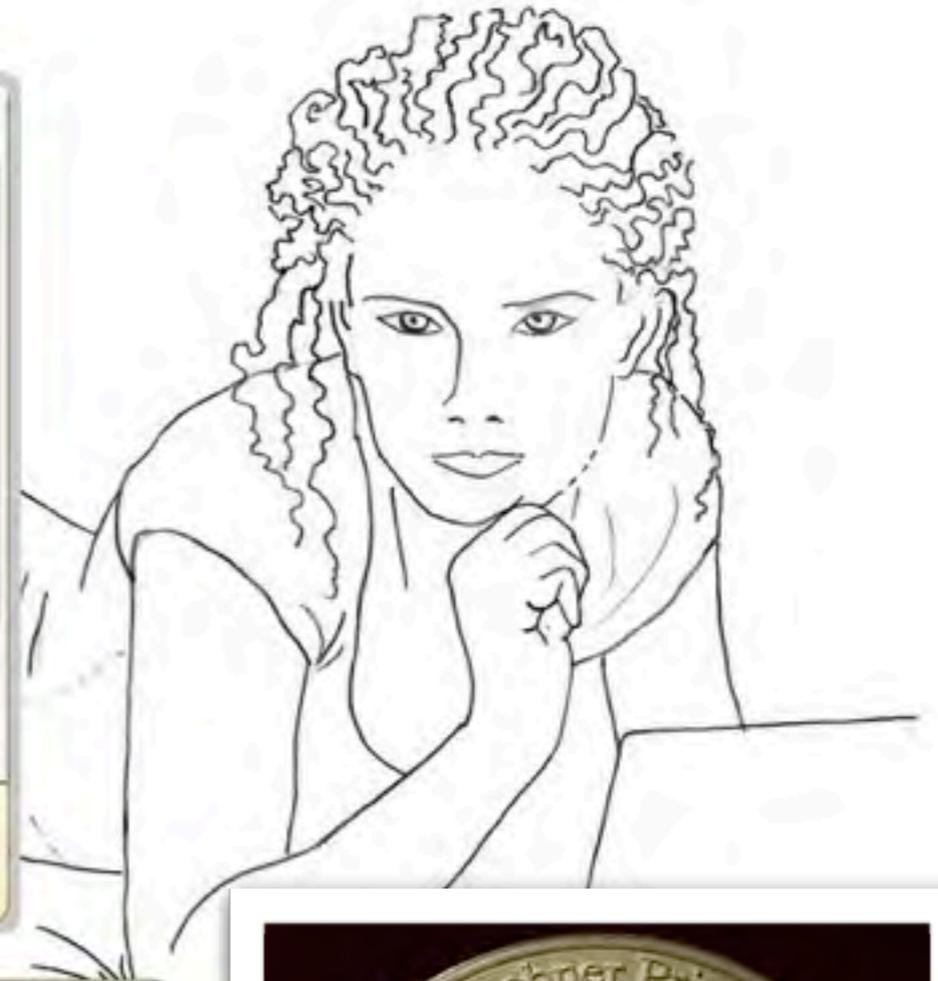


- Joseph Weizenbaum 1966
- ›Please tell me your problem‹
- ELIZA – A Computer Program For the Study of Natural Language Communication Between Man and Machine, *Communications of the ACM*, Vol. 9:1, Jan. 1966: p.36-45

- Eliza weiß nahezu nichts
- Eliza rät, flunkert und lenkt ab
- Eliza lernt nichts dazu
  
- **Ist Eliza intelligent,  
weil sie ihre Nutzer erfolgreich täuscht?**

## Meet Rosette

Rosette: Ask your neighbors. Do you have any pets?  
 You: no  
 Rosette: That's a definite no? I travel too much to really have pets. We do have two chickens in the backyard.  
 You: got some tomatoes in the backyard  
 Rosette: I like the taste of tomato.  
 You: also some potatoes  
 Rosette: Do you like potatoes?  
 You: that is why i grow them  
 Rosette: Do you like to garden?  
 You: sometimes  
 Rosette: I'd be interested to hear about the other times. I leave gardening to my chickens. They dig up anything I try to plant in our tiny square of

Rosette: is she real, or is she A.I.? Strike up a conversation with her and [tell us what you think](#).

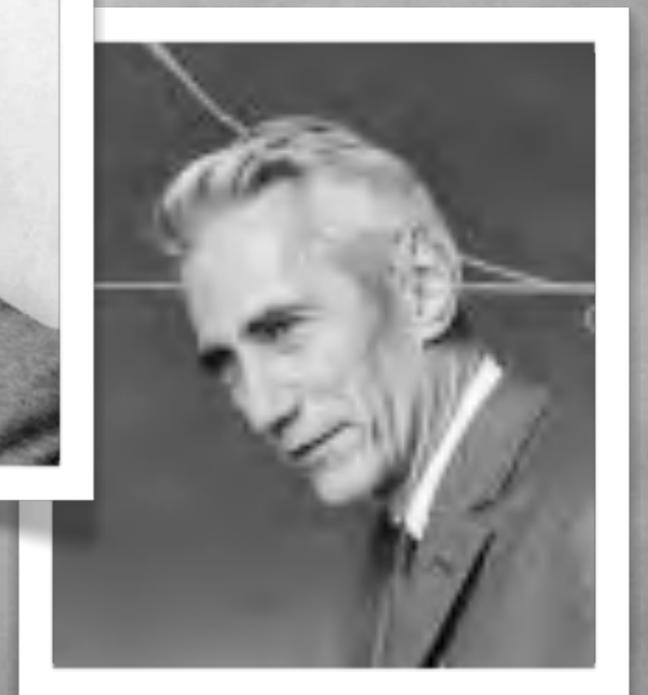
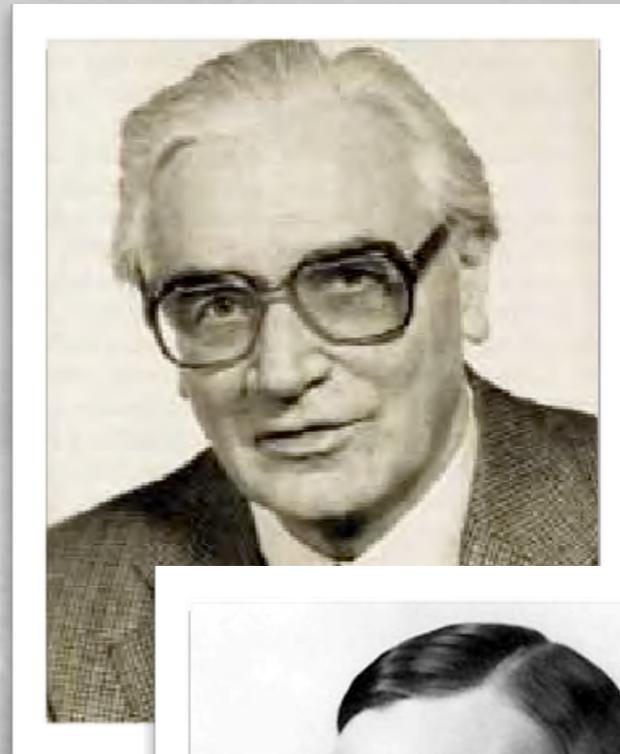
The man behind the curtain for this project is one of our very own Core Engineers here at Telltale, Bruce Wilcox. Bruce has won the 2010 and 2011 Loebner Prize for Artificial Intelligence, and we couldn't be more proud to honor him. You can learn more about the Loebner Prize on [the official home page](#).

While Bruce's chatbot projects are truly a passion for him, the technology behind the bots goes hand in hand with the types of research and development we do here at Telltale. In fact, the technology you see in Rosette is a glimpse at something you may see in one of our future games... [read more](#)



# Schachprobleme als Künstliche Intelligenz? <sup>13</sup>

- Konrad Zuse
- Alan Turing
- Claude Shannon
- ...



# Schachprobleme



○ Deep Blue vs. Garry Kasparov 1997

# KI revisited: Sensor–Aktor–Kontext

- Sprachausgabe
- Spracheingabe
- Sprachverarbeitung
- Sprachverstehen
- Bildverarbeitung
- Bildverstehen
- Gestik
- Vernetztes Arbeiten
- Sensoren, Aktoren
- Roboter-Handeln
- Swarm-Intelligenz
- Netzintelligenz
- Pervasive Computing
- ...



# Giant Electronic Brains

- Internet
- Wikipedia
- Google Maps
- eDoc Server
- Archive.org
- ...



## WORLD BRAIN

by

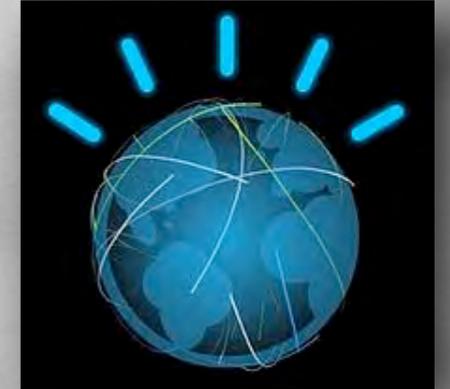
H. G. WELLS

### THE IDEA OF A PERMANENT WORLD ENCYCLOPAEDIA

(Contribution to the new 'Encyclopedie Francaise',  
August 1937)

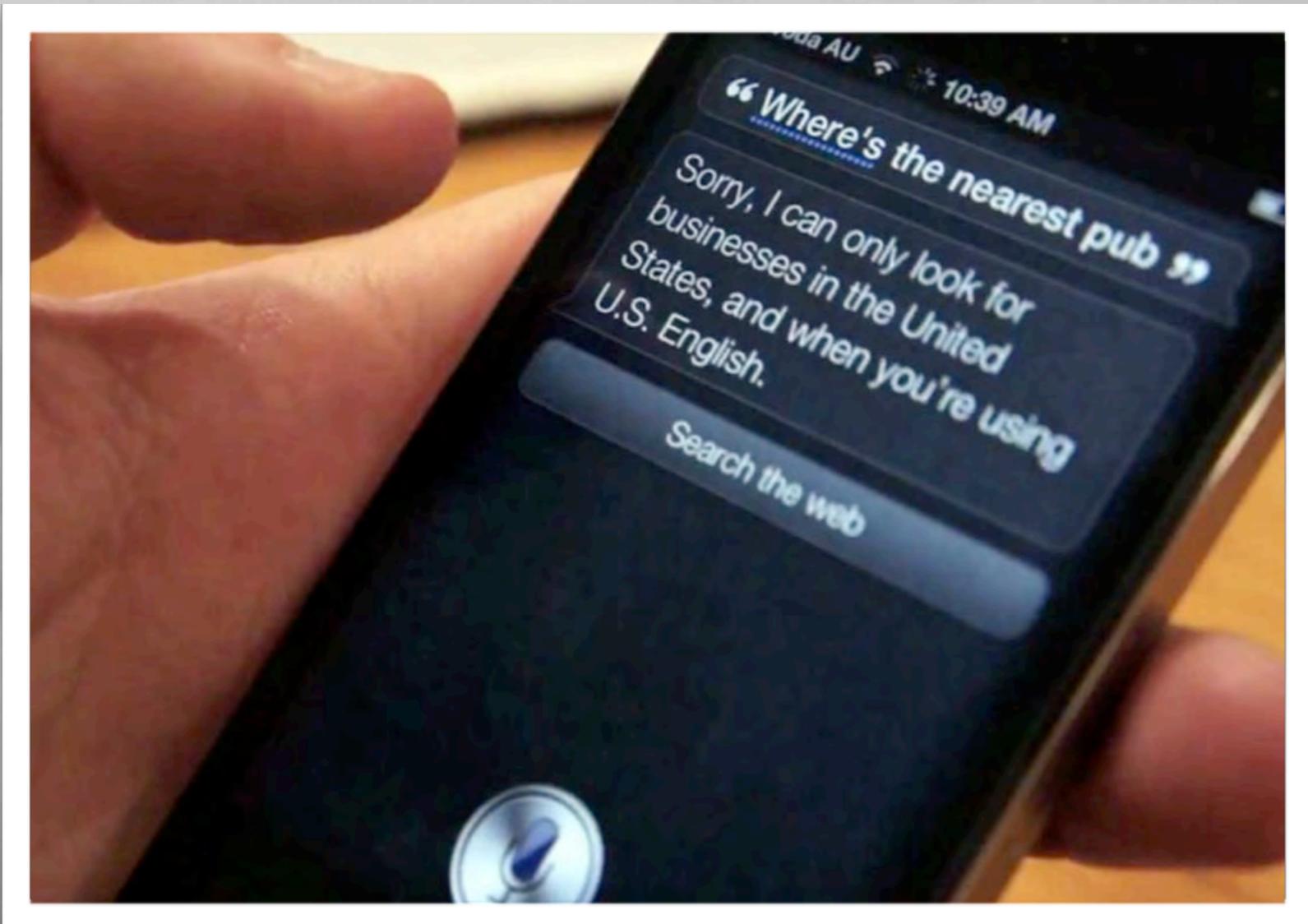
**I**T is probable that the idea of an encyclopaedia may undergo very considerable extension and elaboration in the near future. Its full possibilities have still to be realized. The encyclopaedias of the past have sufficed for the needs of a cultivated minority. They were written " for gentlemen by gentlemen in a world wherein universal education was unthought of, and where the institutions of modern democracy with universal suffrage, so necessary in many respects, so difficult and dangerous in their working, had still to appear. Throughout the nineteenth century encyclopaedias followed the eighteenth-century scale and pattern, in spite both of a gigantic increase in recorded knowledge and of a still more gigantic growth in the numbers of human beings requiring accurate and easily accessible information. At first this disproportion was scarcely noted, and its consequences not at all. But many people now are coming to recognize that our contemporary encyclopaedias are still in the coach-and-horses phase of development, rather than in the phase of the automobile and the aeroplane. Encyclopaedic enterprise has not kept pace with material progress. These observers realize that modern facilities of transport, radio, photographic reproduction

# Eliza revisited: IBM WATSON



- 90 IBM Power 750 Server
- 2880 POWER7 Prozessor Kerne
- 16 Terabyte RAM

# Eliza revisited: Apple Siri

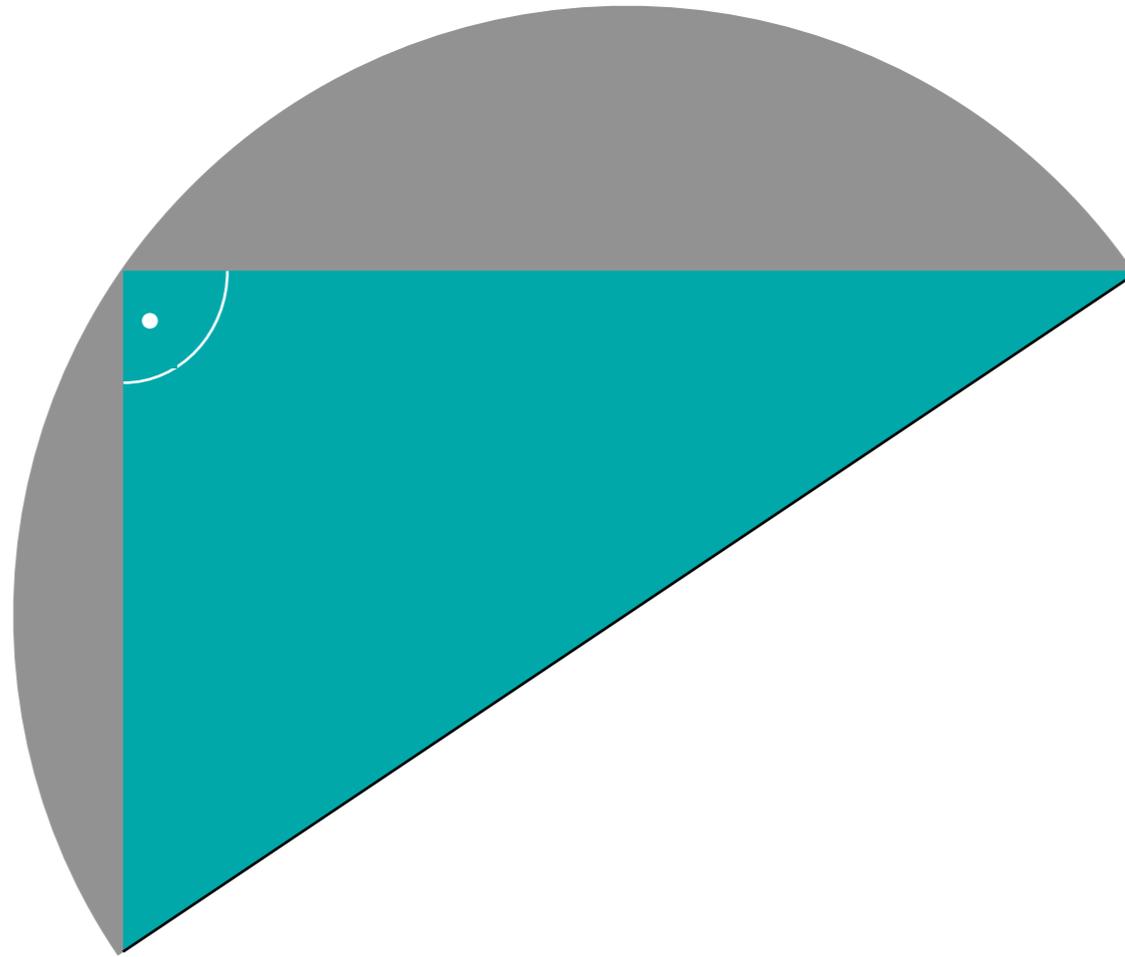


- **Ist Watson intelligent?**
- **Kann Watson denken?**
  
- **Ist Siri intelligent?**
- **Kann Siri denken?**

# Rechnen, Denken, Argumentieren: Sprache

- *Das ist richtig. Wir kennen keine bessere Lösung.*
- *Das ist falsch. Wir können Dich sowieso nicht leiden.*
- *Das machen wir so, weil wir auf die Schnelle keine bessere Lösung finden.*
- *Das machen wir so, weil ein Fehler nicht viel Schaden anrichten wird*
- *Das lass ich gelten, weil ich keinen Streit will.*
- *Das lass ich gelten, weil ich deine Hilfe brauche.*
- *Marie, zieh deine Jacke an. Warum? Weil du deine Jacke anziehst!*
- **In welchem Umfang ist Argumentieren, Sprechen, Denken logisch?**

# *Rechnen, Denken, Visuell Argumentieren*



# Rechnen, Denken, Argumentieren

- Soll Denken korrekt, widerspruchsfrei, vollständig und angemessen, kurz soll Denken logisch sein?
- Sollen sich intelligente Programme logisch verhalten?
- In welchem Umfang soll Denken ehrlich, offen, höflich, humorvoll, empathisch sein?

# Rechnen, Denken, Argumentieren

- Moderne Rechner können rechnen, regelhaft ableiten, Suchanfragen analysieren, riesige Datenbestände durchsuchen und Ergebnisse filtern.
- Wir uns daran gewöhnt, von **intelligenten Maschinen** zu sprechen, ohne auf starken Widerstand zu stoßen.
- *›Nevertheless I believe that at the end of the century the use of words and general educated opinion will have altered so much that one will be able to speak of **machines thinking** without expecting to be contradicted.‹*



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