

# Will computers surpass us in the near future?

Promises and problems of artificial intelligence

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Brussels Girl Geek Dinner #5

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- 2 Intelligence
- 3 Language
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# AI in popular media



## BBC documentary *Visions of the future*

The message of futurologist Michio Kaku:

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- **exponential growth** of computer power will lead to intelligent computers;
- **only two problems**: computers don't understand what they see and hear;

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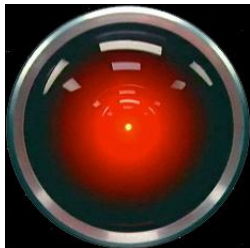


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- **only two problems**: computers don't understand what they see and hear; → **not the only problems!**

# Outline of this talk



- I show a couple of quotes by AI researchers, comics about AI and examples where AI goes wrong.
- These illustrate some technical and philosophical problems with AI.
- This is of course anecdotal evidence, and thus not meant as a rebuttal of AI.
- My aim is to show you some difficulties and subtleties of (artificial) intelligence.
- I focus on language, but of course intelligence encompasses more.

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# Definitions of intelligence



R.J. Sternberg

*Viewed narrowly, there seem to be almost as many definitions of intelligence as there were experts asked to define it.*

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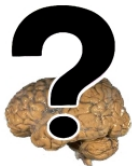


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## Definition by Shane Legg and Marcus Hutter

*Intelligence measures an agent's ability to achieve goals in a wide range of environments.<sup>a</sup>*

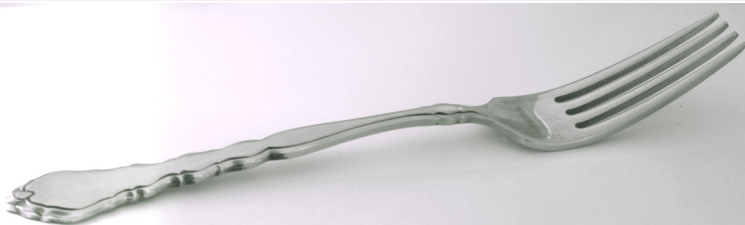
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<sup>a</sup><http://www.vetta.org/definitions-of-intelligence/>

# Putting a fork in one's eye

Marvin Minsky, *The Society of Mind* (1988)

*We rarely recognize how wonderful it is that a person can traverse an entire lifetime without making a single really serious mistake – like putting a fork in one's eye or using a window instead of a door.*



# A game of catch



## Jeff Hawkins, *Learn like a human* (2007)

*By the age of five, a child can understand spoken language, distinguish a cat from a dog, and play a game of catch. These are three of the many things humans find easy that computers and robots currently cannot do. Despite decades of research, we computer scientists have not figured out how to do basic tasks of perception and robotics with a computer.*

# A game of catch



## Jeff Hawkins, *Learn like a human* (2007)

*Our few successes at building “intelligent” machines are notable equally for what they can and cannot do. Computers, at long last, can play winning chess. But the program that can beat the world champion can’t talk about chess, let alone learn backgammon. Today’s programs –at best– solve specific problems. Where humans have broad and flexible capabilities, computers do not.*

# Solve it over the summer



Rodney Brooks, *New Scientist* 2578 ( 18 November 2006)

*Show a two-year-old child a key, a shoe, a cup, a book or any of hundreds of other objects, and they can reliably name its class - even when they have never before seen something that looks exactly like that particular key, shoe, cup or book. Our computers and robots still cannot do this task with any reliability. We have been working on this problem for a while. Forty years ago the Artificial Intelligence Laboratory at the Massachusetts Institute of Technology appointed an undergraduate to solve it over the summer. He failed, and I failed on the same problem in my 1981 PhD.*

# Computer chess



## Chess is a lost game for mankind

- Supercomputer **Deep Blue** defeats world champion Garry Kasparov in 1997
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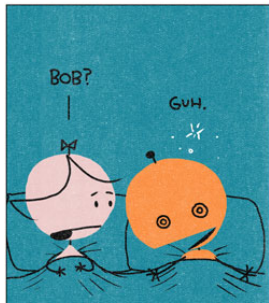
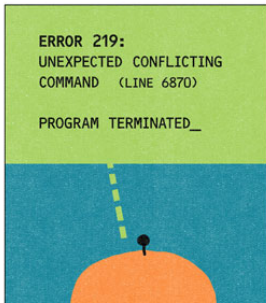
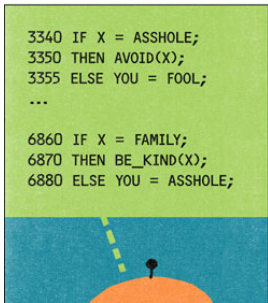
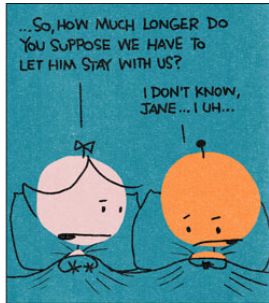
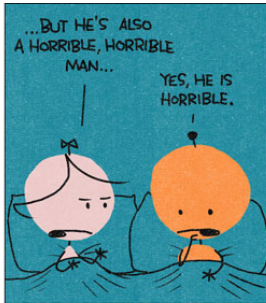
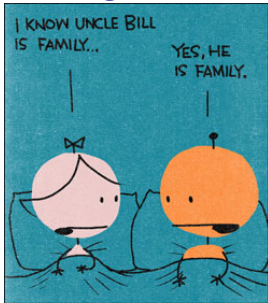
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## Is a chess computer a match for us?

*A computer once beat me at chess, but it was no match for me at kick boxing.*

Emo Philips

# Conflicting commands



WE THE ROBOTS © CHRIS HARDING

WWW.WETHEROBOTS.COM

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# Concrete

Systran<sup>1</sup> translates sentences automatically:

The screenshot shows the SYSTRAN website interface. At the top, the SYSTRAN logo is followed by the tagline "De wereldleider in vertaalsoftware". A navigation bar contains links for "PRODUCTEN", "OPLOSSINGEN", "ONDERSTEUNING", "OVER SYSTRAN", "CONTACT", and "KOOP ONLINE". A language dropdown menu is set to "Flemish".

The main content area features a translation window titled "Vertaling met SYSTRAN BOX". It shows a translation from English to French. The English text is "The progress towards monetary union must be made concrete." The French translation is "Le progrès vers l'union monétaire doit être accompli à béton", where "à béton" is circled in red. Buttons for "Tekst" and "URL" are visible above the text input fields.

To the right, there is an advertisement for "SYSTRAN Enterprise Server 6 Translator and Dictionary for Intranet". The ad includes an image of the software box and a "More information" button.

Below the advertisement, a news item states: "New: SYSTRAN launches Enterprise Server 6 solution [en] (PDF- 49 kb) | March 12, 2008".

At the bottom, a section titled "VIEW A DESKTOP PRODUCT COMPARISON" displays five product boxes labeled "Web", "Home", "Office", "Business", and "Premium".

<sup>1</sup><http://www.systransoft.be/>

# Le ventilateur



# What's (in) a name?

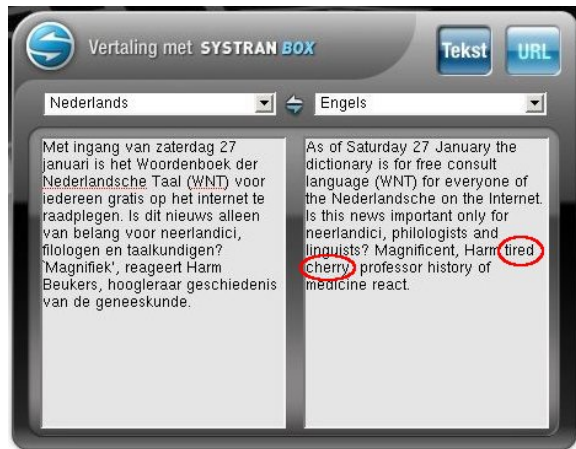
Vertaling met **SYSTRAN BOX** Tekst URL

Nederlands ↔ Engels

Met ingang van zaterdag 27 januari is het Woordenboek der Nederlandsche Taal (WNT) voor iedereen gratis op het internet te raadplegen. Is dit nieuws alleen van belang voor neerlandici, filologen en taalkundigen? 'Magnifiek', reageert Harm Beukers, hoogleraar geschiedenis van de geneeskunde.

As of Saturday 27 January the dictionary is for free consult language (WNT) for everyone of the Nederlandsche on the Internet. Is this news important only for neerlandici, philologists and linguists? Magnificent, Harm tired cherry professor history of medicine react.

# What's (in) a name?



Systran reads Beukers as *beu-kers* = tired cherry, analogous to *water-kers*.

# Systran funnies

- Babel Fish<sup>2</sup> is based on Systran.
- Google Translate<sup>3</sup> was based on Systran, but is now using its own system, that translates the sentence almost correctly as “Les progrès vers l’union monétaire doit se concrétiser.”

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## Systran Funnies

In 1998 EU employee Rosemarie Sauer-Stipperger published a document “Systran funnies”<sup>a</sup>, a collection of wrong but comical translations by Systran. The sad thing is: **10 years later** Systran is still making a lot of these errors, like the first two I showed.

<sup>a</sup>Google for “systran funnies”.

<sup>2</sup><http://babelfish.altavista.com/>

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- massive computer power
- a massive data set
- very smart people

Can Google make a smart automatic translation program?

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## Google Translate

- Google Translate is using pairs of translated texts, e.g. a French and English version of the same document of the EU.
- If you ask the system to translate a new sentence, it searches for sentences that look like the given sentence and constructs the most probable translation of the sentence.

# The statistical approach

Does this statistical approach work?

- It works surprisingly well, knowing that it's based on statistics and not on understanding.
- But there are a lot of issues...

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## Meneer de voorzitter

- Tilburg professor Antal van den Bosch made a similar program as Google Translate.
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- When you give an English sentence to translate, it regularly begins the Dutch translation with “Meneer de voorzitter”, because it thinks a text has to begin with it.

# Context shifts in natural language

## Taragana Translator Plugin for Wordpress

### English

Run the following from command line: *cat*  
*/proc/cpuinfo*



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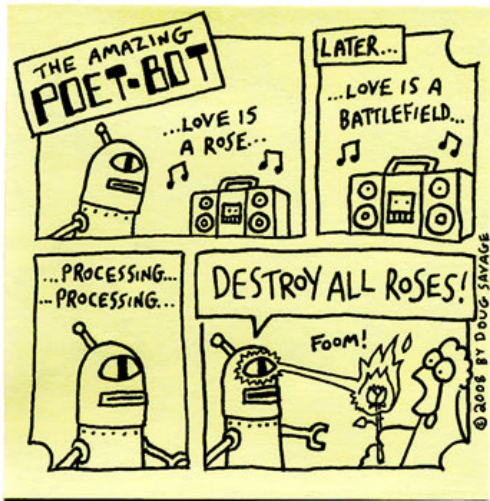
### Dutch

*Stormloop naar de volgend vanuit opdrachtregel:*  
*kattenkop proc/cpuinfo*

# Love is a battlefield

## Savage Chickens

by Doug Savage



www.savagechickens.com

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# Machine capacity



## John McCarthy (1956)

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## John McCarthy (2006)

*I would say that 50 years ago, the machine capability was much too small, but by 30 years ago, machine capability wasn't the real problem.*

# Questions?



*"The computer is claiming its intelligence is real, and ours is artificial."*

# More information

## More information:

- Artificial Intelligence portal on *Wikipedia*: [http://en.wikipedia.org/wiki/Portal:Artificial\\_intelligence](http://en.wikipedia.org/wiki/Portal:Artificial_intelligence)
- Blog *Intelligent Machines*:  
<http://www.inma.ucl.ac.be/~francois//blog/>
- *AInews.org* news aggregator: <http://www.ainews.org>
- *Association for the Advancement of Artificial Intelligence (AAAI)*:  
<http://www.aaai.org/>
- My blog *De conceptuele ingenieur*: <http://koan.filosofie.be>
- E-mail me: [kvervloesem@gmail.com](mailto:kvervloesem@gmail.com)

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