I Robot

Dow's Lake Toastmasters Presentation
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The film "I, Robot" focuses on some of the capabilities that that robots may possess at some time in the future, and the challenges that this may pose to society. But like most other robot films, it really fails to question our understanding of ourselves and of how our minds work, even though science is evolving rapidly and it is forcing us to reassess our current thinking about ourselves.

I chose the title "I, Robot" for this presentation because I believe that Computational Intelligence must now evolve past a heavy emphasis on powerful, universal machine learning theories, and focus more on genetically pre-specified modules that incorporate those leaning theories plus a huge amount of very specific information, processes, knowledge and behaviours. In other words, we must look at powerful systems somewhat like we have looked at robots – you have to put something inside them to start with.

My theme today is also that our minds are substantially pre-programmed genetically and epigentically – essentially all of the "very hard stuff". The "easy stuff" is what we learn, our knowledge, education, our use of logic. As an example, Einstein's theory of relativity is relatively easy to "understand" (many do) and program, whereas many simple cognitive functions cannot be matched and are not terribly well understood.

Examples to show why preprogrammed

But why do I say that we are genetically pre-programmed, and what are some of the reasons for believing that this is so? Let's start by revisiting how organisms behave at every level of biology. We have trivialized what life can accomplish at every level, we have taken life's capabilities for granted. Modern robotics is reminding us of what biologists have always known - life is extremely complex and powerful, and it did not happen by chance or learning in a few days!!

Paramecium - Take the example of proterozoa, microbes like the single-celled paramecium which is covered by hundreds or thousands of hair-like cilia. The paramecium coordinates the movement of its cilia to move through water. It's easy to think that it is only a simple mechanical behaviour with no intelligence - easy to say until you are the one that has to program a virtual paramecium. And that's ignoring "ordinary physiology" which isn't simple at all, and which has to be controlled very carefully. And think for a minute, proterozoa don't have a brain. How does the paramecium control its movement, how doe the single-celled amoeba move and extend its cell walls to envelope food particles? Do you really think that it learned everything from scratch, even such a simple organism? Of course not, but we use the term "instinct" and assume that this is trivial.

Penguins - As a second example, consider the film "The March of the Emperor

Penguins", which I only recently saw on the recommendation of a friend with who I was discussing the theme of this presentation. From the perspective of this presentation, it is is the behaviour of the young penguins that is so dramatic. They are left entirely on their own by both parents, and the young penguins automatically walk the short distance to the sea, dive in and get on with life with no supervision, training, or emulation. When you think of it in terms of our primitive computing metaphor, a huge amount of data, procedures, operating systems, and behaviour are pre-programmed in the penguins. That's obvious, but its usually hard to say in the context of behaviour because we WANT to believe that the mother teaches and guides the child.

Humans - As a third example, and the most problematic one when it comes to clashes with our believe systems, consider human capabilities. We all learn language, yet none of our mothers understood fundamental linguistics nor can anybody adequately reproduce Natural Language Processing in a machine. Many of us get married, but how many actually get advice or read magazines? Parents raise children, but are the books much more than a consolation that others have gone through the same process, encountered the same problems, experienced the same fears, emotions, joy, frustration and pride?   My argument is that parents and teachers rely substantially on our pre-existing capabilities that really do the hard work. That's not to say that you don't learn or develop intellectually. It's just to say that the formal learning approaches are only a part of the story – the easier part.

Pre-programmed, but like no programming that we're used to

Let me give you a warning. The programming that I am speaking of is NOT like what you are probably thinking of, and advanced computing does NOT resemble what you probably learned in university. So although I am using robot metaphors for biology and biological metaphors for robots, these metaphors REQUIRE the newer advanced machine learning theories, the connectionist architectures, and evolutionary process of Computational Intelligence, as well as the old classic procedural programming, logic and symbolics.

Conclusion

What I can say is that I expect the concept of a substantially pre-programmed mind, together with the learning theories and computational capabilities, to eventually permeate through to a common understanding of the new robots, a new understanding of ourselves that is much more robot-like than many of us will want to believe, but ultimately that being "like a robot" will be far more powerful, creative, and fun than has ever been imagined in the past.

And at some time in the future, if you think of yourself as a robot, neither you nor the robot will be offended.
Just as in the film, I, Robot