

# Training computers to see metaphors

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Suppose you are at an intelligence agency and your computer is faced with terabytes of text every day -- documents, emails, transcriptions of voice conversations and more -- and many contain metaphors. How do you train your computer to ignore what the text literally says and understand the real meaning?

A group of scientists from the U.S. and Israel is beginning a \$1.4 million project funded by the Intelligence Advanced Research Projects Activity of the Office of the Director of National Intelligence to write programs that could do just that. The software would help anthropologists and [linguists](#) study cultures, said lead scientist Shlomo Argamon at the Illinois Institute of Technology in Chicago.

The project is called ADAMA (Autonomous [Dynamic Analysis](#) of Metaphor and Analogy), which is its own metaphor. The word "adama" is Hebrew for both world and man, and the project will begin with four languages: English, Spanish, Farsi, and Russian.

Just coming up with a computational device to identify metaphors would be a major advance, said Raymond Gibbs, a psychologist at the University of California at Santa Cruz.

Defining metaphors [has been the source of a huge debate since Aristotle](#), Gibbs said. High-school classes spend entire periods analyzing Shakespearean metaphors, and even classic American fiction, composed with modern English, contains colorful examples that would stump a computer.

"Cannery Row in Monterey in California, is a poem, a stink, a grating noise, a quality of light, a tone, a habit, a nostalgia, a dream," wrote John Steinbeck.

Of course, Cannery Row isn't or wasn't actually any of those things. It was a physical place where he set his eponymous novel. Steinbeck was piling metaphor upon metaphor to describe the atmosphere to his readers. Readers understood that, but how could a computer?

A metaphor compares two things that are not the same but share attributes. By saying Cannery Row is "a stink," Steinbeck is saying the

place, then the sardine canning center in the West Coast, was smelly. Cannery Row is the target of the metaphor; the nouns it is compared to (smell) are the sources of the metaphor, Argamon said.

"You are applying qualities of the source and applying them to the target," Argamon said.

Metaphors are related to similes, in which one thing is compared directly to another. Similes in English almost always include the word "like" or "as." For instance, detective novelist Raymond Chandler once described someone looking "about as inconspicuous as a tarantula on a slice of angel food."

The ADAMA project would deal with both.

One complexity is that metaphors are culturally derived, Argamon said, and the same metaphor can have diametrically different meanings in different languages.

A favorite example is: "My lawyer is a shark."

In American English, a shark's attributes are viciousness, hunger, toughness, danger, perhaps amorality. In England, "shark" refers to a man who cruises bars to pick up women. In Farsi, the attributes of a shark most commonly referred to is smooth, hairless skin, a feminine attribute. So, in America, a shark is a tough guy; in England a lout, in Iran a wimp.

But the hardest part may be finding metaphors.

One way of identifying them, Argamon said, would be to look for phrases in which concrete terms are combined with abstract terms, combining things that don't fit, such as "Cannery Row" and "poem."

It is usually a metaphor if an adjective is combined with a noun that describes similar characteristics, or if two nouns are combined but one is concrete and the other is abstract. "Dark mood," is an example.

It also is likely to be a metaphor if one noun comes from one sensory domain and is compared to a different one. The phrase "I see what you are saying," is an example, sight being applied to hearing.

The next step is deciding what they mean.

First, the computer, working from a huge database of words, would analyze the feeling associated with the metaphor. Does the metaphor have positive, negative, or neutral connotations? Are there positive or negative words nearby? It seeks patterns in the way words are used over large amounts of data.

Some metaphors are common to subcultures within communities, or even individuals, Argamon said, which can provide a useful insight into their view of the world.

Take the phrase "tax relief," a metaphor that casts taxes as an affliction, maybe a disease, so tax relief assuages the affliction, he said. It probably would be used only by people who favor reducing taxes.

Coming up with a computational method to identify [metaphors](#) is a huge task, Gibbs said. The standard definition now is that researchers know them when they see them.

A computer can deal with "It was the best of times," Argamon said. And it can deal with "It was the worst of times."

It is stuck if a writer puts the two sentences together.

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