For centuries, scholars and scientists have dreamed of a mechanical device with the power of language. That dream is now a reality. The language machine that will listen, understand, translate and speak is rapidly becoming a part of everyday life. This book, commissioned by The British Council from Eric Atwell at the University of Leeds, explores some of the technological, social and educational implications of language machines in the years to come. Will we need to learn languages in the 21st century?
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Imagine picking up the telephone to speak to someone in another country. You have no common language but you are still able to communicate, each of you speaking and hearing your own language.

This is the power of language engineering.

– Linglink Project Report to the EU (1997)
Preface

How will computers be used for language learning in 2020? Will we still be learning languages at all? This book goes some way towards answering those questions.

Potentially, computers let you choose your own speed of learning, your own method, and your own vocabulary to reflect your own interests. The concept of ‘the classroom’, where learning takes place in groups for economic reasons, is itself under threat. The success of individual computer-based learning in subjects such as maths and physics has already proved that.

But isn’t language a social skill? Language, yes. Language learning, not necessarily. Teachers may soon be able to concentrate on productive tasks, while the donkey work of practice takes place between individuals and their computers.

So language use will never be replaced by machines? We can’t be sure of that either. This book shows how close we are to Douglas Adams’ babelfish becoming reality. There is no point in suggesting that diplomats will never negotiate via a translation machine, or that politicians will never rouse a crowd of people with translation machines stuck to their ears. If the technology is available, people will use it.

The technology of the language machine may have begun crudely, perhaps even comically. But if one day, I find myself speaking Welsh while my wife answers in Slovak, who will need a world language?

Watch this space: this is how the motor car began.

Rhodri Jones
Manager, English 2000
The British Council

Progress and Prospects

‘The success of language engineering research and technological development is bound to have an impact on our economic future because it can be applied across such a wide range of information systems and services with such significant benefits.

... The information society will permeate virtually every area of life involving interactions between people and organisations, in both the public and private spheres. [Language Technology] will enable the information society through intuitive, human-centred modes of interaction with products and services. These will include spoken interaction, removing the need for keyboards and keypads, the use of many different languages to process information and interact with devices – as well as the ability to communicate across language barriers.’

Language Engineering: Progress and Prospects ‘98,
The EU Commission (1998)
Surveying the territory

Language machines — machines that in some sense simulate human language and human language behaviour — are used daily around us. Indeed, such machines already have a long history, and have acquired a place in our culture and our expectations.

This book provides a survey of the current state of speech and language technology, focusing particularly on machine translation and speech recognition, highlighting the histories and academic disciplines contributing to their development; it examines the components and technologies; possible pitfalls; main developers; current and potential uses; predicted developments; and paints some likely scenarios for the future impact of the language machine. Finally, this book focuses on current and prospective developments that could have an impact on demand in the marketplace for language teachers and language-based professions in the foreseeable future.

It may help to define what constitutes ‘the foreseeable future’. The Future of English? (Graddol, 1997) contains projections for as far ahead as 2050; the BT Technology Calendar (page 12) includes predictions to 2045. The developments alluded to in this book are based on an arbitrary forward look of approximately 20 years.

Precise predictions are of course, dangerous: nobody knows for sure what the rate of progress will be in language machine development. Yet what we can be sure about is that personal computing technology is developing — at an almost alarming rate. We need only to look around to see that many applications which once seemed impossible or fantastical, are possible today.

The impact?

The question, ‘What will it all mean?’ is a fundamental one, and is addressed at many points throughout this book. Here, it may be easier or preferable to explain by example. The following passage from the Linglink Project Report to the EU (1997) illustrates some prospective uses and markets for the language machine, which may themselves
form a starting point for a consideration of possible implications:

‘Think how much more easily you could use your computer, by simply telling it what to do. Suppose also that many of the features of your car were voice operated, such as using the telephone, selecting a CD, opening the windows, and learning about traffic conditions ahead.

Consider how much time you would save if a computer could find exactly the information you are looking for, from multilingual sources, and do it much more efficiently than you.

Imagine picking up the telephone to speak to someone in another country. You have no common language but you are still able to communicate, each of you speaking and hearing your own language.

Access to systems and services through natural language will make them available to everyone. The barriers will be gone. Machines will understand what we tell them and we shall understand each other better.

Through language engineering we can find ways of living comfortably with technology. Our knowledge of language can be used to develop systems that recognise speech and writing, understand text well enough to select information, translate between different languages, and generate speech as well as the printed word.

By applying such technologies we have the ability to extend the current limits of our use of language. Language enabled products will become an essential and integral part of everyday life.

This is the power of language engineering; using the power of language.

Linglink Project Report to the EU (1997)
What makes a language machine?
The term language machine is used throughout this book, but it is really an umbrella term for several developments in computer technology. Such developments will provide us with opportunities to carry out familiar tasks in new ways. For example, we will be able to do the following:

* talk to machines and have them transcribe accurately what we have said (speech recognition);
* talk to machines and have them understand the basic content of what we have said, so they can respond appropriately to a question about information that they contain, or to which they can provide access (speech understanding);
* use machines that translate words automatically from one language to another (whether we input words by speech, handwriting, by scanning text or using a keyboard), or use machines to translate our words to several languages (machine translation);
* produce a draft of our words in another language for subsequent refinement (machine-assisted translation);
* read out loud screen-based text such as email, Web pages or word-processed documents (speech synthesis);
* search through databases of multilingual documents without needing the ability to speak, type or read all of the languages involved;
* issue commands to ‘intelligent devices’ – such as a car radio or a mobile phone – using only our voices;
* speak to a computer and get feedback on the ‘correctness’ of pronunciation or the appropriateness of lexical choices and grammar style;
* use computers interactively in the teaching of languages.

At the heart of each of these lies a model of language that understands not simply the *vocabulary* of one or more languages, but also *grammar, syntax and semantics*.

A language machine is therefore a computer that is capable, in one way or another, of extracting and acting on the meaning of words.