NLP:
Animals, Machines, and Money
An AI-Entrepreneurial Perspective

Selmer Bringsjord
(with prior help from Rikhiya Ghosh)
RAIR Lab

AHR?
Nov 13 2017
Context ...
Humans, at least neurobiologically normal ones, are fundamentally rational, where rationality is constituted by certain logico-mathematically based reasoning and decision-making in response to real-world stimuli, including stimuli given in the form of focused tests; but mere animals are not fundamentally rational, since, contra Darwin, their minds are fundamentally qualitatively inferior to the human mind. As to whether computing machines/robots are fundamentally rational, the answer is also “No.” For starters, if $x$ can’t read, write, and create, $x$ can’t be rational; neither computing machines/robots nor non-human animals can read nor write nor create; ergo, they aren’t fundamentally rational for this reason alone. But news for non-human animals and computing machines/robots gets much worse, for they have not the slightest chance when they are measured against $\mathcal{H}$. 
And Supporting Main Claim …

Humans have the ability to gain knowledge by reasoning (e.g., deductively) quantificationally and recursively over abstract concepts, including abstract concepts of a highly expressive, including infinitary, nature, expressed in arbitrarily complex natural language.
Forget about even the monkeys ...
monkeytalk

INSIDE THE WORLDS AND MINDS OF PRIMATES

JULIA FISCHER
Washoe, who lived with Beatrix and Allen Gardener, learned 132 different signs in less than five years. Most of these we would understand as pleas or requests—indeed her first word was “more.” But she was also quite capable of commenting on what she saw or experienced by transferring terms she had learned on one occasion to related items of the same category. In other words, she was able to generalize. Her skill in composing novel combinations was especially remarkable: she signed “hearing eating” for the dinner bell, or “hearing dog” after she had once heard a dog barking. Even so, she ultimately failed to develop in these expressions any grammatical structure.46

Herbert Terrace and his associates trained Nim Chimsky. Terrace initially greeted the project with enthusiasm, but in time became a strong critic of ape language projects. Nim learned roughly the same number of signs as Washoe; he also combined them and transferred them in a generalizing way. He applied the sign for “dog” not only to the particular dog used to teach him the sign but to any dog he encountered. Still, for the most part, he merely repeated what his trainer had just shown him. Nor did Nim exhibit any regularity in his communication. This failure led Terrace to agree with Chomsky that syntactic competence is an achievement peculiar to human beings.47

Proponents of the ape language projects realized that the meager lexicon and unimpressive combinatorial skill of the animals might be due to memory deficiencies. Addressing this possibility, they replaced gestural signs with artificial symbolic languages. Ann and David Premack taught the chimpanzee Sarah to communicate using small plastic tiles in a variety of shapes and colors. The Premacks wanted to know if Sarah could make sentences when presented with the basic elements for composing them. They also used these tiles to evaluate Sarah’s understanding of categories and relations. The initial plan was to have Sarah learn the symbolic language purely by observation, but when this approach failed, they resorted to motivational rewards as in previous ape language studies. Sarah eventually learned the meaning of 130 symbols representing objects, activities, and qualities. She came to understand reasonably complex combinations such as “put banana
was far from systematic and exhaustive. Indeed, the collaborators in Project Nim freely admitted that they had failed to keep a thorough accounting of their results. One may justifiably ask whether “water bird”—the chimpanzee Lana’s celebrated original word creation for “swan”—was not rather a chance product, simply a linking of two descriptive signs, the one indicating “water” (the swan’s pool) and the other indicating “bird.” How easily animals may be led by cues from their handlers to form particular expressions is evident in the following example. Lana had been trained to communicate with the aid of a touch-activated computer screen. This sort of communication was called Yerkish (after the Yerkes National Primate Research Center). Lana was regarded as highly gifted, and one of her most famous innovations was the word “apple which-is orange” to designate an orange. When the expression is examined in its context, however, doubts arise concerning her alleged spontaneous creativity. Below is an excerpt from a “dialogue” between Lana and her trainer, Tim. An initial question mark indicates that a query was being posed.  

Tim: ? What color of this.
Lana: Color of this orange.
Tim: Yes.
Lana: Tim give cup which-is red.
Tim: Yes.
Lana: ? Tim give which-is shut.
Lana: ? Shelley give.
Tim: No Shelley.
Lana: Eye.
Lana: Tim give which-is orange.
Tim: What which-is orange.
Lana: Tim give apple which-is green.
Tim: No apple which-is green.
Lana: ? Tim give apple which-is orange.
Tim: Yes.

Lana’s computer was essentially an elaborate Skinner box that, in response to certain key presses, would reward her with tasty treats of food or drink, play movies, or summon a trainer to tickle her. “Please machine give candy” was one of her most frequently used expressions. Other great apes learned Yerkish too. The bonobo Kanzi was not given dedicated instruction but was permitted to accompany his mother at her training. As a result of observing his mother’s sessions, he
If a machine can handle natural language, that’s big money ...
The Alexa Prize
$2.5 Million to Advance Conversational Artificial Intelligence
September 2016 – November 2017

Home Page of The Loebner Prize in Artificial Intelligence
"The First Turing Test"

Loebner Prize Gold Medal
(Solid 18 carat, not gold-plated like the Olympic "Gold" medals)

What is the Loebner Prize?

The Loebner Prize for artificial intelligence (AI) is the first formal instantiation of a Turing Test. The test is named after Alan Turing, the brilliant British mathematician. Among his many accomplishments was basic research in computing science. In 1990, in the article "Computers, Machinery, and Intelligence" which appeared in the philosophy journal Mind, Alan Turing asked the question "Can a Machine Think?" He answered in the affirmative, but a central question was: "If a computer could think, how could we tell?" Turing’s suggestion was, that if the responses from the computer were indistinguishable from that of a human, the computer could be said to be thinking. This field is generally known as natural language processing.

In 1990 Hugh Loebner agreed with The Cambridge Center for Behavioral Studies to underwrite a contest designed to implement the Turing Test. Dr. Loebner pledged a Grand Prize of $100,000 and a Gold Medal (pictured above) for the first computer whose responses were indistinguishable from a human’s. Such a computer can be said "to think." Each year an annual cash prize and a bronze medal is awarded to the most human-like computer. The winner of the annual contest is the best entry relative to other entries that year, irrespective of how good it is in an absolute sense.
But what’s the test? ...
Turing Test?

Source: Wikimedia Commons

Source: https://xkcd.com/329/
Turing Test?

Source: Wikimedia Commons

Source: https://xkcd.com/329/
Other Tests

- Winograd Schema Challenge (Ernest Davis, Leora Morgenstern, and Charles Ortiz; 2014)
- Total Turing Test (Harnad; 1989, 1991)
- Truly total Turing test (Schweizer; 1998)
- Feigenbaum Test (Feigenbaum, 2003)
- Hutter Prize (Hutter, 2006)
- Lovelace Test (Bringsjord, 2001)
Other Tests

- Winograd Schema Challenge (Ernest Davis, Leora Morgenstern, and Charles Ortiz; 2014)
- Total Turing Test (Harnad; 1989, 1991)
- Truly total Turing test (Schweizer; 1998)
- Feigenbaum Test (Feigenbaum, 2003)
- Hutter Prize (Hutter, 2006)
- Lovelace Test (Bringsjord, 2001)
The problem: CRA ...
Toward the Chinese Room
Toward the Chinese Room
Toward the Chinese Room

native Chinese speaker
Toward the Chinese Room

哪個國家在地球上人口最多？
Nǎge guójiā zài dìqiú shàng rénkǒu zuìduō?

native Chinese speaker
Toward the Chinese Room

哪個國家在地球上人口最多？
Nǎge guójiā zài dìqiú shàng rénkǒu zuìduō?

native Chinese speaker
Toward the Chinese Room

哪個國家在地球上人口最多？
Nǎge guójiā zài dìqiú shàng rénkǒu zuìduō？

native Chinese speaker  native Chinese speaker
Toward the Chinese Room

哪個國家在地球上人口最多？
Nǎge guójiā zài dìqiú shàng rénkǒu zuìduō?

請不要傻了。這個國家你住，當然在，。
Qǐng bù yào shǎle. Zhège guójiā nǐ zhù, dāngrán zài, .

native Chinese speaker  native Chinese speaker
The Chinese Room
The Chinese Room
The Chinese Room

native Chinese speaker
The Chinese Room

native Chinese speaker

knows no Chinese whatsoever
The Chinese Room

Nǎge guójiā zài dìqiú shàng rénkǒu zuìduō?

native Chinese speaker

knows no Chinese whatsoever
The Chinese Room

哪個國家在地球上人口最多？
Nǎge guójiā zài dìqiú shàng rénkǒu zuìduō?

native Chinese speaker

Chinese Room

knows no Chinese whatsoever
The Chinese Room

哪個國家在地球上人口最多？
Nǎge guójiā zài diqiú shàng rénkǒu zuìduō?

native Chinese speaker

knows no Chinese whatsoever
The Chinese Room

哪個國家在地球上人口最多？
Nǎge guójiā zài dìqiú shàng rénkǒu zuìduō?
native Chinese speaker

Chinese Room

請不要傻了，這個國家你住，當然在。
Qǐng bù yào shǎi le, zhè ge guójiā nǐ zhù, dāngrán zài.

knows no Chinese whatsoever
The Chinese Room

哪個國家在地球上人口最多？
Nǎge guójiā zài dìqiú shàng rénkǒu zuìduō?

native Chinese speaker

Chinese Room

knows no Chinese whatsoever
The Chinese Room

The Chinese Room

哪個國家在地球上人口最多？
Nǎge guójiā zài dìqiú shàng rénkuò zuìduō?

請不要傻了。這個國家你住，當然在，。
Qǐng bùyào shǎile. Zhège guójiā nǐ zhù, dāngrán zài, .

native Chinese speaker

knows no Chinese whatsoever
The Chinese Room Argument

“Real Robots and the Missing Thought Experiment in the Chinese Room Dialectic”:

http://kryten.mm.rpi.edu/searlebook1.pdf
The Chinese Room Argument

“Real Robots and the Missing Thought Experiment in the Chinese Room Dialectic”:

http://kryten.mm.rpi.edu/searlebook1.pdf
The Chinese Room Argument ’
The Chinese Room Argument

The Chinese Room Argument


2. If a computer can understand Chinese, Searle-in-the-room understands Chinese (because Searle is doing in the room exactly/fundamentally what computers do: viz. manipulating symbols according to rules).
The Chinese Room Argument


2. If a computer can understand Chinese, Searle-in-the-room understands Chinese (because Searle is doing in the room exactly/fundamentally what computers do: viz. manipulating symbols according to rules).

Therefore (how?):
The Chinese Room Argument


2. If a computer can understand Chinese, Searle-in-the-room understands Chinese (because Searle is doing in the room exactly/fundamentally what computers do: viz. manipulating symbols according to rules).

Therefore (how?):

3. A computer can’t understand Chinese (or English, Norwegian, etc.).
Nonetheless, Ferrucci et al. shot at the big money ...
Is there hope? …
“Coping With Humans”

By: IBM. Source: https://www.youtube.com/watch?v=NX8y9T1MaP4
“Coping With Humans”

By : IBM. Source : https://www.youtube.com/watch?v=NX8y9T1MaP4