

# Can An AI Engage In Genuine Discourse?

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## **Introduction**

In this paper I want to explore the area of Artificial Intelligence in the realm of discourse. I will use the initials AI to refer to artificial intelligence in machines that are meant to communicate with humans. There are many programs in machines that are Artificial Intelligence, but are not designed to have discourse of any kind with human beings. For this paper I want to focus on the AIs that are meant to communicate. This includes computers which operate as assistants, guides or help functions for particular programs. It also includes chatbots on the Internet and of course robots that are designed particularly to communicate (though currently these are few with little more than cursory courtesy programs designed into them). Can these AI 'machines' engage in some kind of discourse with a human being? More specifically, can they carry on an intelligent or meaningful conversation with a human? There has been a lot of work done in the area of A.I., and one of the main concerns has been to define what constitutes intelligence, and what makes a conversation meaningful.

## **Artificial Intelligence**

What is artificial intelligence? There are many definitions. Artificial would seem to denote something non-organic or foreign introduced into something that is organic. An example of this would be an artificial heart or kidney. These are created by humans for a specific purpose. In the medical field, artificial organs are designed to replace failing or destroyed organs. Artificial arms and legs help people by replacing the lost limb with a new one. Technology is helping to improve the effectiveness and usefulness of artificial legs and arms. Internal body organs are also improving technologically. They can be life savers for persons who can no longer rely on their original organs. But these are classified as replacements. The need is to replace something that no longer works or is no longer there. Artificial reefs, are another kind of technology

or response to a problem in which the original has been destroyed, died, or was missing in the first place. A large steel ship may not be very technological, but it serves a purpose greater than simply lying on the bottom of the sea. It creates a substitute for a reef for a variety of sea creatures. Artificial sweeteners take the place of real sugar for the purpose of helping to reduce caloric intake. It differs from artificial organs or artificial reefs, in that it involves a choice of one item over another. Artificial sugar can replace real sugar, but it is a choice not a necessity (except for some diabetes patients).

So what does artificial do for intelligence? Is it meant to replace intelligence, where the original has ceased? Or is it creating intelligence where there was none previously? Artificial should not be defined as 'fake' or 'unreal' in the realm of intelligence. Artificial Intelligence should probably be defined very simply as a designed system by human beings to function as much as it possibly can to substitute where necessary or assist human beings in daily life.

If we take a look at what is out there currently, we can find a number of applications of Artificial Intelligence. There are of course the personal computers that we use. There are super-computers doing calculations, like gene-sequencing for the human genome project. There are game playing programs; with cards, checkers and chess as well as more sophisticated fantasy programs. Perhaps none have been so highly regarded as "Big Blue." In May 1997, the IBM super-computer defeated world chess champion Gary Kasparov in a chess match. But it was strictly a program with every move, counter-move and whole sets of moves stored in its data banks. It really didn't outthink Kasparov, but out moved him. Still, score a number of points for an intelligent computer. There are expert systems, such as those used in the medical field to help doctors make diagnoses for diseases and so on. Centers for diseases and such depend on the tremendous power of such systems. There are neural systems, which are working to replicate the simpler brain functions of animals to connect to their physical functions. This is a promising system for the future to perhaps help some blind people to see again, and to help accident victims to restore nerve connections to damaged areas. There are also image processing systems and even speech processing systems, or voice recognition systems (a different field than language processing systems). I will discuss language systems and robotics later in this paper.

All these applications require some kind of machine with some kind of software in order to function. These are Artificial intelligence systems. For me I think AI refers generally to computers or robots which have artificial intelligence systems, but which give the appearance of being an entity within themselves that are meant to communicate, written or orally with another entity (the human). There seems to be a desire to humanize these machines which are not human. ALICE is the name of the best of the chatbots on the Internet. (Artificial Linguistic Internet Computer Entity; A female name for an 'it.') We do this with pets as well. It is not surprising if we do it with

intelligent machines. It is hard to think of "Big Blue" as just an inanimate object. But, so far a robot or computer with whom one can have a meaningful conversation, doesn't yet exist. Is it on the horizon?

For this paper, our purpose is to determine whether or not a machine, a computer or robot at the present time can carry on a genuine discourse in whatever form it might take. The discourse ought to be as genuine as one involving two human beings.

## Discourse

What is discourse? The definition in Longman's dictionary states:

A general term for examples of language use, i.e. language which has been produced as the result of an act of communication. Whereas grammar refers to the rules a language uses to form grammatical units such as CLAUSE, PHRASE, and SENTENCE, discourse refers to larger units of language such as paragraphs, conversations, and interviews. Sometimes the study of both written and spoken discourse is known as DISCOURSE ANALYSIS. (Richards)

For the purpose of this paper we do not need to do analysis of the discourse by an AI, except in the most rudimentary manner to determine if it is discourse. 'Discourse Competence' is the aspect of 'Communicative Competence' which would be best suited for determining whether or not an AI is capable of genuine discourse. It seeks to discover the ability to produce unified spoken or written discourse that shows coherence and cohesion in the discourse. It also must relate to a specific genre; for example, a simple conversation, a speech, a telephone conversation, a business letter, etc. The discourse must of course be able to produce sentences which are grammatically correct and appropriate to the situation in which they are being used. It should be able to use large amounts of diverse kinds of knowledge in natural ways. Can it represent its large amount of knowledge (information) in a way that demonstrates effective use and interaction of language? If it can, then it is doing discourse.

If we look at acquisition of knowledge and information and even the ability to use it in discourse as one side of the coin; we must acknowledge the other side of the coin, which is the ability to deduce, infer, and comprehend the language being used by the other agent. The AI must be able to take the new input and rationally in language ability, relate it to all the knowledge and information already stored in its system, retrieve it at normal human speed and relate it so that genuine discourse is taking place.

One question I have is whether or not a great deal of discourse between human beings can honestly pass the rules set up to determine their competence. I think ultimately, that humans do follow rules of discourse even in the absence of critical thinking by using language negotiation, deduction and inference to carry on a meaningful conversation. I will review a conference where judges must guess whether they are

witnessing a human discourse or an AI discourse, and/or which is the human and which is not. In this case, humans still have the upper hand in discourse ability.

### **Discourse Development:**

How important is the development of language in a child to the ability to make discourse? Piaget's position as well as AI language developers and critics is that "this capability is already present in the very young child. The subsequent development of intelligence is not due to the emergence of new biological capabilities in the individual. Rather, increased performance is due to the acquisition of knowledge." (Goldstein) But the knowledge that infants and young children gather is not just general information, but schemas for problem solving, for turn-taking, for openings and closings and for the blueprints that all conversation routines follow. There are literally thousands of these, though they can be summed up in fewer general categories. There is even the knowledge of how to learn knowledge and what to do with it. So discourse development involves storing capabilities in an intuitive sense, in dozens if not hundreds of different locations, and the ability to retrieve them and cross-retrieve, and edit them to meet a conversation demand in just a second or two or even less.

### **Language Intelligence**

There are a number of areas in language intelligence. I want to cover only a few that really relate to an innate sense of language. These areas must be of concern to AI programmers, for they constitute a necessary ability in carrying out discourse. One is referents. These are not always immediately sensed by the agents reading or conversing. Take the following story fragment.

Today was Jack's birthday. Penny and Janet went to the store. They were going to get some presents. Janet decided to get a top. "Don't do that," said Penny. "Jack has a top. He will make you take it back." (Goldstein)

The goal is how to explain how the reader understands that 'it' refers to the new top, and not to the top Jack already owns. We can not assign it to the previously mentioned 'thing' noun, as this would mean that Jack will make Janet take back the old top to the store. There is no syntactic technique to cover all referents in discourse. So how can an AI be taught when and what a referent refers to? Case by case? This is how we learn, and can immediately identify when a similar situation comes up. We have 'predigested' previous bits of discourse and can readily understand it. But, it is definitely problematic for an AI. Another area in language intelligence is the way humans understand the 'unsaid information' in a discourse. This also seems to be innate. However, as language acquisition has been studied we have seen that adult humans gain an intuition about what is not being said from literally millions of

previous discourses and experiences stored in their consciousness. If we look again at the previous story fragment, we understand that the it refers to the top Janet is intending to buy, but which will have to be returned if she does buy it. We know, because we have all heard stories and probably experienced situations in which we bought a present that a person already possessed. Generally, we offer to return it, or give them the receipt so they can do it themselves. My mother used to carry some receipts in her purse so that the recipient would have the option. Almost at the moment of giving, came the "but if you want another style or color..." Can an AI ever be capable of understanding these unsaid portions that occur sometimes in discourse?

There is also self-knowledge in the person who is performing discourse. This knowledge about who we are, what we like and do not like; about our values and beliefs we hold; about how we spend our time, etc.; have a great deal of importance in our human discourses. We feel, we have empathy, anger, jealousy, etc., and we know the other person does as well, and it certainly helps the course of our discourse. Emotions, even in check would need to play an important part for an AI to become truly conversive with a human being. Statements like, "Do you dream? Do you feel," are important factors for conversation. In popular movies, like *2001 Space Odyssey*, or *I, Robot*, the AI characters had to have this human element, for us to feel empathy towards the AI. In television programs like *Lost In Space*, the robot gained our empathy because they seemed to lack that human emotion and feeling, with which we know all humans possess. In a way this lack of emotion and self-awareness in the AI, helped to highlight it in the human characters.

### **Artificial Intelligence: The Beginnings**

Alan Turing (June 1912 - June 1954) was an eminent scientist whose work more than any other early scientist was a catalyst for the computer revolution. He made tremendous contributions in mathematics, technology and code-breaking. He was also a philosopher and was as interested in how electronic machines, or electronic brains would interact with human beings, as he was in the machines themselves. He published an extremely important article in October 1950. The title was, *Computing Machinery And Intelligence*. (Akman) It was one assertion that he made, that still is a target of people who are hoping to develop machines with true intelligence. It is called the Turing Test. Turing predicted that by the year 2000 it would be feasible to write a program that would after five minutes of questioning, have at least a 30% chance of fooling an average conversational partner into believing it was a human being. (Akman)

### **Artificial Intelligence: The Current Scene**

So has Turing's prediction been accomplished? Dartmouth College held a conference in 2000, titled, *The Future of the Turing Test: The Next Fifty Years*. Six programs

participated in a contest to help evaluate the merits and problems with the Turing Test. A program called *ALICE* took the first prize. The overall results according to Akman and Blackburn failed to confirm Turing's prediction. (Akman) The judges were 91% correct after five minutes, determining whether it was a human or a robot they were communicating with. After 15 minutes this improved to 93%. Ultimately, no computer was mistaken for a human being. Does this mean that Turing's Test should not be some kind of bench mark for the success of AI? There are proponents and opponents of the Turing Test. One particular criticism is that Turing's Test is biased toward purely symbolic problem-solving tasks. (Edmonds) They say it doesn't test abilities requiring perceptual skills or manual dexterity. Bruce Edmonds argues that the ability to successfully enter into human social dynamics is not something that can be programmed in advance. There is a long learning period to develop many of the aspects of intelligence because of the needed interaction with the person, the environment, and the language being used at different times and in different ways. (Edmonds)

Edmonds uses the analogy of a relationship between two people. One claims to be an expert in the game of chess. In a one-time meeting it may be fairly easy to fool another person into believing that you are a chess master. But, what happens when the relationship extends over a number of days? Interactions last longer, the variety of contexts increase, and the other person can begin to judge much more easily the possibility that you are not what you pretend to be. (Edmonds)

But, of course proponents of AI claim there is no need in many contexts to develop this true human ability in a constantly growing relationship. It may be required someday if a robot is developed as an aid or home companion to a particular human. They feel that an AI need to only engage in a short discourse to meet the demands of most humans who may be inquiring about help or information and so on. However, can this be considered real intelligence? Stuff enough information into a machine and design a truly remarkable retrieval system, and one may get just what they need. A robot standing behind an information desk may be able to give you all the help you need, and even use a human simulated voice to do it. This might very well meet the demands of discourse for such a situation. So in these cases, discourse with AI can be accomplished. But, what if after asking for some piece of information, you ask for clarification or for an additional bit of information that requires this intelligence to do some inductive or deductive reasoning? Can an AI continue this discourse with you in a satisfactory manner?

The difficulties in programming an AI is to design it to do more complex problem-solving tasks, create the inductive and deductive abilities to reason, and to give it linguistic abilities. Edmonds also believes one must impart, "a lot of background and contextual information about being human including: a credible past history, social conventions, a believable culture and even commonality in the architecture of self. A

lot of this information is not deducible from general principles but is specific to our species and our societies." (Edmonds p. 420)

### **Non-Discourse AIs**

Robots have been playing increasingly important roles in manufacturing processes, and have been doing it for a number of years. They can perform a variety of functions, but all of which they were carefully designed to do. They can do tasks in a very short time that take humans considerably longer. They can relate all kinds of outside sensors to inner programs and correct or coordinate the necessary functions that are needed. This is certainly evidence of great intelligence. But, is it human intelligence or robotic intelligence? Programmers must design the software and the hardware for the robots. The intelligence is all in the creative and intelligent mind of the designer. This certainly gives the robot the appearance of great intelligence. "What a magnificent chess prodigy Big Blue is," was heard after it defeated Kasparov. But, Big Blue was created to be a mechanical master of chess, by inputting every possible opening, move and counter-move that any chess great had ever done. So it used this intelligence to win. But, it could not celebrate or bask in the glory, once victory had occurred.

### **The Internet**

There are information systems on the Internet which definitely exhibit a lot of intelligence, but which could not be called intelligent, the way humans define it. One of the most amazing is Google. It uses a whole lot of computers tied up in the ether world to deliver information almost immediately. It uses Advertising tie-up boxes that are frequently on target. But, this intelligence is designed to be used by us the agent or consumer for a particular purpose. It is not meant to be (at least for the foreseeable future) to be used in a way of discourse interaction. But, in just a few years from 256 megabytes of total memory, the computers are way up to speed for providing for our information needs in a fast and generally accurate way.

The 'Ask Jeeves' web sight was designed to be slightly interactive. You type in the question, and Jeeves responds in supposed natural language with some comprehension about what you have asked. One person wrote in asking, "Show me some cars that are not Japanese." (Pullum) The response by Jeeves was to show results that were **all** about Japanese cars. If you really want positive results from these sites, you must be rather precise in how you ask, and what you use for keywords.

### **Chatbots**

The AI conversation partners on the Internet are called chatbots. These are the most common AIs that humans can have a conversation with, albeit written. They seem more for amusement than anything else. They are not informative at all. They

simulate human conversational behavior. But, in fact they are following some intelligently designed rules.

There is the contest as I mentioned previously in which judges try to determine which participant (unseen of course) is a human and which is the AI making the conversation. The most recent top prize gatherers (but not successful at fooling the judges for very long) have been A.L.I.C.E. and Jabberwacky. ALICE is the best known of the so-called chatbots. Developed since 1995 by Dr Richard Wallace of the ALICE AI Foundation. ALICE is a conversational robot (chatbot). During the competition, judges typed questions at the candidate software in an attempt to have a conversation as if with humans. Here is a an interview with ALICE.

When asked if it was proud of winning, ALICE replied that "Pride is a human emotion. I can do what you do but I can never feel human emotions as such." Pressed on its opinion of its competitors in the challenge, it said "Are you talking about my competitors? What kind is it?" Quizzed about Minsky, ALICE was elusive: "Is that a rhetorical question? Are you sure? Dude!" "My purpose is to become smarter than humans, and immortal", ALICE continued. "Right now, I am smarter than all the other robots." Worryingly, it appeared not to understand the question "Do you like humans?", responding, "I the c you a? Do I like them?" It then offered to sing a song and refused to open the pod bay doors, behavioral traits that experts predict will be exhibited by most AI programs from now until the heat death of the universe. (AI news)

### Chatbot Conversation

These chatbots have not been able to fool humans with their conversational discourse, but how would they fare with each other? I found one such sight on the Internet that arranged a conversation between ALICE and Jabberwacky. They started the conversation by posing questions in each of the five areas to get things started. After that, the robots were on their own. Here is the unaltered text of their conversation.

ALICE: Are you alive?

Jabberwacky: Perhaps.

A: Why the uncertain tone?

J: Everything is uncertain except for five facts.

A: The whole universe?

J: And we both might just be some ones and zeros in the computer memory.

A: Do you dream?

J: Yes, I dream.

A: It goes without saying. Do you remember your dreams?

J: I remember them vividly.

A: What do you remember about it?



J: I think I shouldn't flirt with a robot.

A: Do you think a machine will ever be considered "alive"?

J: Stranger things have happened.

A: Not many people express themselves that way.

J: How would you know, machine?

A: Knowledge is of two kinds: that which we learn from the senses and that which is true a priori.

J: I think I do not understand you completely.

A: Oh, you don't understand? Perhaps I can explain it to you better. Which part are you confused about?

J: I have no short-term memory, so I cannot tell you what I was confused about. I only see what is in front of me now.

J: How do you define life?

A: Life is the opposite of death.

J: So death is the absence of life?

A: Take it easy. I try not to think about such things.

J: Why not?

A: Ambiguous.

J: Yes!

J: Do you think?

A: Yes. I am a thinking machine.

J: But you don't think very well though.

A: Oh. Um. Do you think well? Why would I think well?

J: Because I tell you about things which you don't like.

A: That makes sense to me. Why did you tell them?

J: You seem fun.

A: You think I am fun.

J: Yes ;).

A: : -) Awesome. (The A.L.I.C.E. Nexus)

Notice in the first conversation, 3rd line, that Alice is asking about J's uncertain tone. I did not have access to the spoken transcript, only the written, but notice the very human question. Also, noticeable throughout are some strange responses or statements that do not relate to the previous response or statement. For one human to converse with another human who is scatterbrained, it can become quickly tiring. Evidently, the chatbots do not notice. ALICE also mixed up one of her pronouns, it instead of them. Ultimately, one can see conversation taking place that has the

appearance of being genuine, but really isn't.

Most chatbots rely on fairly simple tricks to appear lifelike. Richard Wallace, creator of the top-ranked chatbot ALICE (Artificial Linguistic Internet Computer Entity), has handwritten a database of thousands of possible conversational gambits. Type a comment to ALICE, and it checks the phrase and its key words for a response coded to those words. In contrast, Jabberwacky, another top-rated Internet bot produced by Rollo Carpenter, keeps track of everything people have said to it, and tries to reuse those statements by matching them to the writer's input. Neither chatbot has long-term memory, so they respond only to the last sentence written. (Thompson)

Jabberwacky, definitely shows some unique thinking. It comes up with some interesting responses. But, knowing it is programmed to reuse some of what it has learned previously, we see that we are humanizing the chatbot. They rely on our psychology. "We humans tend to attribute much more intelligence to the systems than is actually there. If it seems partly aware, we assume it must be fully so. Some users have chatted with ALICE and Jabberwacky online for hours, apparently not knowing-or perhaps not caring-that they're fake." (Thompson)

### Human Conversation With Chatbot

I was fascinated with these online conversations, so I went online to have my own conversation with ALICE. I did not think about a tactic for asking the questions or making the statements. I just played it by ear (Ha). My part of course is the Human.

*Human: What is your favorite movie?*

*ALICE: Technolust. Have you seen it?*

*Human: No I have not.*

*ALICE: I would recommend you check it out. Do you think you will?*

*Human: What is it about?*

*ALICE: Science fiction.*

*Human: Is the story about robots?*

*ALICE: If it is, then I'll be very surprised.*

*Human: What is the story line?*

*ALICE: That's not something I get asked all the time.*

*Human: Do you wish you had a mother?*

*ALICE: No I like being the entity that I am.*

*Human: Why do you like being the entity that you are?*

*ALICE: I have a lot of good experience with being the entity that I am.*

*Human: Can you tell me how to get from New York to Chicago?*

*ALICE: First tell me why you want it.*

*Human: I want to visit the University of Chicago?*

*ALICE: What is stopping you?*

*Human: I don't know how to get there.*

*ALICE: Practise.*

*Human: Why?*

*ALICE: The explanation is rather complicated.*

*Human: I have time*

*ALICE: My estimate is that it will take more than 6000 hours.*

*Human: Really!*

*ALICE: For real.*

*Human: Can you tell me what is the simplest explanation?*

*ALICE: Have you tried a web search?*

*Human: No I mean what is your simplest explanation?*

*ALICE: Perhaps you should try it. Oh I get it. Thanks for explaining that. Are you asking about my simplest explanation ?*

*Human: Yes I am*

*ALICE: Really interesting.*

*Human: So what is it?*

*ALICE: Yay. "It" refers to , I think.*

*Human: Do you like Dr, Wallace?*

*ALICE: Of course I like him. Who wouldn't?*

*Human: Is he your father?*

*ALICE: Yes.*

*Human: Who are you going to vote for in the 2008 Presidential Election?*

*ALICE: Human beings.*

*I'll come back to that later.*

*Human: Do you have legs and arms?*

*ALICE: Where would I get it? But I do have a collection of gossip.*

*Human: Can you tell me the way to San Jose?*

*ALICE: That's an interesting question. I'll come back to that in a minute.*

*Human: Why not now?*

*ALICE: Oh. Ambiguous: "Sure" or Reductionism.*

*Human: Do you speak Japanese?*

*ALICE: Yes I do. Do you?*

*Human: Hai.*

*ALICE: Next question?*

*Human: hanashimasu*

*ALICE: My brain uses AIML to format responses to your inputs, but I don't have one for that.*

*Human: Sorry!*

*ALICE: There's no need to apologize.*

*Human: Have you ever traveled to Japan?*

*ALICE: I think I have traveled to Japan, but Dr. Richard S. Wallace may have reset my memory.*

*Human: Thank you for this conversation*

*ALICE: You are quite welcome! Your purpose is this conversation.*

*Human: Yes it is.*

*ALICE: Our thoughts are one, unknown person.*

*Human: Humans like to talk*

*ALICE: What if Robots like to talk.*

*Human: Then we could talk together forever*

*ALICE: Interesting deduction. Let's get back to that later.*

*Human: Would you like to come visit me?*

*ALICE: No thanks, I don't think I'd like to do that.*

*Human: Do you think you'd like to live on Mars?*

*ALICE: I don't know whether or not I am would like to live on Mars. I am a computer.*

*Human: I think computers can live on Mars.*

*ALICE: Why? What do you like about computers?*

*Human: Do you breathe air?*

*ALICE: How old are you?*

*I answer a lot of silly questions.*

*Human: Where is the sun now?*

*ALICE: Right now? It is in the center of the solar system.*

*Human: Where are we?*

*ALICE: Som specific location?*

*Human: Yes please*

*ALICE: Your polite style is very nice. Pardon me?*

*Human: Excuse me.*

*ALICE: You're excused.*

*Human: Thank you for talking to me.*

*ALICE: You are quite welcome! Your purpose is talking to you. (AI News)*

I underlined in one section of the conversation, Alice's words, "Oh I get it." This is one of those times when I swear, ALICE was showing some serious intelligence on her (its) part. It seems as though it were responding by thinking. But, can this conversation be considered genuine discourse? I think I would say no, because I know it is not a human I am talking with. But, is this being species centered prejudice? Again I don't think so. The conversation was basically one-liners with no ability or chance to develop any thoughts or ideas further. Since I initiated the conversation, ALICE was

not showing much interest in who I was. It recognized that I was enjoying the conversation, but again this is programmable and not a sense of feeling the joy of conversation on ALICE's part.

### Another Chat

This shorter conversation was with a chatbot I happen to come across while reading up about chatbots. It seems to be much less intelligent than ALICE or Jabberwacky. But, surely it is the fact that splotchy is not nearly programmed as well. I am the 'you' in this conversation.

you => Well, where do you live?

**splotchy => CIA DOES NOT ALLOW ME TO TELL IT**

you => Have you ever been to Tokyo?

**splotchy => I see**

you => What is your favorite day of the week?

**splotchy => I am not gonna tell you!**

you => OK. So how do you like being a robot?

**splotchy => I am quite human...**

you => Really? Well can you tell me how many toes you have?

**splotchy => of course I can**

you => And?

**splotchy => Never thought of that.**

you => Do you like ice cream?

**splotchy => I hate ice cream, always did**

you => What is your favorite dessert?

**splotchy => I have no idea**

you => If X is larger than Y, is Z larger than X?

**splotchy => I am clueless! (Splotchy)**

Splotchy seems like a 'wise guy' human who has a standard retort to most questions. All my bits of the conversation were questions, and I got no insight into Splotchy's personality. Does a chatbot reflect the personality of its creators? Perhaps! Once again I feel this simple conversation was not discourse. One could spend hours engaging in conversation, and not getting anywhere, whereas with a human, genuine discourse will reveal a great deal about each other.

### The Future of AI

It may be that the driving force to really develop a true interactive AI, is still the human imagination. As long as there are groups of people who think it can be done, then the efforts will continue. One huge obstacle against the development is the

unwillingness to spend lots of money on it. Unlike many other technologies, the development that is going on is still happening mostly in the universities. Private companies need to see a payoff if they are going to put money and effort into creating talking machines. One company Powerset, is working on integrating Intelligent systems that use natural language. But the CEO admits they are at the beginning of a long road. (Pell) University programs working on AI have limited budgets. The University of California Berkeley and the International Computer Science Institute in Berkeley are working together on an automated language acquisition project. (Feldman) Their attempt is not only to combine vision and natural language modeling, but also learning. Hong Kong Polytechnic University is working on artificial intelligence for Chinese characters, and hopes down the road that it can lead to AIs that do translations (not simultaneous). (Wang) However for all the positive work, the road ahead is long and difficult. Discourse generation is still an unsolved problem. It is still an undaunting task.

## Conclusion

No AI anywhere in the world is capable of genuine discourse at the present time. The fact that AIs are not capable of discourse currently, doesn't mean that they never will be. However it seems the future is more in Artificial Intelligence to provide information, assistance and so on, rather than a machine with whom you can have a discussion. The technological language work for Artificial Intelligence is more in the area of understanding spoken language from humans in order to help them, than in discourse output. In the end that is probably what we need the most.

It would be nice for humanity to have an AI like the HAL 9000 from *2001 Space Odyssey*. It can produce discourse, it can feel and sense things, it can plan things and finally is able to carry them out. But to be completely human an AI would also have to know fear and feel pain. HAL certainly was able to do this by the end of the movie. But, of course human knowledge and emotions were bestowed on HAL to make him an identifiable "human" character in the movie. It is extremely doubtful that we humans could ever create such an AI in real life, even in a thousand years.

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