CHAPTER 1: SETTING THE SCENE

*Once upon a time there was a teddy bear called Twink--*and with those few words, the scene is set. We know what we're talking about. Twink's story can begin

This story can't begin so quickly, however. For we *don't* yet know what we're talking about. Some readers may know very little about cognitive science at this stage. Even more to the point, those who are already familiar with it think of it in varying ways. That was true right from the start, and it's even more true now. (So it's no accident that the summary chapter of a recent book is subtitled: "It's Cognitive Science--But Not As We Know It"--Wheeler 2005: 283.)

One of the founders of the field, when asked to define it, confessed that "Trying to speak for cognitive science, as if cognitive scientists had but one mind and one voice, is a bum's game" (Miller 1978: 6). And twenty years afterwards, two longtime leaders edited a book called *What Is Cognitive Science?* (Lepore and Pylyshyn 1999). You'd think they'd know by now! But no: even in the textbooks, never mind coffee conversations and idle chat, definitions differ.

I shan't list them: the boredom barometer would shoot through the roof. However, the differences do make a difference. This will become clearer throughout the following pages, as we see how theory and practice have changed (in some cases, coming full circle). Meanwhile, before starting the story, some scene setting may be helpful.

One way of saying what we're talking about is to give some examples of the wide-ranging questions studied by cognitive science. I'll do that in Section i. And I'll do it in everyday language: the technicalities can wait until later.

Another is to give a definition of the field, even if this can't be presented as *the* universally agreed definition. I'll do that in Section ii. This, I hope, will help to show why I've decided to tell the story in the way I do.

Finally, in Section iii, I'll identify a number of traps that lie in wait for anyone discussing the field's intellectual history.

1.i: Mind and Its Place in Nature

A host of intriguing questions about mind and its place in nature occur to most thinking people. (The FAQs of the mind, Web-users might say.) As explained in the Preface, some have puzzled me for almost as long as I can remember--and I usually found that my friends were puzzled by them too. They centred on the nature of mind and the mind-body problem; the evolution of mind; freedom and purpose; and how various psychopathologies are possible.

Most of the topics studied in cognitive science fall under one of these broad categories. And those which don't, such as the nature of *computation*, are closely related to them.

a: Questions, questions ...

We're intrigued by consciousness, for example. We know there are close correlations between brain events and conscious states--but why is that so? The answer seems to be that our brains generate our consciousness. But how do they do this, in practice? Even more puzzling, how *can* they do this, in principle?

Or maybe we only *think* we know this? Some people argue that it *doesn't even make sense* to suggest that there are correlations between conscious states and brain states. How could anyone with any common sense be led to make such a deeply counterintuitive claim? Perhaps "common sense" itself is radically misguided here (and was radically different in other historical periods)?

What about dogs and horses: are they conscious? And snails, flies, newts ...? For that matter, what about newborn babies: are they conscious in *anything like* the sense in which adult humans are? What of machines? Could a machine be conscious--and if not, why not?

People often wonder whether a creature has to have a brain, or something very like one, to be intelligent. If so, why? Is a brain (as well as eyes) needed to *see*, for example? What do the visual brain cells do that the retinal cells don't? What about intelligent *action*? How, for instance, does the brain convert an Olympic diver's intention to dive into the finely modulated bodily movements that ensue? If we knew this, could we drop talk of intentions and refer only to brains instead?

Consider chimps, or cats: what can *their* brains do, and what can't they do? And what can they do without the mammalian (and avian) glory, the cerebral hemispheres? Given that *Homo sapiens* evolved from lower animals, what does this tell us about our mental powers? Can anything interesting be learnt about the human mind by studying distantly related species such as frogs, or insects?

As for machines, just how--if at all--must an artifice resemble a real brain if it's even to *seem* to support a mind? And *even if* studying insects can teach us something about ourselves, what about studying inanimate tin cans--like a Marsrobot, or an automatic controller in a chemical factory? How could these things (sic) possibly be relevant? What mental powers does a human brain provide, and how does it manage to do so? How is free will possible? And creativity? Are creative ideas unpredictable, and if so why? What are emotions--and do they conflict with rationality, or support it?

Are our abilities inborn, or determined by experience? And how does the brain get its detailed anatomical structure: from genetics or from the environment--or perhaps even from spontaneous self-organization? (Is that last suggestion mere handwaving, more magic than science?)

Do we all share psychological properties that mould every human culture? Perhaps the same underlying sense of beauty: maybe in symmetry, or expanses of water? Or the same tendency towards religious belief? If so, is that because we've been evolved that way? Or are evolutionary explanations of human psychology mere Just So stories, no more plausible than the delightful tale about The Cat Who Walked By Himself (Kipling 1902)? Superficially, at least, cultures are hugely diverse ... but can they harbour *just any* conceivable idea?

In mental illnesses of various kinds, what's gone wrong: something in the brain, or something in the mind? What's the difference?

Sometimes, people say that only living things can have a mind. Is that true? If so, why? What is life, anyway? And how did it arise in the first place? Could a living thing be created by us?

Last, but by no means least, coffee-table chat abounds with puzzles about language. For instance, people wonder what *counts* as a language: why not birdsong? Can any non-human animals learn a language? If not, is that merely because we're better at learning, or because language is a human instinct? And what, exactly, does that mean? Is language needed for thought, or can some dumb animals think?

Can two different languages ever express exactly the same thought? Or is perfect translation impossible? Could a machine converse with us in English, or French--and would it understand us, even if it did? Imagine a machine that appeared to be solving problems and using language just like us: would that prove that it was truly intelligent?

None of these questions is new. (That's largely why listing them is a scene-setting equivalent of saying "Once upon a time, there was a teddy bear ... ".)

Some date back to Aristotle. Many, including those about language-using machines, were discussed in the 1630s by Rene Descartes. Others were considered by Immanuel Kant, Johann von Goethe, or Wilhelm von Humboldt in the late-eighteenth century. The rest surfaced in the nineteenth, or very

early twentieth, century (see Chapter 2).

Originally, then, most were discussed by philosophers. Some still are (the difference between *mind* and *brain*, for example). But even those need to be considered in light of the scientific data available.

Most of our Twink-questions were later developed--and some answered--by traditional scientific research in psychology, anthropology, neurophysiology, or biology. Since the 1940s, however, *every one* has been further sharpened by work in cognitive science.