

Assessing Information Heard on the Radio

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Abstract

In this paper I elaborate my two-stage model of belief-acquisition. In particular, I look at how agents acquire information from the radio and I list many factors that may cause an agent to override the defeasible rule to believe what he hears on the radio.

1 Introduction

Some people working in artificial intelligence (AI) see its ultimate goal as being that of constructing an artificial person (Charniak and McDermott 1985, p. 7). Brooks (2002, p. 209) thinks that it is just a matter of time before this goal is achieved: ‘The question then is when, not if, we will build self-reproducing intelligent robots.’ Moravec (1999, p. 88) is confident that androids will be a reality in the near future: ‘By 2040, I believe, we will finally achieve the original goal of robotics and a thematic mainstay of science fiction: a freely moving machine with the intellectual capabilities of a human being.’

Many of the theoretical and practical problems associated with the task of manufacturing an android are currently being tackled by a large number of researchers, both in academia and in industry, and quite a lot of progress has already been made in solving them. Robots have been built that are able, for example, to stand upright without falling over, to walk on two legs, to ascend and descend stairs, to recognise and handle, where appropriate, various sorts of object, to navigate around obstacles and to distinguish between animate and inanimate things. Furthermore, progress has also been made in modelling various cognitive abilities on computers. Research continues, for example, on such topics as planning, reasoning, belief-revision and truth-maintenance, problem-solving, machine learning, natural-language understanding and processing, image processing and vision. However, there is one very important human ability that an android would have to possess that has largely been overlooked. Until we are in

a position to model this fundamental human ability the main goal of AI and robotics cannot be fully achieved. As well as having a large amount of in-built knowledge and the ability to acquire beliefs by means of perception, a general-purpose, intelligent and autonomous android would also have to have the ability to extend its knowledge by listening to and believing other people's assertions and by reading what human beings have written. Such an ability is needed if the android is going to be able to interact with human beings in any meaningful way. Elsewhere I have argued at length that the ability to acquire beliefs by accepting other people's assertions is an essential component of human belief-acquisition and I will not repeat those arguments here. The interested reader should consult (Diller 2003) and (Diller 2002, pp. 2–3).

Although we get most of our information from other people by believing what they assert, we do not believe everything that we hear and read. In (Diller 2003) and (Diller 2002, pp. 4–6) I have proposed that our way of dealing with the assertions of other people is governed by the defeasible rule to believe them. This sounds very simple, but it is extremely fruitful because it forces us to look at the reasons why we decide not to accept another person's word and there are lots of such reasons. We receive information from a variety of sources. For example, we acquire beliefs from other people by listening to what they say to us in the flesh, from reading books and journal articles, from listening to the radio, from watching television, from reading newspapers and from the Internet. In other papers I have looked at the factors that may cause us to override the defeasible rule to believe other people when we are hearing what another person says to us in the flesh (Diller 2000b), when we are reading a book (Diller 2001) and when we are reading a journal article (Diller 2000a). My aim in this paper is to do the same for the situation when we receive information by listening to the radio. When I started this paper, my intention was to look at how we evaluate assertions that we hear on the radio, that we hear on or read from the television and that we read in the newspapers, but I soon realised that there are significant differences between out ways of assessing the information found in these three media. To cover all three in a single paper would have made it far too long. So, I have restricted myself to considering assertions heard on the radio.

Sociologists study mass communication and mass media and some of their concerns overlap mine. Johnson (2000, p. 184) lists the questions that sociological research on the media focuses on and these include: 'Who controls the mass media and, with them, the information they transmit? How does mass communication affect individuals—from the products people buy to their political opinions to the tendency toward violent behavior—and how do these effects vary by characteristics such as social class, age, gender, and education? How does the cumulative effect of many mass media outlets transmitting similar messages shape populations and their perception of social reality?' So far as content is concerned, sociologists are usually interested in seeing how the output of the media is influenced or distorted by the dominant ideology of the country they are located in or of the owners of the media. I accept that the information transmitted by the media has been shaped by many factors, including ideology. I have learnt a lot from the limited amount of sociological literature that I have looked at, but my concerns are different. Given that many assertions are made on the radio,

what I am interested in is how they are evaluated by the people who hear them. I am interested in the reception of information and not in its production. Someone who is aware of the sociological take on the media and accepts it will assess what they hear on the radio differently from someone who is ignorant of this research. My model of belief-acquisition can accommodate such differences in how people acquire knowledge.

There are huge differences in how people assess the information that they encounter on the radio (and elsewhere). My goal is to devise a model that can accommodate all these differences. I am not trying to present an ideal picture of the best or most rational or most efficient way of evaluating information, because such an ideal does not exist. My model explains how individuals assess assertions by noticing features that indicate that the assertion is likely not to be truthful, but the specific features that people look for are not common to everyone. One person, for example, may regard Ian Paisley as the true spokesman of Ulster Unionism and hang on his every word, whereas another may see him as responsible for many of Northern Ireland's problems and distrust everything that he says. Eventually, I hope that my model will become so concrete that it will be possible to implement it in a computer program. But, before that can happen, we need to understand how people process the information that they hear and read and in this paper I look at how they do this in the case of assertions broadcast on the radio. Furthermore, in this paper I am only interested in factual information. How we assess and learn from moral, aesthetic and other sorts of evaluative material raises still further questions that I cannot deal with here.

2 The Two-phase Model

Several years ago I introduced a two-stage model of belief-acquisition (Diller 1999). Since then the model has been considerably refined, extended and improved. Here I briefly summarise the latest version of this model which can be found in (Diller 2002, pp. 4–7) on which the present account is based.

My model of belief-acquisition is shown in Fig. 1. This diagram is taken from (Diller 2002, p. 5). There are two main ways in which we acquire beliefs directly, namely by making judgments about our surroundings and by accepting other people's assertions either in written or spoken form. These methods constitute the first phase of belief-acquisition. The way in which we come to have beliefs about our surroundings through the use of our senses is complicated, but it is not my concern in this paper. So, I will just make use of the fact that we do have the ability to make judgements about our immediate neighbourhood and I will not attempt to analyse it further. Elsewhere I have argued that our acceptance of other people's assertions is governed by the defeasible rule to believe them (Diller 2003). These two first-phase processes, however, do not always result in us acquiring true beliefs and so there is a second phase of belief-acquisition in which we critically examine some of our beliefs in order to weed out the false ones and replace them with better ones.

In the situation in which a person evaluates an assertion that he hears or reads he can either believe it and add it to his belief-system or he can reject it. In the model these are the only two options available. Assertions that we accept are, in reality,

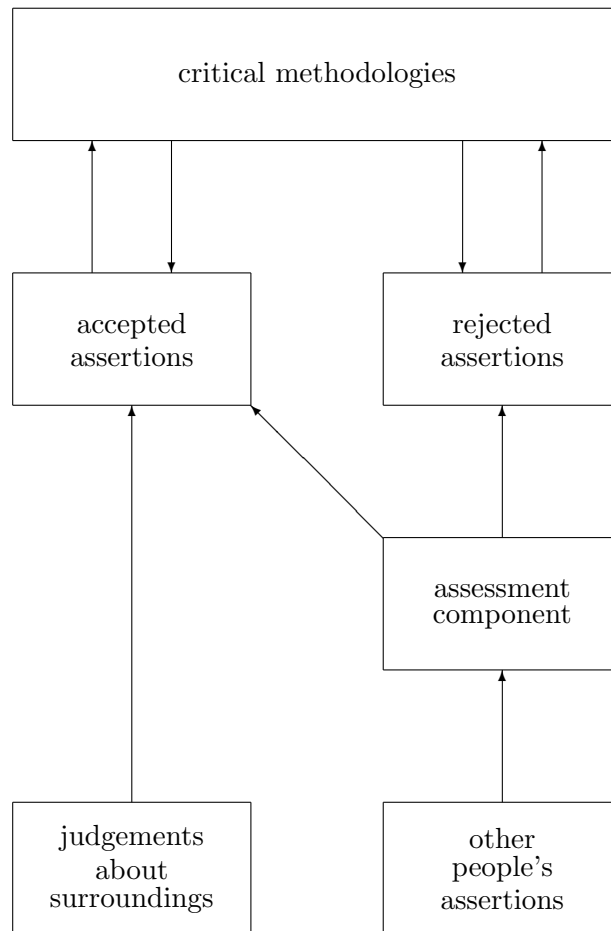


Figure 1: A two-stage model of belief-acquisition.

not all treated in the same way. In practice, we do not accept everything that we assess to be worth believing with the same degree of conviction. We do believe some things more strongly than others. Similarly, the assertions that we reject are, in reality, not all treated in the same way. For example, although a person may not accept an assertion, he may decide to entertain it in order to work out its consequences or he may flag it up as something that he will investigate thoroughly later. My model is, therefore, a simplification of or a first approximation to the actual way in which people deal with assertions. Such a simplification is justifiable, however, in order to gain a better understanding of how people evaluate the assertions that they encounter in vast numbers on a daily basis.

I will now briefly characterise the assessment component of the model. (More information about the assessment component can be found in (Diller 2002, pp. 7–14).) The way in which I unpack the defeasible rule to believe other people's assertions is to represent it as an ordered set of rules all of which except the last are conditional ones.

The last rule in the ordered set is not conditional and it is the non-defeasible rule to believe the assertion in question. There are many reasons why someone may decide not to accept an encountered assertion and each such reason becomes the antecedent of one of the conditional rules in the assessment component of the model. For example, a radio play is a work of fiction and so we do not normally believe the various assertions that the actors performing it make. This can be captured by adding the following conditional rule to the assessment component, ‘If the assertion X is uttered by an actor during the performance of a radio play, then reject X .’ (This is a simplification of the actual way in which we treat assertions by actors, since sometimes they are made to say things that are true in the real world.)

So far I have been describing the first stage of belief-acquisition. The judgements that we make about our perceptual environment and the evaluations that we carry out concerning the assertions we encounter have to be done in real time. The decision has to be made virtually instantaneously whether to accept the assertion in question or reject it. As the decisions involved have to be made in real time the assessment that takes place cannot be very sophisticated. As a result of this people will come to have some false beliefs and they will also reject some assertions which, as a matter of fact, are true. In the model, therefore, there is a second stage of belief-acquisition in which a small number of assertions are subjected to a detailed and possibly time-consuming investigation. In the second stage a person can either check something that he believes or investigate an assertion that he previously rejected. When someone checks one of his beliefs, he may either decide that he was correct in having that belief in the first place or he may conclude that on this occasion he made a mistake and reject the belief. Similarly, when someone investigates the truth of an assertion that he rejected previously, he may change his mind about its truth-value and add it to his belief-system or he may decide that he was correct in rejecting it and not alter his assessment of it. When a person does change his mind about the status of an assertion, he will probably need to make further revisions to his belief-system in order to remove any obvious inconsistencies arising out of the change of mind.

In order to illustrate just how time-consuming it can be to thoroughly investigate the truth of a small number of assertions I shall consider the famous meeting between the philosophers Karl Popper and Ludwig Wittgenstein on the evening of Friday, the 25th of October 1946. Popper had been invited to speak at the Moral Sciences Club in the University of Cambridge. He had been asked to speak about some philosophical puzzle and he decided to present a talk entitled “Are there Philosophical Problems?” This was meant to be provocative as it was well-known at the time that Wittgenstein believed that there were no genuine philosophical problems. Soon after beginning his talk Popper was interrupted by Wittgenstein who, not surprisingly, spoke about the non-existence of philosophical problems. Popper, in turn, interrupted Wittgenstein and recited a list, which he had prepared in advance, of problems that he regarded to be philosophical. Wittgenstein dismissed each of the examples on Popper’s list as not being genuinely philosophical, but rather as belonging to some other discipline. Popper (1974, p. 98) describes as follows what happened next:

I then mentioned moral problems and the problem of the validity of moral rules. At that point Wittgenstein, who was sitting near the fire and had been nervously playing with the poker, which he sometimes used like a conductor's baton to emphasize his assertions, challenged me: 'Give me an example of a moral rule!'. [sic] I replied: 'Not to threaten visiting lecturers with pokers.' Whereupon Wittgenstein, in a rage, threw the poker down and stormed out of the room, banging the door behind him.

Soon after the book in which Popper wrote this account appeared he was accused of lying by Peter Geach who had been present at the meeting. No one denied that Wittgenstein left the meeting early. In fact, it was his habit to leave meetings of the Moral Sciences Club early. The issue was whether he left in the way that Popper recounts. According to Geach, Popper gave his example of a moral rule in the discussion that followed Wittgenstein's departure. This may appear to be a storm in a tea cup, but years later David Edmonds and John Eidinow became interested in what really happened that evening and went about investigating the correctness of Popper's account. The encounter between Popper and Wittgenstein lasted a few minutes, yet the investigation that Edmonds and Eidinow conducted took at least several hundred hours and maybe even several thousand hours. It involved many activities including reading numerous published books and articles, visiting several libraries that hold relevant unpublished material, conducting a number of interviews with people who were present at the meeting, digesting all the information they collected, critically evaluating it and coming to a conclusion about what actually happened and then writing a book about the incident (Edmonds and Eidinow 2001) and also producing a radio programme about it. (The radio programme, entitled *The Red Hot Poker*, was broadcast on BBC Radio 4 on Saturday, the 28th of April 2001.) As a result of all this research Edmonds and Eidinow came to the conclusion that Geach's version of events was, in fact, the correct one.

This example illustrates just how much time and effort it can take in order to thoroughly check out the correctness of a small number of assertions. In this case just three or four. If we assume that a person only hears or reads 100 assertions a day and that he starts hearing and reading this number of assertions aged 10, then by the age of 38 he would have encountered over a million assertions and over two million by the age of 66. Clearly, no one could possibly investigate every assertion that they encounter in any great detail. Furthermore, in the course of their investigation Edmonds and Eidinow had to accept a large number of assertions on trust. In due course, someone may decide to subject some of those to thorough scrutiny, just as they subjected Popper's account to detailed testing, and it may be found that some key component in the story that Edmonds and Eidinow relate is false. This sort of historical inquiry is potentially never ending. I hope that the reader is now convinced that we can only thoroughly check a very small number of our beliefs. The vast majority we have to simply accept on trust.

In investigating the correctness of Popper's account of his encounter with Wittgenstein, Edmonds and Eidinow undertook some historical research using standard methods of enquiry. This, however, is only one of the critical methodologies that can be

employed to thoroughly test the accuracy of our beliefs. This is because there is not a single methodology that can be used to check the correctness of every kind of factual assertion. Different methods are used for different kinds of assertion. For example, the way in which someone checks a physical assertion, such as ‘The speed of light in a vacuum is 299,792,458 metres per second’, is very different from the historical methodology that Edmonds and Eidinow used to check the correctness of Popper’s account of what happened at the Moral Sciences Club. Furthermore, not everybody has the ability to check every kind of belief that he has. A historian would know how to ascertain the correctness of Popper’s account and a physicist would know how to determine the value of the speed of light, but the historian is unlikely to have the knowledge to work out what the speed of light is and the physicist is unlikely to be able to conduct historical research into issues relating to what happened in the past. The topic of how people go about checking their beliefs is a vast one and, unfortunately, I cannot pursue it further here.

People re-evaluate their beliefs for a variety of reasons. My aim in this paper is, however, to investigate how we evaluate novel assertions that we hear on the radio. I am, therefore, unable to look in any great detail at the reasons why people re-evaluate their beliefs.

The evaluation of novel assertions, according to the model shown in Fig. 1, is carried out by the assessment component. This consists of an ordered set of rules all but the last of which is a conditional rule which specifies a condition under which an assertion is to be rejected. It should not be thought that an agent’s assessment component undergoes no changes during that agent’s life. There are several reasons why an agent may decide to alter his assessment component and there are three ways in which such a change can be made. The agent may decide to add an entirely new rule to his assessment component or to delete an existing rule or to modify an existing rule. Like the re-assessment of beliefs that occurs in the second stage of the model being developed, changes to a person’s assessment component occur during reflective periods of that person’s life when he is not actively engaged in gathering new information. Detailed information about why and how an agent’s assessment component is altered can be found in (Diller 2002, pp. 14–16).

There is a lot of interaction between a person’s belief-system, the factors that he takes into account in order to decide whether or not to override the defeasible rule ‘Believe what you hear or read’ and his second-stage critical methodology. The following are the three main ways in which these elements interact:

- (1) Beliefs are added to a person’s belief-system if they do not trigger any of the factors that cause him to override the rule ‘Believe what you hear or read’.
- (2) The factors that cause overriding may involve various beliefs. Thus, the way in which a person evaluates a particular type of utterance can change as his belief-system changes. For example, one of the rules in an agent’s assessment component could be, ‘If X is uttered by an unreliable person, then reject X .’ If the agent believes Jones to be unreliable, then he will not accept what Jones says. However, the agent may come to realise that he was mistaken in believing

Jones to be unreliable. As a result of re-evaluating his opinion of Jones, he will no longer reject what Jones says.

- (3) Beliefs are also added and removed from a person's belief-system as a result of the operation of that person's critical faculties.

When we come to accept a new belief or reject an old one, that may have a knock-on effect on our pre-existing knowledge. We may have to engage in some form of belief-revision. This is an issue that is the subject of much interest, but my concerns in this paper are different.

3 Assessing Information Heard on the Radio

3.1 Introduction

People who listen to the radio can receive a great deal of information from it and information obtained in this way is not restricted to the current cultural, economic and political situation. However, a person listening to the radio does not accept every assertion that he hears. There are many features of an assertion and the circumstances in which it is uttered that may make us wary of accepting it. I propose to group these factors into five categories.

- (1) We sometimes take *external* factors into account when evaluating an assertion heard on the radio. By external factors I mean such considerations as the country in which the radio station we are listening to is based and the time at which we happen to listen to it.
- (2) Sometimes information about the person making the assertion may cause us to be wary of accepting it. This information would be about some property possessed by the *assertor*.
- (3) There may be something about the *manner of delivery* of the message that makes us hesitate to accept it.
- (4) The actual *content* of the assertion may make us think that it is not correct and incline us to reject it.
- (5) There may be something about the *listener* that makes him wary of accepting a particular assertion.

I will now look at some of the factors falling into these five categories in much more detail. It should be noted that by discussing these various factors separately I do not mean to suggest that they are all independent of each other.

3.2 External Factors

There are certain features of the context in which an assertion is made, rather than of the assertion itself, that may incline an agent to reject that assertion and not add its

content to his belief-system. I will here look in more detail at five such external factors. These relate to the time when the assertion is broadcast, the owner of the radio station which broadcast it, the location of that radio station, the type of programme during which it was uttered and the political situation in the country at the time the assertion was made.

date Strange as it may seem we do sometimes take the time and date on which we are listening to the radio into account when assessing the correctness of the information that is being conveyed. The clearest example of this occurs on All Fools' Day which occurs on the first of April in England. Before noon some radio programmes in recent years have carried items which sounded like genuine news stories, but which were in fact bogus. This happens, for example, on the *Today* programme on the BBC's station Radio 4. In the nature of things such fictitious news items are ephemeral, but a few years ago I remember one supposedly coming from a small village which had a statistically highly improbable number of lottery winners. I cannot remember the exact figures, but it was something like 80 people who had won more than a quarter of a million pounds in a village with a population of about 300. There was nothing about the item to suggest that it was anything but a normal news story. The reporter involved, as I recall, interviewed several villagers who said that they had won substantial amounts of money on the lottery. He may well have interviewed a mathematician who reported on the improbability of the event. There could easily have been an interview with a psychic trying to explain the luck of the village as a result of its being located at a point where a large number of ley lines converge. Somebody listening to such a broadcast would not be able to tell from anything about it that it was mere make believe. The only thing that could alert a listener to its fictitious character is the fact that it was broadcast before noon on All Fools' Day and maybe also that the *Today* programme has a tradition of putting out made-up stories on that day. Someone who did not have these pieces of information, say a foreigner unacquainted with English customs, could well have accepted the story as veridical.

owner There are occasions when the way in which a person assesses an assertion that he hears on the radio is influenced by what he knows about the person or organisation that owns the radio station involved. There are, for example, radio stations that are owned and run by the Roman Catholic Church. The content of programmes put out by such a radio station, therefore, is likely to be informed and infused by the doctrines and values of the Roman Catholic Church. Vatican Radio, for example, broadcasts programmes in many languages all over the world. On its website <http://www.vaticanradio.org/inglese/enindex.html> it clearly states: 'VATICAN RADIO ... THE CHURCH POINT OF VIEW'. Just to make sure that there can be no doubt about its outlook, it goes on to say: 'From topical subjects to in-depth programmes on moral questions, Vatican Radio, offers to everyone, catholic or not, the Church point of view.' Someone listening to such a radio station who is not a Roman Catholic is likely to be wary of accepting the various assertions made by contributors to its programmes.

location Sometimes when evaluating an assertion made by someone during a programme broadcast by a radio station we take into account the country in which the radio station is based. There are several reasons for this. One is that there is a different amount of government control over the media in different countries. Thus, an English person is more likely to believe what he hears in a news bulletin broadcast on BBC Radio 4 than what he hears broadcast on Radio Baghdad. That is not to say that such a person accepts uncritically everything asserted in a news bulletin on Radio 4, but he does not treat everything as being of dubious authenticity. Another reason relates to the traditions of the country in which a radio station is located. For example, the first amendment of the US constitution states: ‘Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances.’ As a result of this there are Americans who believe that their media provide the best news broadcasts in the world, though others claim to have detected various biases in the US media.

type of programme We take the kind of programme during which an assertion is made into account when assessing the value of the information being conveyed. Not all programmes broadcast on the radio are factual. There are many different sorts of programme. I will not attempt to give an exhaustive list of all the various types of programme on offer, but will just mention a few. As well as putting out news broadcasts, radio stations also put on plays, current affairs programmes, comedy shows, soap operas, short stories, programmes about consumer affairs, programmes designed for special categories of listeners (such as the visually impaired, the disabled, women and people belonging to ethnic minorities) and quiz shows. (There are also radio stations which are mainly devoted to broadcasting music, but even these may have news bulletins and there is usually an announcer who informs the listener what he is listening to.) If we incorrectly categorise the type of programme that we are listening to, then we may well acquire a lot of beliefs that are in fact false or, alternatively, reject a number of assertions that are actually true.

A notorious example of people acquiring false beliefs as a result of incorrectly classifying a programme broadcast on the radio occurred on Sunday, the 30th of October 1938, when Orson Welles and his Mercury Theatre on the Air put on Howard Koch’s adaptation of H.G. Wells’s 1898 science-fiction novel *The War of the Worlds*. (This radio play was broadcast on the Columbia Broadcasting System.) The adaptation updated the action of the novel and presented it as happening in the present. The play is largely in the form of a series of live newscasts of an invasion of the earth by Martians. Out of about six million people who heard the broadcast around one million were frightened or disturbed to some extent because they believed, for a time at least, that what they were listening to was actually happening. Out of this million people several thousand were severely panic-stricken. All these people thought that the newscasts that they heard on the radio that evening were genuine ones and not fabricated ones that were part of the Mercury Theatre’s play.

Clute and Nicholls (1993, p. 1300), writing in *The Encyclopedia of Science Fiction* many years later, say that from the script of the radio play it is clear ‘that neither Koch nor Welles could have intended to hoax the radio public. Though it was indeed presented in the form of a series of emergency newscasts, dramatic devices (the passage of hours, for instance, in a few minutes of radio time) were conspicuous even during the first half of the broadcast, which caused the most panic; the second half, after a brief programme break, was set several days later.’ Clute and Nicholls, however, had the luxury of being able to *read* the script that Howard Koch had written. Reading a script is a very different matter from listening to a play on the radio. When you are reading you can refer back to what you read earlier. You can also put the script aside for a while and think about it. You have the leisure to make notes on the text and analyse it and maybe also look up what other people have written about it. When you are listening to a play on the radio, however, you do not have the opportunity to do any of these things, with the possible exception of making notes, as you listen. Making notes on a radio programme as you listen to it, however, is not something that many people do. Cantril (1982) investigated the panic caused by Orson Welles’s version of *The War of the Worlds* and he found that some people had not heard the beginning of the play. Others turned off their radios after the first few programme interruptions and went to find loved ones. There were, in fact, many reasons why people did not register the features of the play or the circumstances of its broadcast that would have alerted them to its fictional status. Eventually, though, again for a variety of reasons, people did realise that they had been listening to a play.

political situation There are times when we take the political situation of the country in which a radio station is based into account when assessing the correctness of an assertion that someone makes in the course of a programme broadcast by that radio station. This happens, for example, in times of war. It is often said that the first casualty of war is truth. When a country is at war, restrictions are likely to be placed on journalists covering the war. It is also likely to be the case that a certain amount of patriotic propoganda will find its way onto the air waves at such a time.

3.3 Factors Relating to the Assertor

Sometimes there are things that we know about the person making an assertion that influences our assessment of the correctness of what is said on the radio. Such information can be placed in seven main categories. These relate to the role that the assertor plays in the programme concerned, the assertor’s ideology, the character of the assertor, any possible agenda that the assertor may have in appearing on the radio, any relevant expertise that the assertor may have (if talking about some specialist topic), the age of the assertor and the assertor’s gender. (I have discussed some of the assertor’s properties that may make an agent wary of accepting what that assertor states in the case that the assertion is uttered in the flesh in (Diller 2000b, p. 228). I

have also looked at some of the author's properties that may cause an agent to reject what that author has written in a book (Diller 2001, p. 345) or a journal article (Diller 2000a, pp. 75–76). There are similarities between those accounts and this section, but the present version is much more thorough and detailed.)

role A variety of people make assertions that are broadcast on the radio and the capacity in which a person appears in a programme or the role that they play in that programme can influence our assessment of the assertions that they make. There are several roles that people can play in a radio programme. For example, a person can appear as a journalist reporting on a particular news story, as an eyewitness of some newsworthy event, as a commentator, as an expert or as a presenter. There are many ways in which the role a person has in a radio programme may affect our assessment of that person's assertions. For example, if a person appears as the eyewitness of some newsworthy event, we may give great credence to what they say. They were, after all, present at the event and saw it with their own two eyes. Sometimes the role that a person has in a programme is much more important than that person's character. For example, the character of a newsreader is irrelevant to an assessment of the information that he transmits. He is, after all, reading what other people have written. A person who rates the BBC highly as a source of trustworthy news does not do so because the BBC employs newsreaders who are reliable people in their private lives. Such a person is likely to think highly of the BBC because of the ethos and traditions of that organisation.

ideology If a person hears a statement on the radio and he knows that the assertor has a very different ideology from his, then his initial reaction may be to be very dubious about the correctness of the assertion that he heard, though he may, for various reasons, seek to counteract this tendency. For example, for decades the politics of Northern Ireland has been dominated by the opposition between the majority Protestant community and the minority Catholic community. Members of each community are very distrustful of members of the other side. A Catholic hearing Ian Paisley, the leader of the Democratic Unionist Party, speaking on the radio, for example, is unlikely to be impressed by what he hears. Similarly, a Protestant hearing Jerry Adams, the President of Sinn Fein, is likely to be very wary of accepting anything that he says.

character A radio listener may have some knowledge about the character of the person making an assertion that makes him wary of accepting it straightaway. People do have a tendency, for example, to think of others as being reliable or unreliable. To take an extreme case, a listener is unlikely to believe what a person he knows to be a habitual liar asserts on the radio.

agenda If we know something about the goals or the agenda of a person we hear speaking on the radio, then this may make us wary of accepting his assertions at face value. For example, if the assertion is made by a politician during a party political address broadcast on the radio, then we may be very sceptical

about the correctness of what the politician says. We know that he wants us to cast our vote for his party and that this goal influences everything that he says. The tendency to distrust a politician is probably greatest amongst voters who belong to a different party, but nowadays people tend to distrust politicians of all persuasions. To take another example, a listener may hear an interview with a celebrity on the radio who has just written a book. The listener may be wary of believing what this celebrity says because he knows that she is trying to get people to buy her book. That such interviews continue to take place shows that they do influence people to buy books marketed in this way and not everyone is aware of what is happening.

expertise When we hear somebody talking on the radio about some specialist topic, we are likely to believe that person if he is an expert on the subject he is talking about. Conversely, if the person is not an expert on the subject he is talking about, then we are likely to be very sceptical of what he says. Of course, on some occasions this tendency of ours might prevent us from learning something useful.

age Sometimes the age of a person that we hear on the radio influences the way in which we assess what that person says. Some listeners may, for example, become sceptical when they realise that the speaker is a child or a very old person.

gender It is possible that the gender of the assertor affects how a listener evaluates what that person says on the radio. To take an extreme example, a misogynist is likely to be wary of accepting what he hears a woman assert on the radio.

3.4 Factors Relating to the Manner of Delivery

According to Lyons (1977, pp. 637–638), ‘There is much in the structure of languages that can only be explained on the assumption that they have developed for communication in face-to-face interaction.’ In order to help analyse how this helps in understanding various aspects of a language he introduces the notion of the *canonical situation of utterance* which ‘involves one-one, or one-many, signalling in the phonic medium along the vocal-auditory channel, with all the participants present in the same actual situation able to see one another and to perceive the associated non-vocal paralinguistic features of their utterances, and each assuming the role of sender and receiver in turn’ (Lyons 1977, p. 637). Although Lyons is interested in explicating the meaning of various features of language, the primacy of the canonical situation of utterance also applies to epistemological concerns. All of us learn our first language in a social context and as we learn how to speak we also acquire beliefs through accepting what we are told. In due course, we learn not to trust everything that we are told. We are taught what to look for in an assertion that may indicate that it is not worth accepting. To begin with, all this happens in canonical situations of utterance. Elsewhere I have analysed in great detail the various features of an assertion and the context in which it is made, when that assertion is made by someone to us in the flesh, that may make us wary of accepting it (Diller 2000b). Some of these relate to non-verbal features (Diller

2000b, pp. 228–229). For example, a person’s body language may make us think that he is lying to us. Clearly, such features are not available to us when we are listening to the radio. There are, however, features of the way in which someone speaks that may make us think that he is not being completely truthful. When an agent is listening to the radio all he has to go on is what the assertor says and the way in which he says it. I will look at features of the content of an assertion that may make an agent wary of accepting it in the next section. Here I will look at the manner in which someone speaks.

intonation There may be something about the way a person speaks that alerts an agent listening to the radio that that person is lying. It is also the case that if someone is inarticulate or lacks charisma, this may make us wary of accepting his assertions. With experience, we may realise that some very charismatic people are far from being truthful. Many politicians and charlatan messiahs, for example, are extremely articulate, but they usually have other goals than an honest quest for the truth.

3.5 Factors Relating to the Content of the Message

There may be features of the content of an assertion that we hear on the radio that alerts us to the possibility that it may be inaccurate. Such features include the coherence or the consistency of the message conveyed, whether it induces any strong emotion in the listener, whether it is about something that is out of the ordinary and whether it is about the sorts of thing that people often lie about or make mistakes about. (I have discussed some of the assertor’s properties that may make an agent wary of accepting what that assertor states in the case that the assertion is uttered in the flesh in (Diller 2000b, p. 229). I have also looked at some of the author’s properties that may cause an agent to reject what that author has written in a book (Diller 2001, p. 345) or a journal article (Diller 2000a, p. 76). There are similarities between those accounts and this section, but the present version is much more thorough and detailed.)

consistency The content of an assertion that we hear on the radio may have characteristics that make us wary of believing it without further ado. One consideration concerns the coherence of the message and its internal consistency. Thus, we would not accept an inconsistent message or an assertion that was inconsistent with something else that we had recently heard on the radio. People rarely make straightforwardly inconsistent assertions, like ‘It is raining and it is not raining’, but they may well make two or more assertions that others may, being more logical and rational, see as being inconsistent.

As an example of hearing inconsistent assertions on the radio I will mention an incident that occurred a few years ago. I was listening to BBC Radio 4 on Saturday, the 21st of June 1997, and on the *Today* programme John Humphreys, one of the presenters, asserted that today was the solstice, but it was not the longest day of the year. Then, a few minutes later on the programme *Sport on 4* the presenter Cliff Morgan stated that today was both the solstice and the longest day. Thus, within a few minutes I had heard it asserted that the day on which

I was listening to the radio was both the longest day and it was not the longest day. The summer solstice is the day on which the sun is farthest from the equator and also when it touches the tropic of Cancer, whereas the longest day is that on which the time elapsing between sunrise and sunset is greater than on any other day of the year. There is no necessary connection between the two days. Hearing the two inconsistent assertions I thought it likely that John Humphreys was correct. The information broadcast on a news programme I considered to be more reliable than that broadcast on a sports programme. Had it been important for me to know whether or not the 21st of June was the longest day of 1997 I would have investigated the matter further, but as the issue did not interest me very much I did nothing further about it.

emotion The content of someone's assertion on the radio may create an intense emotional reaction in the listener and this may influence the way in which that person assesses further assertions from the same person.

extraordinary events The content of an assertion may be so out of the ordinary that we are very reluctant to accept it without further ado. For example, we may be listening to the radio and hear a programme about people who claim to have been abducted by aliens. The programme may contain many eyewitness accounts of people who claim to have encountered extraterrestrials. Some of these may go on to say that they had been taken inside the aliens' spaceships where they have been subjected to a variety of experiments. Although we generally accept eyewitness testimony, the experience of alien-abduction is so out of the ordinary for most of us that we are reluctant to admit that it really happens.

common lies and mistakes There are a number of topics that it is common for people to either lie about or to make mistakes about. During a war, for example, it is unlikely that a government will broadcast accurate information about the number of casualties suffered in a particular battle. This is something that governments often lie about. As an example of a situation in which people often make mistakes consider a demonstration, such as an anti-war rally. On a news item about the demonstration it is often the case that one of the organisers will be asked to state how many people attended the march. The figure he gives is invariably higher than the police estimate of the number of demonstrators. I do not want to suggest that the organisers of a rally deliberately lie about the number of people that participated in it, but they are keen to have a large turnout and so they will have a tendency to overestimate the size of the crowd that supports their cause.

3.6 Factors Relating to the Listener

There are a number of properties of the person listening to the radio that may make that person wary of accepting what he hears being asserted. Here I will look at seven such features. These relate to the listener's pre-existing knowledge, to any possible consequences that result from accepting the assertion being evaluated, to the relevance

of the assertion to the listener, to the listener's character, to the maturity of the listener, to the listener's gender and to the situation in which the listener is in when he hears the assertion being asserted. (I have discussed some of the assertor's properties that may make an agent wary of accepting what that assertor states in the case that the assertion is uttered in the flesh in (Diller 2000b, pp. 229–230). I have also looked at some of the author's properties that may cause an agent to reject what that author has written in a book (Diller 2001, p. 346) or a journal article (Diller 2000a, pp. 76–77). There are similarities between those accounts and this section, but the present version is much more thorough and detailed.)

pre-existing knowledge Whether or not we accept an assertion that we hear on the radio may be influenced by our pre-existing knowledge. For example, if the assertion is straightforwardly inconsistent with what we already know and we are confident of the truth of the statements that it is inconsistent with, then we are unlikely to accept the assertion outright. Some of the people who listened to the Mercury Theatre's production of *The War of the Worlds* and who were not sure initially if they were hearing a real news story or a play came to the conclusion that it was fiction because of their pre-existing knowledge. For example, Cantril (1982, p. 90) mentions a listener who had been in the army. He listened to the radio play and heard that something had landed at the Wilmuth Farm, Grovers Mill, New Jersey. He knew this area quite well as he did not live very far from it. When it transpires that this is a spaceship and Martians emerge from it, four companies of State Militia are dispatched from Trenton to Grovers Mill. At this stage, the former soldier was certain that he was listening to a hoax because he knew from his time in the army that there were not so many infantrymen in the vicinity to be sent to Grovers Mill. (The interviews that Cantril draws on were conducted several weeks after the initial broadcast of the play and this listener actually said the he knew that 'there were not three regiments of infantry in the vicinity', whereas in the play 'four companies of State Militia' are mentioned. (Cantril 1982, pp. 90 and 19). This interviewee's memory does not affect the point that I am making.)

consequences We sometimes take the obvious consequences and repercussions of accepting an assertion heard on the radio into account when deciding whether or not to accept it. For example, if the message is such that accepting it would have a profound effect on the listener's current plans, life-style or belief-system, then some people would be unlikely to accept it outright, even if it comes from a reliable source who shows no signs that he is lying. Of course, not everybody would react in the same way. Some people have such a respect for authority that they will believe what a person in authority says even if this means making a big change in what they had planned to do. In investigating the panic cause by Orson Welles's version of *The War of the Worlds*, Cantril (1982) noticed that different people reacted differently to what they heard. One twenty-year old student was returning to college with his friend after visiting the friend's girlfriend. He turned on the radio and heard some of Welles's play, but he did not know

it to be a play. He heard that the route to Trenton was closed. He stopped at a drugstore to phone his family, but could not get through because all the lines were jammed. Together with his friend they decided to go back and rescue the friend's girlfriend. He also turned off the radio to avoid hearing further bad news. Later that night he finally realised that what he had heard had been a play. He was so shaken up by the experience that he could not digest his food properly for the following four days (Cantril 1982, pp. 168–169). Here we see someone altering his plans because of what he heard and accepted on the radio.

relevance We consider the importance of the message and its relevance to us. We tend to be less critical of assertions that are not particularly important to us than those that are really important to us. For example, at 8pm on Thursday, the third of January 2002, the BBC broadcast a documentary about General Wladyslaw Sikorski on Radio 4 entitled *One Night in Gibraltar*. People listen to the radio for a variety of reasons and it is possible that someone with no interest in the history of the Second World War had the radio on at that time while she was doing some ironing for her husband and left it on as background noise. On this programme a large number of assertions were made. For example, it was asserted that in his youth Sikorski had fought for the independence of Poland, that he had been Prime Minister of Poland, that he died on the 4th of July 1943 in an air crash off the coast of Gibraltar, that his body was brought to shore in a small boat, that a secret RAF inquiry was hurriedly assembled two weeks after the crash and came to the conclusion that the crash was an accident, that there were no less than four air accidents in which Sikorski's plane was involved in a period of 18 months and at least two of these were definitely the result of sabotage and that in 1969 the then British Prime Minister, Harold Wilson, set up a new secret inquiry which concluded that sabotage could not definitely be ruled out as a cause of the air crash that killed Sikorski. My hypothetical listener with no interest in the Second World War is likely to simply accept all these assertions or, at least, those that she happens to hear. She has no special interest in the subject-matter of the programme and no reason to doubt what she hears. By contrast, a person with a keen interest in the history of the Second World War is likely to listen carefully and critically evaluate what he hears in the light of his pre-existing knowledge.

character The character of the listener to a radio programme may influence his assessment of assertions that he hears. For example, a creative person may be willing to accept assertions that are out of the ordinary, whereas a less creative person may be wary of accepting such assertions or even thinking about them.

maturity A person's maturity may influence his assessment of the assertions that he hears on the radio. Thus, an adult is likely to be far less credulous than a child. Adults have learnt from other people and their own experience that people are not always as truthful as they ought to be.

gender Some people, such as Tannen (1992), claim that there are differences between men and women in how they react to information, especially that coming from an expert. To put the matter crudely, men are much more likely to be sceptical of experts and women are more likely to accept expert opinion.

listening situation In his study of the aftermath of Orson Welles's broadcast of *The War of the Worlds*, Cantril (1982, p. 142) mentions that some people miscategorised the programmer as fact because they listened to it with other people:

We know that for some individuals the tumult of a group, especially if its members are excited, somehow retards their intellectual activity. They like to be alone or at least in a quiet place when they must reason something out. They are unable to concentrate with so many distracting stimuli around them.

A person who likes to be alone to think things through may well react differently to the same assertion depending on whether he is alone or in a group when he hears it.

4 Conclusion

Many problems have to be overcome before scientists will succeed in building a humanoid robot with intellectual abilities analogous to those possessed by human beings. Although it may be impossible to build such an android, it is sensible to design androids, at least initially, whose abilities are similar to human intellectual ones. This is because, in designing an android, it makes sense to design one that human beings can interact with. If the android was very different from us, then it would be difficult to interact meaningfully with it. In this paper I have looked at some of the problems that arise from the fact that human beings need a great deal of information in order to be fully-functioning members of any human society. It is impossible for them to generate all this knowledge for themselves. Most of this knowledge comes from other people. Any android that we design and build would be in the same position. Before we can even begin to design an android we have first to understand the abilities that humans have. In this paper I have further developed my two-stage model of belief-acquisition. In particular, I have looked at how people acquire information from the radio and I have mentioned many factors that may cause us to override the defeasible rule to believe others. A great deal of work still needs to be done before we can implement a realistic model of belief-acquisition in a computer program. I have, however, done some of the ground-breaking work on this topic. I hope that some people reading this paper will be stimulated to join me in this exciting, but sadly neglected, field of AI research.

References

- Brooks, R. A. (2002). *Robot: The Future of Flesh and Machines*, Allen Lane: The Penguin Group, London.
- Cantril, H. (1982). *The Invasion from Mars: A Study in the Psychology of Panic, With the Complete Script of the Famous Orson Welles Broadcast*, paperback edn, Princeton University Press, Princeton (New Jersey).
- Charniak, E. and McDermott, D. (1985). *An Introduction to Artificial Intelligence*, Addison-Wesley Series in Computer Science (consulting editor: Michael A. Harrison), Addison-Wesley, Reading (Massachusetts).
- Clute, J. and Nicholls, P. (eds) (1993). *The Encyclopedia of Science Fiction*, Orbit, London.
- Diller, A. (1999). The belief-filter component, *Cognitive Science Research Papers CSRP-99-9*, School of Computer Science, University of Birmingham.
- Diller, A. (2000a). Evaluating information found in journal articles, in Á. Nepomuceno, J. F. Quesada and F. J. Salguero (eds), *Logic, Language and Information: Proceedings of the First Workshop on Logic and Language: Instituto de Lógica, Lengua e Información, Universidad de Sevilla, Sevilla, 29, 30 de noviembre y 1 de diciembre de 2000*, Kronos, Sevilla, pp. 71–78.
- Diller, A. (2000b). Everyday belief-acquisition, in G. P. Henning (ed.), *Argentine Symposium on Artificial Intelligence (ASAI2000) Proceedings: Tandil, September 5–7, 2000*, Sociedad Argentina de Informática e Investigación Operativa (SADIO), Buenos Aires, pp. 221–232. This paper is also available on the Internet at the following URL: <http://www.cs.bham.ac.uk/~ard/papers/asai2000.html>.
- Diller, A. (2001). Acquiring information from books, in M. Bramer, A. Preece and F. Coenen (eds), *Research and Development in Intelligent Systems XVII: Proceedings of ES2000, the Twentieth SGES International Conference on Knowledge Based Systems and Applied Artificial Intelligence, Cambridge, December 2000*, Springer, London, pp. 337–348. This paper is also available on the Internet at the following URL: <http://www.cs.bham.ac.uk/~ard/papers/es2000.html>.
- Diller, A. (2002). A model of assertion evaluation, *Cognitive Science Research Papers CSRP-02-11*, School of Computer Science, University of Birmingham.
- Diller, A. (2003). Designing androids, *Philosophy Now* (42): 28–31.
- Edmonds, D. and Eidinow, J. (2001). *Wittgenstein's Poker: The Story of a Ten-minute Argument Between Two Great Philosophers*, Faber and Faber, London.
- Johnson, A. G. (2000). *The Blackwell Dictionary of Sociology: A User's Guide to Sociological Language*, second edn, Blackwell, Oxford.

- Lyons, J. (1977). *Semantics*, Vol. 2, Cambridge University Press, Cambridge.
- Moravec, H. (1999). Rise of the robots, *Scientific American* **281**(6): 86–93.
- Popper, K. (1974). Intellectual autobiography, in P. A. Schilpp (ed.), *The Philosophy of Karl Popper: Book 1*, Open Court, La Salle, pp. 3–181.
- Tannen, D. (1992). *You Just Don't Understand: Women and Men in Conversation*, Virago Press, London.