

rudolf p. botha

the world of language

3 its capacities stratum



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Editorial

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Editors **SPIL PLUS**
Department of General Linguistics
University of Stellenbosch
STELLENBOSCH 7600
SOUTH AFRICA

Editors: Cécile le Roux
Kay McCormick
Mary-Ann Kemp

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THE WORLD OF LANGUAGE

3 ITS CAPACITIES STRATUM

by

Rudolf P. Botha

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This is the third of a series of studies painting a macroscopic picture of the architecture and dynamics of linguistic reality. It has to be read together with the first two, *The World of Language. 1 Its Crust* (= *SPIEL PLUS* 24, 1994) and *The World of Language. 2 Its Behavioural Belt* (= *SPIEL PLUS* 25, 1994). Without the generous assistance of Cecile le Roux, Walter Winckler, Theresa Biberauer and Christine Smit I would not have been able to make any progress with the project.

R.P.B.

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3 Language capacities

What does it mean to say that someone is 'a very poor speaker'? This, you may remember, is what the King called the Hatter in rebuking him for saying things such as:

'I'm a poor man, your Majesty ... and I hadn't begun my tea --- not above a week or so --- and what with the bread-and-butter getting so thin --- and the twinkling of the tea ---' [AIW 148]

Clearly, it was the oddness of utterances such as these that triggered the King's irate judgement. But in calling the Hatter 'a very poor speaker', the King most likely had something else, something deeper, in mind too. The Hatter, you see, didn't produce just the occasional wayward utterance; on the contrary, he spoke like this much of the time, even in formal settings. And so, the evidence he gave in the trial of the Knave --- who stood accused of stealing some tarts made by the Queen of Hearts on a summer's day --- was simply littered with such aberrant utterances. In all likelihood, therefore, the King had also meant that there was something seriously amiss with the Hatter's capacity to speak. And, for once, the King would have got it right: a very poor speaker is someone whose capacity to speak is less than up to scratch, not merely someone who accidentally produces an odd utterance now and then.

Which brings us to the general point: language behaviour presupposes various **language capacities**. That is to say, underlying the layer of language behaviour, linguistic reality must have a deeper layer, namely **the layer of language capacities**. It is on these capacities that we will focus in the present chapter, considering questions such as the following: What are the language capacities without which language behaviour would be simply impossible? By what macroscopic properties are these language capacities characterized? How are the various language capacities interlinked? In pursuing these and related questions, we will concentrate on the language capacities presupposed by the two more basic means of language behaviour, which --- to repeat -- are (i) speaking and (ii) comprehending spoken utterances.

Before beginning to explore the layer of language capacities, let us think for a moment about the whereabouts of this layer of the world of language. What matters here is that it is a hidden layer, covered as it is by the more outward layers of language products and of language behaviour. As a result, language capacities are even less amenable to direct inspection than language products or language behaviour are. To study the nature

and properties of language capacities, scholars have to use indirect means, in particular those of theory construction and theory testing. But, of course, the hypotheses that go to make up theories are in essence guesses, though of a constrained sort; so, understandably, scholars disagree even about macroscopic properties of language capacities. It follows, too, that the partial reconstruction offered below of the architecture and dynamics of the layer of language capacities can at best be tentative. But perhaps you find this entirely unsurprising. After all, we have reached this layer by falling down a conceptual rabbit-hole, travelling in the process through two other layers of the world of language. And like real rabbit-holes, conceptual ones also grow darker and darker as they wind downwards away from the surface. The deeper things lie, in short, the harder it becomes to make out what they are really like --- language capacities being no exception to the rule. But let us turn to the first kind of language capacities.

3.1 Capacities for language processing

Producing utterances and comprehending utterances, as we have seen, can be taken to be the two most basic forms of language behaviour. Producing an utterance of a sentence such as *The Cheshire Cat sat on a branch for a while*, for instance, involves 'transforming' an unobservable message into an utterance signal, which is a stretch of observable speech, writing or signing. And comprehending an utterance of a sentence boils down to recovering such a message from such a signal. What happens when someone produces or comprehends an utterance is called **(language) processing**. Now, producing utterances and comprehending utterances are not the same thing; so, on functional grounds, people can be expected to have two basic capacities for processing utterances: a **(language) production capacity** and a **(language) comprehension capacity**. In the case of spoken language, the first of these capacities is realized in what is conventionally called the **speech-production system**, and the second is realized in the **speech-comprehension system**.¹ It is with these two systems that we will be concerned below, considering them first from the point of view of their architecture, and then from the point of view of their dynamics.

3.1.1 Functional architecture

3.1.1.1 Speech-production system

On a well-documented view, the processes (or processing activities) involved in producing a spoken utterance can be partitioned into three macroscopic **processing components** or **processors**: the Conceptualizer, the Formulator and the Articulator.² Each of these components receives a certain kind of input and produces a certain kind of output. And the output of one of these processors can form the input to another one of them.

But what do the terms 'input' and 'output' mean here? To get to grips with this question, we can think of the raving Queen and her overworked Executioner as processors. Doing this, we can say the following: what the Queen takes as input are unsuspecting Wonderlanders (generally innocent, to boot); then, by applying to them a process of sentencing, what she produces as output are candidates for beheading. Taking these sentenced but still 'headed' creatures as input in turn, the Executioner processes them by means of his axe, transforming them into an output of headless bodies and bodiless heads. But let us get back to the processors, luckily less lethal, that operate in speech production.

The processing that takes place in the **Conceptualizer** --- called 'conceptualizing' in par. 2.3.1.1 --- includes everything that the speaker has to do in planning and putting together a preverbal message. This message, you may recall, consists of what the speaker intends to utter or convey, including knowledge, thoughts, feelings, wishes, sensations and so on. In the case of an utterance of *The Cheshire Cat sat on a branch for a while*, for example, the Conceptualizer forms three conceptual units --- an **EVENT** (the Cheshire Cat's sitting before the time of the utterer's speaking), the **PLACE** of that event (the sitting took place on a branch) and the **DURATION** of that event (the sitting lasted for a short while only); the Conceptualizer also, however, joins these three conceptual units into an output, namely a single coherent preverbal message.

In the case of a spoken utterance such as *The Cheshire Cat sat on a branch for a while*, the **Formulator** accepts as its input certain fragments of preverbal messages --- for example an **EVENT**, a **PLACE**, a **DURATION** and so on --- and produces as its output an articulatory plan. Also known as **encoding**, formulating involves two main subprocesses. In the first, **grammatical encoding**, formulating 'translates' a fragment

of conceptual structure into one or more syntactic units. In so doing, it selects lexical items whose meanings match parts of the intended conceptual structure or preverbal message. In the case of the past event of the Cheshire Cat's sitting, for example, formulating selects *the*, *Cheshire Cat* and *sat* as lexical items whose meanings match the EVENT fragment of the preverbal message. In addition, the lexical items selected in this way are grouped by formulating into specific ordered strings, for instance syntactic surface structure phrases such as the Noun Phrase *The Cheshire Cat* and the Prepositional Phrase *on a branch*. These syntactic phrases, in turn, formulating organizes into bigger phrases (such as the Verb Phrase made up of the verb *sat* and the Prepositional Phrase *on a branch*) and clauses (such as *The Cheshire cat sat on a branch for a while*).

Units or constituents of syntactic surface structure form the input to **phonological encoding**, the second main subprocess involved in formulating. By means of phonological encoding an articulatory or phonetic plan is built or retrieved for syntactic surface structure units such as words, phrases or clauses. Such a plan will specify for *Cheshire*, for example, that it forms the first, more heavily stressed part of a compound word; that it consists of two syllables; that the first syllable is phonetically more prominent (stressed) than the second one; that the first segment is /tʃ/ and so on. An articulatory or phonetic plan, it is held, represents a speaker's internal speech. This internal speech is not yet overt speech, but rather a programme for articulation that has still to be executed. Made up of the musculature of the respiratory, laryngeal and superlaryngeal systems, the **Articulator** takes as its input the chunks of an articulatory plan and produces overt speech on the basis of the information borne by these chunks.

As we noted in par. 2.3.1.1, speaking involves the speaker's monitoring both his/her internal speech and his/her overt (or external) speech. Through self-monitoring, a speaker checks whether he/she has been conceptualizing, formulating and articulating an utterance correctly. This self-monitoring allows the speaker to detect and correct errors in a flash. If this self-monitoring is done in a special processing component --- as some language scholars believe --- the **Monitor** is a complex 'character'. Its basic job is to judge the speaker's speech, both internal and overt. But this judging presupposes that the monitor comprehends such speech; also, the Monitor's judging leads it directly to repair what it judges to be bad in such speech. So, interwoven in monitoring, we find processes involved in the judging, comprehension and production of utterances.

To sum up: viewed within a macroscopic perspective, the architecture of people's **speech-production system** looks as follows:³

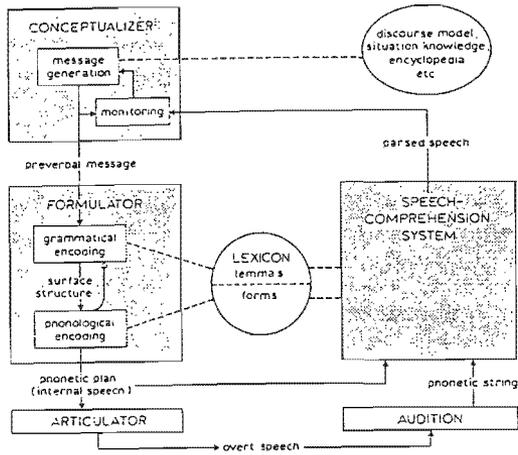


Figure 1: Levelt's (1989) Blueprint for the Speaker

It should be kept in mind that the processing components --- represented by the boxes in the diagram above --- are delimited on the basis of function. That is to say, processes that do the same kind of job in the production of utterances are taken to belong to the same component. This means, then, that the diagram presents a large-scale picture of the **functional architecture** of a speaker's speech-production system. Accordingly, the diagram is not to be taken as somehow directly picturing or mapping something physical, for example one or more parts of a speaker's body. This is a point to which we will return in par. 3.1.2 below.⁴

3.1.1.2 Speech-comprehension system

But what about speech comprehension? Is there really a separate system for the processing that takes place in the comprehension of an utterance such as *The Cheshire Cat sat on a branch for a while*? The diagram above, and in particular the big empty box labelled 'SPEECH-COMPREHENSION SYSTEM', suggests that people have a speech-comprehension system that is distinct from their speech-production system. Is there any evidence indicating that these two systems are genuinely distinct? At first glance, it may well appear more 'economical' for people to have a single system for language processing: a system used in one direction when utterances are being produced and simply used in reverse when utterances are being comprehended. But there are strong indications that linguistic processing is not done by a single dual-purpose processing

system. Rather, it appears, people have distinct systems for producing utterances and for comprehending utterances.

In this regard, something quite instructive happened towards the end of the curious croquet game organised by the White Queen in Wonderland. (Lewis Carroll kept quiet about this incident for reasons of his own; as you will see presently, the incident was a most tragic one.) Having flown into yet another purple rage over a player's unruly conduct, the White Queen began to shriek in a strange, halting way:

'Off with his ... er ... hair his hat ... er ... hand ... his whatsitname!'

And, turning to the Executioner, she continued in the same tentative way:

'Get on with it, examiner ... er ... exhumer ... I mean executor or whatsyername!'

In producing these utterances --- and they were followed by a string of similarly odd ones --- the Queen seemed unable to find the right words, specifically *head* in the first utterance and *executioner* in the second. She had no problem whatever, though, in comprehending things spoken to her by fellow-players. This is clear from the fact that she got even more agitated at various utterances of theirs: the King's perplexed exhortation *Pull yourself together, my dear!*, the startled March Hare's indignant protestation *I'm nobody's hare to be cut off!*, the Hatter's muttering of the inane phrases *Hats off to the Queen, hats off to her Majesty ...* and Alice's frightened cry *Oh dear, she's getting fierouser and fierouser!*

What the King and the others did not realize (not at first, at any rate) was that the Queen had suffered a stroke, which temporarily impaired her speech-production system. The stroke caused her to suffer what is known as **specific anomia**. This condition impairs certain processes of selecting or producing words of a specific sort, though without generally affecting other productive processes. Or --- and this is important to us --- without generally affecting processes involved in the comprehension of spoken utterances. Data about language pathologies such as specific anomia indicate that a language user's system for producing spoken utterances is not the same as his/her system for comprehending spoken utterances.⁵

This partly resembles the situation in which the White King employed more than one messenger:

'I must have *two*, you know [he explained to Alice] --- to come and go. One to come and one to go.' [TLG 280]

And, irked by Alice's question 'Why one to come and one to go!', the King repeated impatiently:

'I must have *two* --- to fetch and carry. One to fetch, and one to carry.' [TLG 280]

In a sense, the Queen had a 'fetcher' and a 'carrier' too. Whereas her 'carrier' was laid low by the stroke, her 'fetcher' remained unscathed, able to get on with its job as usual. For 'carrying', you see, people --- real ones and dream ones --- have a speech-production system, but for 'fetching' they have a separate speech-comprehension system.⁶

That brings us back to the empty box labelled 'SPEECH-COMPREHENSION SYSTEM' in the diagram represented above. What would the functional architecture of the speech-comprehension system look like? A 'blueprint for the listener or hearer' à la Levelt cannot be presented in any detail here. It is possible to identify on the basis of function, though, some of the macroscopic processing components that play a part in the comprehension of speech. These components include the following:

- the **Perceptor**, which identifies certain noises as speech sounds;
- the **Recognizer**, which, on the basis of the perceived sounds and other cues, decides what words have been uttered;
- the **Parser**, which 'parses' a string of words by assigning it an internal organization or a syntactic structure;
- the **Interpreter**, which assigns a parsed string of words an interpretation on the joint basis, firstly, of the meaning of the individual words and, secondly, of the relations holding among the words;
- the **Understander**, by whose working the interpretation of a parsed string of words is meshed with information from various other sources of meaning.

Drawing on information furnished in par. 2.3.1.2, the characterization of these processing components is at best suggestive. Different scholars working in the area of language comprehension will partition the various processing activities differently, thereby proposing different functional architectures for the speech-comprehension system.⁷

3.1.2 Nature and location

Even someone as argumentative as Humpty Dumpty would find it hard to deny that normal people have a speech-production system and a speech-comprehension system. But where do they have this?

A first, obvious response would be: 'inside the person's body'. Clearly, it might be argued, to produce the sounds of spoken utterances, a speaker uses his/her vocal tract. This tract is made up of certain organs (e.g., the lungs), muscles (e.g. those used for breathing), bony structures (e.g. the voice box), cavities (e.g. those of the nose and mouth), and so on; clearly, therefore, the vocal tract is something physical. And similar things might be said about the processing involved in the perception of utterances. For example, to perceive spoken utterances, a hearer/listener uses his/her auditory system: a system whose component parts are to be found in the outer, middle and inner ear, in the brain stem and in the brain itself. And all this, surely, means that the speech system is something 'bodily' too --- so the first response might conclude.⁸

But the first response won't do. To see why, think for example about the processing involved in conceptualizing and formulating in the case of speech production. Think, too, about the processing involved in parsing, interpreting and understanding, in the case of speech comprehension. The former processing, although it is 'productive', obviously does not take place in the vocal tract. Nor can the latter processing, which is 'comprehensive', be located in the auditory system.

But what about the brain? Surely the brain is the place where conceptualizing, formulating, parsing, interpreting and understanding take place? Surely, therefore, like the brain, these processes are physical too? Think, for example, of the fate of the White Queen. Surely the stroke affected a part of her brain; surely it was as a consequence of the stroke that she could no longer 'find the right words'? Surely this goes to show that the processing involved in 'finding the right words' is something physical --- indeed, to be more specific, something neurological.

Not quite. In the above line of argument an important distinction is overlooked, one illustrated in an amusing conversation that Alice had with the White Knight. A poor rider, the White Knight keeps falling off his horse --- to the front, to the rear, to the sides. But being made of sturdy stuff, he never lets himself be unduly upset by these frequent unsaddlings. Having tumbled headlong into a deep ditch on one occasion, for example, he goes straight on talking to Alice in his usual tone of voice. Feeling understandably baffled, she cannot resist asking him 'How *can* you go on talking so quietly head downwards?' The Knight looks surprised by Alice's question, and here is what he replies:

'What does it matter where my body happens to be?
... My mind goes on working all the same. In fact the more head downwards I
am, the more I keep inventing new things.' [TLG 304]

Though without a shadow of doubt a poor rider, the White Knight deserves credit not only for being a good talker, but also for having a good intuitive understanding of what talking involves: one talks with one's mind more than with one's body. That is, the processes involved in talking take place mostly in the speaker's mind. They are mental processes. The same is true of many of the processes involved in speech comprehension.

But what is one's mind supposed to be? On a widely held view, the **mind** is a symbolic system. The mind can construct symbols; and the mind can manipulate symbols in various thought or cognitive processes. **Mental symbols** or clusters of mental symbols serve to represent perceptions, ideas, beliefs, images, memories and so on. Collectively, the mental symbols that represent some perception, idea or the like form a **mental representation** of it. A **mental process** --- in particular a thought or **cognitive process** --- transforms one mental representation into another one. Conceptualizing, formulating, parsing, interpreting and understanding are typical instances of mental processes that transform certain mental representations into certain other mental representations.⁹

But what, then, is the mind as opposed to the brain? The mind and the brain are two sides of the same coin. To talk about the mind is to talk at an abstract level about something functional: something that does such things as thinking, imagining, perceiving, speech processing, and so on. To talk about the brain is to talk at a concrete level about something physical in which this functional something is 'realized'.

Obviously the functions the mind performs depend on the brain's physical mechanisms; if the brain's mechanisms are injured, the mind's functions are impaired too. This is illustrated by the White Queen's inability to 'find the right words' following the injury to her brain by the stroke. The relation between the mind and the brain has been compared by some scholars to the relation between a computer program on the one hand and a computer on the other hand. (The computer program --- a bit of 'software' --- contains a complex set of instructions for carrying out specific tasks. The computer --- a piece of 'hardware' --- is the physical machinery that executes/runs the program and thereby actually performs the tasks.) This comparison has formed the basis of what has become known as the **computer model of the mind**. On this model, the basic idea is that the mind is the brain's computer program.¹⁰

3.1.3 Features of the dynamics

Having considered in outline the functional architecture of the speech-production system and of the speech-perception system, we turn next to the dynamics of speech processing. Within our macroscopic perspective, we are interested in the general features of the processing that people engage in as they produce or comprehend spoken utterances.

3.1.3.1 Functional specialization

Neither in Wonderland nor in Looking-Glass Country will you find a gardener doing beheadings as a sideline, an executioner dabbling in cooking, or a cook working after hours as a ticket collector. In both of these dream worlds, such important offices are left to specialists to discharge: to an experienced Executioner, to two Footmen --- a fish and a frog --- in livery, to a ticket-collecting Guard, and so on. As for the few would-be all-rounders, such as the soldiers doing duty as arches in the croquet game, or the White King doubling as a judge in the Knave's trial, they are spectacularly unsuccessful at their unfamiliar jobs.

In the processing of speech, the same generally holds true. Much of what happens in the production or comprehension of utterances is done by specialist processes (or processors), not by general-purpose ones. It is not the case, for example, that both linguistic noise --- such as that produced in uttering *The scared Knave's teeth chattered uncontrollably* --- and nonlinguistic noise --- such as that made by the uncontrollable chattering of the scared Knave's teeth --- are processed by the same all-purpose

perceptual mechanisms. Rather, there is a specialist processor that is responsible for perceiving linguistic noise, that is, for perceiving the signals of spoken utterances.

The point under discussion may be illustrated with reference to the production of utterances too. In grammatical encoding --- the 'translation' of preverbal messages into structured strings of words --- cognitive processes such as those used in general problem-solving play no part. Data about language pathologies such as anomia indicate, for example, that the process responsible for the selection of the 'right' words is so specialised that its task cannot be successfully taken over by some general process. And the fact that the specialised process can be impaired by a stroke that leaves other productive processes unaffected is further evidence of the specialised nature of this process.

Indeed, nearly all the processes involved in speech production or perception are **functionally specialized**: they do (and can do) one, specialized, thing only. And the majority of these processes are **domain-specific**: they affect (and can affect) things of a specific kind only. Among the processes involved in speech production or perception, there appear to be only a few nonspecialist ones. For instance, (some of) the processes involved in the conceptualization of preverbal messages are believed to be involved in cognition in general.¹¹

3.1.3.2 **Autonomy**

When you come to think of it, the Executioner is a professional through and through. Not only is the nature of his job of a highly specialist sort; he also acts in a highly constrained way. He uses his axe only, remember, on those luckless Wonderlanders that are referred to him by the White Queen; as for the King's candidates for beheading, he consistently refuses to do anything about them. What is more, you won't catch the Executioner listening to advice from the Cook or asking assistance from the White Rabbit prosecutor when he has to deal with a particularly tricky assignment. Such as beheading the Cheshire Cat after its body has already vanished. No, when there is work to be done, the Executioner, self-reliant, acts very much on his own.

A similarly constrained functioning marks the specialist processes involved in the production and comprehension of utterances. Take, for example, grammatical encoding, (the family of) those specialist processes that 'translate' preverbal messages into syntactic phrases and clauses. Firstly, grammatical encoding operates on nothing but (chunks of) preverbal messages. Secondly, in building appropriate syntactic

phrases, grammatical encoding requires no information other than that contained in preverbal messages. Thirdly, in building such phrases, grammatical encoding does not use aid from other processes involved in the production of utterances. These three features manifest a general property of grammatical encoding: it is an **autonomous** process. So is phonological encoding, to mention a second example. Phonological encoding takes, as its exclusive input, the surface syntactic phrases built by grammatical encoding. And, solely on the basis of the information conveyed by the properties of these phrases, phonological encoding produces as its output a phonetic plan that has to be implemented in articulating the utterance (or utterance fragment). This kind of autonomy is considered to be characteristic of many of the processes involved in speech production and speech perception.

If the input of some process (or system of processes) is maximally restricted, and if the operation of that process (or system of processes) is minimally affected by the output of other (systems of) processes, the process (or system) is said to be 'informationally encapsulated'. Grammatical encoding, phonological encoding and various other processes involved in the production or comprehension of utterances are believed to have this complex property of **informational encapsulation**. To put it in terms of an image from the world of work: jobwise, these processes --- much like the Executioner -- are blinkered loners.¹²

3.1.3.3 Automaticity

In Wonderland, the social calendar provides for far more than chaotic sporting events and public executions. It also involves, for instance, the Mad Teaparty, thrown by the Hatter --- the event at which Alice first met the Dormouse. More squirrel than mouse, this fellow has the annoying habit of constantly dropping off to sleep. To wake it up, the Hatter and the March Hare have to do such unpleasant things to the Dormouse as pinching it or pouring hot tea onto its nose. And they abuse the Dormouse further by resting their elbows on it and by trying to put it into the teapot. But none of this has much effect on the Dormouse's behaviour for, as it says --- in its sleep, of course ---

'I breathe when I sleep' is the same thing as 'I sleep when I breathe'. [ATW 95]

Indeed, falling asleep and breathing are in an important sense the same kind of thing to the Dormouse: it doesn't have much conscious control over either. Just as it breathes automatically, so it sleeps automatically.

Some of the processes involved in the production and comprehension of utterances have the property of being **automatic** too. That is to say, these processes are not under the language user's central or executive control. A speaker-listener does not intend to perform these processes, nor is he consciously aware that they are taking place. In the case of speech production, the processes of grammatical encoding, phonological encoding and articulating are cases in point; in the case of speech comprehension, so is parsing. For example, in producing an utterance of the sentence *The Hatter offered Alice a cup of tea* or *The Hatter gave a cup of tea to Alice*, the speaker does not consciously decide to use an indirect object (*Alice*) or an oblique object (*to Alice*) for encoding the recipient of GIVE grammatically. Nor will he/she be aware of selecting the word *cup* for denoting the artefact in question.

Some of the processing that takes place in speaking is highly controlled. For example, the conceptualizing involved in the planning and construction of preverbal messages requires speakers to make various kinds of conscious choices. Let us note here just three such kinds of conscious choices. Firstly, speakers often have to decide deliberately which items of information to include and which to leave out. Secondly, they usually have to reflect on the best logical structure by which to represent the items included in a certain message. Thirdly, they often have to reflect on the best way in which to develop a certain train of thought. (The Duchess has an intuitive understanding of the non-automatic nature of conceptualizing as opposed to the automatic nature of articulating, an understanding captured in her moral 'Take care of the sense and the sounds will take care of themselves' [AIW 121].)

Monitoring represents another (system of) process(es) requiring a speaker to pay conscious attention to his/her internal or overt speech. Errors are normally detected and repaired almost instinctively. But in certain cases, speakers have to ponder the nature of a particular error and the best way to repair it. Fortunately for the majority of speakers, they are unlikely to agonize over errors in the same way as the White King. For example, having incorrectly labelled as 'important' a piece of evidence given by Alice at the Knave's trial, the White King tries to repair his error in the following floundering fashion:

"Unimportant, of course, I meant", and went on in an undertone, "important --- unimportant --- unimportant --- important ---" as if he were trying which word sounded best.' [AIW 155]

Returning to automatic processes, let us note that they are typically characterised by a number of other interesting properties, to be considered directly below.¹³

3.1.3.4 Mandatoriness

Automatic processes are mandatory too. To see what this involves, consider the following problem experienced by Alice, a problem which you unfortunately won't find mentioned in any officially published account of Alice's adventures. Towards the end of the croquet game, she gets so fed up with the way the Queen repeatedly shrieks *Off with her head!* that she can't bear the thought of having to hear the wretched phrase even one more time. Since she doesn't want to leave the scene of the action, Alice desperately thinks of means of blotting out the Queen's shrieks. She tries the obvious thing, sticking her fingers in her ears; it doesn't really work, though, the Queen's voice being so shrill. And Alice tries to concentrate hard on listening to something else, including the heated argument between the King and the Executioner about the possibility of beheading the already bodiless Cat. But still she can hear the Queen shouting *Off with her head!*

The real problem, you see, is that Alice is unable to switch off the processes involved in her speech-processing system. Nor can she will herself to hear the utterance *Off with her head!* as meaningless nonlinguistic noise. The automatic processes involved in the comprehension of speech are, as you may have guessed by now, **mandatory**: whenever people hear an utterance of a sentence in a language they know, they simply cannot help hearing it as an utterance of that sentence.¹⁴

3.1.3.5 Dumbness

Normally, being automatic makes a process dumb as well. But what kind of dumbness are we talking about here? A clue to the answer may be found in what happens in the course of the Mad Teaparty when the Hatter decides that he needs a clean cup:

"I want a clean cup", interrupted the Hatter: "let's all move one place on."

He moved on as he spoke, and the Dormouse followed him: the March Hare moved into the Dormouse's place, and Alice rather unwittingly took the place of the March Hare. The Hatter was the only one who got any advantage from the change; and Alice was a good deal worse off than before, as the March Hare had just upset the milk-jug into his plate.' [A/W 102]

The way in which Alice, the March Hare and the Dormouse behave here is quite interesting. Note that, though they could each move on by say, four, places, instead they do a highly 'local' thing in each moving on by one place only; that they move on blindly without considering how they will be affected by their action; that they (specifically Alice) are confronted with problems caused by their blind action. One could therefore say that in this scene, Alice, the March Hare and the Dormouse are acting in a dumb way.

Certain processes involved in speech processing, notably parsing, are viewed as dumb or 'deeply unintelligent' in a related way. On this view, the Parser processes an utterance such as *The Cat sat on a branch for a while* by examining the words of the uttered sentence one after the other as they are received. And, in working out the constituent structure of the sentence, it responds to each word in a specific, local, way: it tries to link a word up directly with the immediately preceding word. *Cat*, for example, is linked up with *The* to form the bigger constituent *The Cat*. Often, however, this deliberately simple-minded way of analyzing (the sentence underlying) an utterance gives wrong results: for example, when *sat* is directly linked up with *Cat*. The candidate constituent *Cat sat* is simply not one of the real constituents of the utterance *The Cat sat on a branch for a while*. If the Parser did its work in a 'smarter' way, it would act more like a good detective: it would examine the whole of the utterance for clues about its constituent structure. Only after trying to look at all the evidence would it offer its candidate analysis of what this whole structure might be. In other words, it would be analyzing in a global way. Trying to look at all the evidence, a 'global' Parser would try to test each candidate constituent by first working out the consequences of accepting it. This kind of check-up on direct link-ups, for example, would help to rule out misanalyses such as the *Cat sat* one. But a 'local' Parser, by contrast, assigns structures non-inferentially in a left-to-right way. This represents what has been called a 'rigid follow-the-cookbook approach' to syntactic parsing.¹⁵

3.1.3.6 Fastness

Processes that are automatic are also fast. Being dumb, such processes do not spend time on making inferences or choices. In the words of Jerry Fodor, 'what you save by indulging in this sort of stupidity is ... *having to make up your mind*'; after all, 'making your mind up takes time'. This makes these processes really fast, unlike the actions of the White Knight. Though he boasted that he was capable of 'all kinds of fastness', he could in fact act with a slow kind of fastness only. (Once, for instance, it

took him hours and hours to get out of his cone-shaped hat. He had clumsily fallen into his hat, head first of course, while wearing it [TLG 302-303].)

But to return to automatic, fast processes in speakers' minds. Though speakers have to select words from a huge mental stock, the selection process is so rapid that speech is normally produced at a rate of two to three words per second. And articulation takes place extremely fast too --- at a speed of about fifteen speech sounds or four syllables per second. On the comprehension side, the processes of perception, recognition and parsing are similarly fast. In fact, identifying sentences is considered to be one of the very fastest of psychological processes. Even infants have the ability to recognize linguistic differences in less than a single second. For example, it has been discovered recently that babies between two and three months respond to subtle phonetic differences in under 400 milliseconds.¹⁶

3.1.3.7 Incrementality

Automatic processes share yet another property; they can work in parallel. To see what this means, let us renew our acquaintance with the Cheshire Cat. Now, a cat that could grin would surely be something special. So, too, would one that could speak. Not to mention one that could vanish at will, disappearing from the tip of its tail to the mouth in its head. But none of these three cats would be half as remarkable as the Cheshire Cat which --- as witnessed by Alice [AIW 91] --- could at once grin, speak and slowly disappear. If we were to think of grinning, speaking and disappearing as involving (clusters of) processes, we could say that the Cheshire Cat was able to engage in parallel processing. For, in parallel processing, various things are done at the same time.

If we consider the way in which the major processes involved in speaking are interlinked, we find the Cat to be an even more accomplished 'parallel processor'. How, then, are conceptualizing, formulating --- including grammatical and phonological encoding --- and articulating interlinked? Not in a simple serial way. That is, in producing an utterance such as *The Cat sat on a branch for a while*, a speaker does not first construct the complete preverbal message to be communicated, then formulate a complete syntactic (surface) structure for the message, after that build the complete phonetic plan for the utterance, and finally articulate the whole utterance. If the four processes were to operate one after the other in this simple serial way, fluent speech would simply be impossible.

Rather, in the production of an utterance such as *The Cat sat on a branch for a while* the four major processes run parallel to each other, each one operating on a different fragment of the utterance. This means that the processing of an utterance is done **incrementally**, as is illustrated by the following figure:

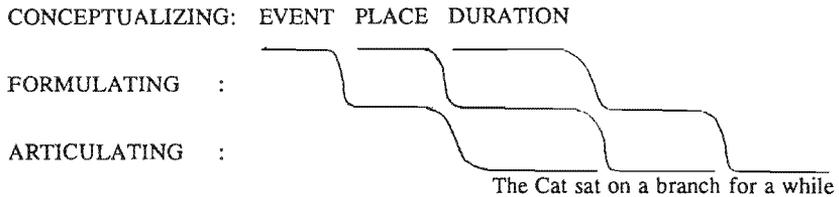


Figure 2: Incremental Processing

Let us see how this figure is to be understood. The speaker first conceptualizes an EVENT (the Cat's sitting at some point in time before the speaker's utterance), then the PLACE of the event (the sitting happened on a branch), and then the DURATION of the event (the sitting lasted a while). As soon as the first fragment of the message (the EVENT) has been conceptualized, it is put into words or formulated. While this takes place, the second fragment of the message (the PLACE) is being conceptualized. As soon as the EVENT fragment has been formulated as *The Cat sat*, it is articulated. While the EVENT fragment is being articulated, the PLACE fragment is getting formulated as *on a branch*. Simultaneously, the DURATION fragment is being conceptualized. While this third fragment of the message is being formulated as *for a while*, the phrase *on a branch* is already being articulated. And so on.¹⁷

From this simple example, it is clear that incremental processing is a combination of serial and parallel processing. Each fragment of an utterance is processed serially. That is, each fragment is processed in stages, starting with its being conceptualized, moving on to its being formulated and ending with its being articulated. The various processes, however, work in parallel. That is, they operate on different fragments of an utterance at one and the same time. Automatic processes are able to work in parallel like this because they do not share the same resources of attention, memory and so on.¹⁸

3.1.3.8 Modularity

Most of the features of language/speech processing considered above are basic in the sense that they are not made up of other features. Combining serial and parallel

operation in a particular way, incrementality, however, is an example of a nonbasic feature. So too is informational encapsulation. In the make-up of informational encapsulation, two more-basic features figure: (a) the input to a process/processor is of a maximally restricted sort, and (b) the mode of operation of a process/processor is minimally affected by the output of other components.

There is a third nonbasic feature that deserves special mention, namely **modularity**. A processing component or processor is considered a module if it is made up of automatic processes and if these component processes are informationally encapsulated. In addition to these two essential properties, modules tend to exhibit one or more other properties from the following cluster: they are functionally specialized and domain-specific; their operation is mandatory; their operation is fast; they are innately specified; they are hardwired; they show highly characteristic and specific breakdown patterns.

To say that a modular processor is innately specified is to say that it is genetically given to the species and that it is only minimally shaped by any sort of learning process. To be hardwired is to be located in specialized neurological (brain) circuitry. And highly characteristic and specific breakdown patterns are caused by injury to such specialized neurological circuitry. The specific anomia suffered by the White Queen is an example of an impairment affecting a module. The Parser (in the comprehension system) and the Formulator (in the production system) are thought to be good candidates for modulehood.¹⁹

3.1.3.9 Computationality

The behaviour of the jury in the Knave's trial was quite remarkable, to say the least. On slates, the twelve jurors wrote down more or less everything that everybody said; then they went on to 'process' their scribbles in surprising ways. When the Hatter, the March Hare and the Dormouse disagreed about when the Hatter had begun with his tea --- the fourteenth of March according to the Hatter, the fifteenth according to the March Hare, and the sixteenth according to the Dormouse --- the King ordered the jurors to 'write that down':

'... and the jury eagerly wrote down all three dates on their slates, and then added them up and reduced the answer to shillings and pence.' [AIW 146]

What the jurors did with the three dates can be characterized metaphorically as follows: they took certain figures as their input; on these input figures they mechanically performed some step-by-step computations; by so doing, they produced an output that represented the input figures in a different way.

If computing is a rarely used form of processing in Wonderland, it is believed to be a quite general form of processing in the world of language. In particular, much of the processing done in the production and comprehension of utterances has been characterized as **computational**. Indeed, it may be argued that various features attributed in preceding paragraphs to processes of speech production and comprehension depend on these processes being of a computational sort. For example, it is hard to see how a process(or) could be informationally encapsulated if its business were not to compute something.

But what does it mean in the present context to say that a process(or) is 'computational'? In this context, 'computational' --- and the more basic 'computation' --- are technical concepts including much more than doing the simple kind of arithmetic at which the Jury excelled. The idea that (much of) speech processing is computational has to be understood within the perspective of a particular view of how the human mind works. On this view, the mind uses a small number of basic kinds of operations to transform (input) mental representations into other (output) mental representations. Such mental transformations are computational processes to the extent that they are carried out in a mechanical step-by-step way in accordance with certain 'rules' or principles.

Returning to speech processing: the processes involved in formulating and parsing are good examples of cognitive processes widely considered to be computational. By contrast, the physical processes involved in articulating and perception are considered noncomputational.²⁰

3.1.4 Interfaces

This brings us to two seemingly unrelated events that occurred in Looking-Glass Country:

First event

Towards the end of an amazing discussion, Alice and the Red Queen began somehow to run hand in hand through the chess board landscape of Looking-Glass Country. The

curious part of the thing was that, though they ran very fast, they never seemed to pass anything; which made Alice wonder if all the things were moving along with them. And, apparently able to guess Alice's thoughts, the Queen cried 'Faster! Don't try to talk!', advice that was superfluous, since --- as Lewis Carroll confides to his readers ---

'Not that Alice had any idea of doing *that*.

She felt as if she would never be able to talk again, she was getting so much out of breath ...' [TLG 209]

Second event

Asked by an anxious Alice what would happen if he did fall off the wall, Humpty Dumpty replied:

'... all his horses and all his men They'd pick me up again in a minute, *they* would. However, this conversation is going on a little too fast: let's go back to the last remark but one.'

A suggestion to which Alice responded very politely:

'I'm afraid I can't quite remember it'. [TLG 265]

These two events are not as unrelated as they seem to be, however: in both, Alice is battling with processing problems. In the first event, shortness of breath makes the production of utterances difficult. In the second event, shortness of memory lies at the root of the failure to recall an utterance. All in all, this illustrates an important general feature of speech processing: the two speech-processing systems interact with capacities and structures that are of a nonlinguistic sort, lung capacity and memory capacity being two cases in point. This is to say that, in speech processing, linguistic reality interfaces with various nonlinguistic realities, including a physical and a mental one. The world of language, clearly, is not a hermetically sealed domain.²¹

3.2 Knowledge of language

To be able to produce or comprehend utterances, obviously enough, one needs an unimpaired processing capacity. But one needs more than that, as Alice and the Emu discovered in Gilbert Adair's *Needle's Eye World* when they tried unsuccessfully to speak to the Italian Hairdresser, an eccentric, nervous individual who used a small

crocodile for trimming the tassel of the mortar-board worn by the whale-like professor called 'the Grampus'. (The Hairdresser, in addition, appeared to use a caterpillar as a comb and an electric eel as a strop for sharpening his razors on.)

To get the Hairdresser to shut up his crocodile-cum-scissors --- which kept on interrupting the Emu's political speech with cries of 'Hear, hear!' --- the Emu angrily and very sharply said to him: 'Another word from your crocodile, and I'll have it made into a travelling-bag!' But, in spite of the seriousness of this threat, the Hairdresser did nothing to silence the crocodile. For, as the Grampus tried to explain to the Emu:

"I'm afraid your - your - ... - your Emu-nence, I'm afraid he speaks nothing but Italics. However, I should be only too pleased to 'translate your kind observation, for I myself speak Italics, don't you know, though my command of it has got a little rusty of late ...' [TNE 53]

The problem, then, was that the Emu (and Alice) didn't speak Italics. Italics, if we are to believe Gilbert Adair, is a language which has a queer emphasis to it and about the pronunciation of which there is something sloping and not quite straight-up-and-down.

Now, in this context, what does it mean 'not to speak a language'? Clearly, it does not mean 'not to be using one's processing capacity at a given moment for producing utterances of the language'. Rather, as hinted at by the Grampus's use of the notion of the 'command of a language', *not to speak a language* here means 'not to know a language'. One's processing capacity for producing and comprehending utterances is of no use for producing or comprehending utterances in a language one does not know. That is, processing utterances in a language presupposes **knowledge of the language**.

But what does knowing a language involve? What is the general nature of knowledge of language? What are its main components and their properties? And how does knowledge of a language fit into the speech-production and speech-comprehension systems? It is with questions such as these that we will be concerned below.

3.2.1 General nature

3.2.1.1 Knowledge of language versus ability to use language

You have perhaps been wondering whether someone's knowledge of a language is really distinct from his/her capacity or practical ability to produce and understand

utterances in the language. Why can't knowledge of a language be regarded as the same as or at least as part of the capacity or ability to use a language? What indications are there that this is not so?

Once again the White Queen's bad fortune can help us in the search for answers. Suppose that the stroke she suffered was a massive one that affected all her language centres, leaving her unable to say or understand anything. Suppose moreover that the Queen, like many stroke victims, was so fortunate as to make a complete recovery in the course of time: regaining her original ability to understand fully what others say; regaining, too, her ability to shout effortlessly things such as 'Off with her head!', 'Get cracking, Executioner!', and 'Give him a hand, Cook!'

While suffering from the effects of the massive stroke, the Queen had no ability or capacity to speak or understand English. If we identified knowledge of a language with the ability or capacity to use the language, we would have to believe that during this period the Queen had no knowledge of English whatsoever. What is more, we would have to believe that the Queen mysteriously 're-mastered' English from scratch in an amazingly short time. Scholars, however, judge these beliefs to be unfounded and far-fetched. So the only alternative is to take the view that the Queen's stroke, while having completely impaired her ability to speak and understand English, left her knowledge of the language intact. To take this view is, of course, to assume that knowledge of language on the one hand and the ability to produce and understand utterances on the other hand are distinct language capacities.

This view is supported by another kind of indication as well. Thus, two people may know their language equally well, yet differ markedly in their ability to use it: the one blessed with the gift of the gab, the other continually tripping over his/her tongue. Even in Wonderland we find individuals differing strikingly in their ability to use language, the fluent March Hare and the faltering Hatter being cases in point. One and the same person, moreover, can on some days be less fluent than on others, humming and hawing on 'bad' days much more than on 'good' ones. By taking special lessons, people can even improve their ability to speak, without thereby increasing their knowledge of their language. Observations such as these indicate that people's ability to use language varies, but that their knowledge of language is fixed. As for its general nature, then, knowledge of language is not a capacity or an ability to do something.²²

3.2.1.2 Knowledge of language versus language use

The fact that someone knows a language is obviously reflected by his/her using it to produce, understand and judge utterances. The Grampus's claim that he knew Italics was borne out, for example, by the fact that he was able to translate the Emu's English utterance 'Another word from your crocodile, and I will have it made into a travelling-bag!' into the Italics utterance '*Another word from your crocodile, and I'll have it made into a travelling-bag!*' And the claim that the Italian Hairdresser spoke Italics was confirmed by the upset way in which he reacted to this Italics utterance:

'Since the Hairdresser could hardly go paler than he already was, he turned crimson instead. Then, with many embarrassed bows in the Emu's direction, he hastily removed the eel off his shoulder and wrapped it round the Crocodile's jaws, tying it into a tight knot with an elaborate bow on top.' [TNE 54-55]

To claim that people's use of their language shows that they know the language is clearly not, however, to claim that their use of the language and their knowledge of the language are one and the same thing. On the one hand, using one's language presupposes knowledge of it. On the other hand, one continues to know one's language even when one does not or cannot use it as is the case when one normally is asleep or anaesthetized or --- alas --- dead drunk. (The Dormouse is exceptional in that it did everything in its sleep, speaking included. It had to, in fact, since it was seldom fully awake!)

What one knows is often not accurately reflected by what one does. This important point was being completely missed by the two Queens when they tried to test Alice's knowledge of arithmetic:

"Can you do Addition?" the White Queen asked.

"What's one and one?"

"I don't know", said Alice. "I lost count."

"She can't do Addition," the Red Queen interrupted.' [TLG 320]

The Red Queen's diagnosis of the cause of Alice's problem was, of course, wrong. The problem was not that Alice's knowledge of arithmetic was inadequate for doing the simple addition required by the White Queen's sum. On the contrary, the problem lay with Alice's memory capacity. She simply couldn't remember how many times ---

eight in all --- she had to add a one to the other number concerned. People's knowledge of arithmetic is far from being the only factor to determine how well they do their addition sums. In short, people's arithmetical performance does not directly reflect their arithmetical competence.

An analogous situation holds in the world of language. A speaker-hearer's knowledge of language --- called **linguistic competence** by Noam Chomsky --- is only one of the factors determining his/her language behaviour or use --- called by Chomsky **linguistic performance**. Various other factors play a role in a speaker-hearer's linguistic performance: factors such as memory limitations, shifts of attention and interest, random distractions, state of health, fatigue, sobriety and so on. Linguistic performance, accordingly, does not directly reflect linguistic competence. This in turn means, amongst other things, that errors of performance do not necessarily point to limitations of competence. When Alice said to the Country Mouse 'No, it don't', for instance, the unacceptability of this utterance did not indicate a flaw or gap in her knowledge of English. The cause of Alice's error was nonlinguistic: the demands of the moment were too much for her powers of concentration. On the one hand, you see, she was amused by the curious logic and funny accent of the Cockney-speaking Mouse; Alice, it maintained, was Halley's comet that had fallen into its haystack. On the other hand, Alice's sense of etiquette strictly forbade her to laugh in the Country Mouse's face. And so she had to concentrate almost all her attention on fighting the laughter down.²³

3.2.1.3 Knowledge of language versus knowledge about language

Various Carrollinian characters appear to be quite knowledgeable about their language, discoursing in a learned way on its parts and properties. Humpty Dumpty, for example, had distinct views on the nature of names, insisting that they must mean something, as his own did:

"... *my* name means the shape I am --- and a good handsome shape, it is too. With a name like your's [i.e., *Alice*] you might be any shape." {TLG 263}

And, to cite one more example, Humpty seemed to know a lot about the properties of the various classes of words too:

"They've a temper, some of them - particularly verbs: they're the proudest - adjectives you can do anything with, but not verbs - however, I can manage the whole lot of them!" [TLG 269]

That a name must mean something, that words have a temper, that the proudest words are the verbs, that one can do anything with adjectives: all these represent bits of Humpty Dumpty's **knowledge about language**. He also had **knowledge of language**, however, specifically knowledge of English: the knowledge that enabled him to speak and understand English and to judge intuitively the utterances produced by Alice.

It is crucial to distinguish between a speaker-hearer's knowledge of his/her language and his/her knowledge about (this) language. All normal speaker-hearers have knowledge of their language, the knowledge they require for producing, comprehending and judging utterances. This knowledge is not conscious. It is a form of **tacit** or **implicit knowledge**, about which ordinary speaker-hearers --- that is, linguistically untrained ones --- cannot make claims couched in technical terms like 'verb', 'noun', and so on. Moreover, what ordinary speaker-hearers tacitly know of their language cannot be false. Knowledge of language, consequently, cannot be a form of scientific knowledge.

As for knowledge about language, such knowledge is a form of **conscious knowledge** and is not presupposed by the use of language. It is restricted, moreover, to linguistically trained or reflective speaker-hearers. And the claims expressing bits of (potential) knowledge about language can turn out to be false --- that is, if they can be tested. The claims made by linguists about (a) language are scientific to the extent that they can be tested. For all his cleverness, Humpty Dumpty would fare wretchedly as a linguist, making, as he does, far too many claims about language that cannot be tested. How would one set about checking his claim, for example, that words have a temper or that verbs are the proudest?²⁴

Tying in with the fact that knowledge of language is not scientific knowledge is the fact that knowledge of language is not justified or grounded knowledge. The beliefs involved in knowledge of language are beliefs which speaker-hearers cannot justify by providing good reasons for them. In terms of Alice's knowledge of English, for example, the word *glory* could not mean 'There's a nice knock-down argument for you', the sense in which Humpty Dumpty used it [TLG 268-269]. Nor, in terms of Alice's knowledge of English, could the word *impenetrability* have the Dumptian meaning 'We've had enough of that subject, and it would be just as well you'd mention

what you mean to do next, as I suppose you don't mean to stop here all the rest of your life' [TLG 269]. Yet Alice was unable to justify her beliefs about the meaning of *glory* and *impenetrability*. And so she let Humpty Dumpty get away with the fanciful story that he could make words do a lot of additional work by paying them extra on Saturday nights when they came to get their wages.²⁵

3.2.2 Componential make-up

So, knowledge of language is not the same thing as the ability to use language, nor is it actual language use, nor is it knowledge about language. What, then, is knowledge of language? One of the ways to arrive at an answer to this question is to do what Alice did when she wanted to get a better view of Looking-Glass Garden. She went to the top of a hill (by walking away from it!), which enabled her to look in all directions. This afforded her a bird's-eye view of 'a most curious country':

'There were a number of tiny little brooks running straight across it from side to side, and the ground between was divided up into squares by a number of little green hedges, that reached from brook to brook.' [TLG 207]

Looking down on Looking-Glass Garden --- which in fact covered all of Looking-Glass Country --- Alice thus found it not to be an undivided whole: it was made up of blocks, like a chess-board (which it in fact was, as Alice soon realized).

But this is the general picture that one also gets of knowledge of language (or linguistic competence) when one surveys it from a removed perspective through a microscope. Knowledge of language is not a homogeneous, undivided whole. Rather, it is made up of distinct blocks or components. Below, we will consider the three principal ones: grammatical competence, pragmatic competence, and a conceptual system.²⁶

3.2.2.1 Grammatical competence

A speaker-hearer's **grammatical competence** --- or **knowledge of grammar** or **mental grammar** --- is his/her tacit knowledge of form and meaning and of the way in which they hang together in his language. What this means may be illustrated with reference to the following snatch of (Mad Tea-Party) conversation (triggered by the Hatter's riddle 'Why is a raven like a writing-desk?'):

"Do you mean that you can find out the answer to it?" said the March Hare.

"Exactly so," said Alice.

"Then you should say what you mean," the March Hare went on.

"I do," Alice hastily replied; "at least - at least I mean what I say - that's the same thing, you know."

"Not the same thing a bit!" said the Hatter. "Why, you might just as well say that 'I see what I eat' is the same thing as 'I eat what I see'!"

"You might just as well say," added the March Hare, "that 'I like what I get' is the same thing as 'I get what I like'!"

"You might just as well say," added the Dormouse, which seemed to be talking in its sleep, "that 'I breathe when I sleep' is the same thing as 'I sleep when I breathe'!" [AIW 95]

By virtue of their grammatical competence, speakers of English know such things as the following:

- Though made up of the same words, *I say what I mean* and *I mean what I say* do not mean nearly the same thing. *I mean what I say* and *What I say I mean*, however, do mean largely the same thing.
- One can say *I like what I get* but not **I like when I get*. And one can say *I sleep when I breathe* but not **I sleep what I breathe*.
- One can say *I get what I like* but not **My get what I like*. Nor can one say **I gets what I likes*.
- One can ask the question *What do I like?* or *Who likes what I get?* but not **Who I like what get?* or **I like who what get?*
- One can say *I sleep when I breathe* but not **I slept when I breathe*.
- One can say *I say what I mean* but not **Say I what mean I*.

Someone who kept on taking pairs or utterances such as *I say what I mean* and *I mean what I say* to mean the same thing would not be considered grammatically competent in English. Nor would someone who regularly produced utterances such as **I like when I get* and the other ones that have been starred above. The bits of knowledge indirectly

identified above, are intended to be illustrative only: grammatical competence has many other ingredients.

Reduced to the essence, grammatical competence has two kinds of ingredients. As for the first, to be able to produce and understand utterances such as those used in the above illustration, speaker-hearers have to know the words or lexical items of the language: *I, say, mean, sleep, breathe, like, get, what, who, when* and so on.²⁷ Some people know the **lexical aspect** of their language better than others --- and some of these like to impress others with their superior lexical knowledge by using unusual or 'high-brow' words in the place of ordinary ones. Like the Dodo who solemnly declared '*I move that the meeting adjourn, for the immediate adoption of more energetic remedies.* ---' [AIW 47]²⁸

But grammatical competence has to include more than lexical knowledge. Thus, *I say what I mean* and *I mean what I say* are made up of the same words but, nevertheless, differ in meaning. And the two utterances --- or rather the sentences underlying the utterances --- differ in one other way only: the words are differently combined. This means that to be able to produce and understand these utterances, speaker-hearers have to know how to combine words in different ways such that these ways convey different meanings or messages. That is, speaker-hearers' grammatical competence has to include knowledge about the **combinatorial aspect** of their language too.²⁷ Knowledge of the combinatorial aspect of language makes it possible for speakers to use a limited number of words for constructing an unlimited number of sentences. Grammatical competence in this sense, it has been claimed, allows people to make infinite use of finite means.²⁸

Knowledge of the combinatorial aspect of language, then, forms the second basic ingredient of grammatical competence. Linguists often refer to this knowledge of speaker-hearers as their (tacit) knowledge of the **grammatical rules** of the language. Such rules --- of which there are various kinds --- are believed to play a crucial role in encoding and decoding meanings or messages. In addition, they form the basis of many of the intuitive linguistic judgements made by speaker-hearers. For example, **Say I what mean I* is intuitively judged to be ill-formed on the basis of a rule of English which informally says: 'A (declarative) sentence consists of a noun phrase followed by a verb phrase'. Judged on the basis of this rule, **Say I what mean I* is in fact doubly flawed: both *say I* and *mean I* violate this rule in that the respective main verbs (*say* and *mean*) precede the (subject) noun phrase (*I*).

The idea that a competence involves knowledge of rules which govern action or behaviour is, of course, not an outlandish idea. Even in dream worlds such as Looking-Glass Country one has to know and follow rules in order to do things in the proper way. Like fighting a battle. Before the Red Knight and the White Knight start banging away at each other with a fury, they first agree to observe the Rules of Battle which they know implicitly. Watching the fighting, Alice tries to reconstruct some of the rules explicitly:

"One Rule seems to be, that if one Knight hits the other, he knocks him off his horse; and if he misses, he tumbles off himself - and another Rule seems to be that they hold their clubs with their arms, as if they were Punch and Judy ... "

Another Rule of Battle ... seemed to be that they always fell on their heads ... '

[*TLG* 295-296]

Like these Rules of Battle, rules of grammar are known tacitly only. Ordinary speaker-hearers of English cannot explicitly state or consciously disregard a rule such as 'A sentence consists of a noun phrase followed by a verb phrase'. Grammatical rules should accordingly not be confused with the prescriptive rules that are hammered into the heads of some schoolchildren. Having survived five to ten years of such teaching, you can decide to stop following such prescriptive rules as 'Don't use double negatives' and 'Don't use *in* in the sense of *into*'. But you cannot decide not to follow grammatical rules which you know unconsciously only. (The former prescription, incidentally, is wasted on the Gryphon which, without batting an eyelid, says such things as *They never execute nobody* [*AIW* 125] and *He hasn't got no sorrow* [*AIW* 126].)

Grammatical competence, it is believed, is in a clear sense a special component of the world of language. To see what this means, we have to dwell for a moment on one of the striking features of Carrollian dream worlds: the stunning diversity of inhabitants that can speak English. There are talking animals of all descriptions: from better known species such as cats, dogs and rabbits to the mythical unicorn and gryphon; assorted birds and even a bird(?) -to-be in the form of a talkative egg, the one and only Humpty Dumpty; water-loving creatures such as frogs, whales, lobsters and tortoises; argumentative caterpillars; soft-spoken insects and so on. (The Siamese-Twin Cats, Ping and Pang, even imagined that it is only in fairy-tales that human beings are also able to speak! [*TNE* 24-25]) Flowers talk even 'when there's anybody worth talking to', as Alice was told by a Tiger-lily [*TLG* 200].

But this, of course, is the kind of stuff that dreams are made of. In the real world, only humans can talk in the sense of being grammatically competent in one or more languages. Taking grammatical competence to be a **computational system**, Noam Chomsky has argued that it uniquely characterizes our species. In an early formulation, he (1972:100) puts the point as follows:

'When we study human language, we are approaching what some might call the "human essence", the distinctive qualities of mind that are, as far as we know, unique to man.'

'But what about such clever apes as the famous Sarah, Washoe, Lana, Koko and Nim (Chimsky)?' you may wonder. Haven't they been shown to be able to acquire and use English or American Sign Language? In the face of mounting evidence to the contrary, the early belief that this is the case has in fact been abandoned as overly optimistic. Higher apes may be capable of elementary forms of symbolic communication laboriously taught to them; they are incapable, though, of constructing an unbounded range of expressions. Highly trained chimps cannot do better than to 'utter' repetitively a restricted number of jumbled strings of 'words' or 'signs', strings such as *Me eat me eat, You me banana me banana you, Give orange me give eat orange me eat orange give me eat orange give me you.* (Small wonder that Lewis Carroll did not see his way open to including simians in the cast of Alice's dreams!) Interestingly, people with severe language impairment --- that is, people who have lost both their grammatical competence and the capacity to acquire it afresh --- can still learn and use simple symbolic systems such as those taught to 'clever' apes. The reason, then, why grammatical competence, along with the capacity to acquire it, is accorded a special place in the world of language can now be clearly seen: the combination of this capacity and this competence simply sets humans apart from other species.²⁹

Noam Chomsky, incidentally, is by no means the first leading scholar to have stressed the species-specificity of human language. This idea was strikingly expressed earlier by Bertrand Russell. The famous twentieth-century philosopher and mathematician put it like this:

'No matter how eloquently a dog may bark, he cannot tell you that his parents were poor but honest.'

And much, much earlier --- in the seventeenth century, as a matter of fact --- René Descartes, regarded by many as the father of modern philosophy, phrased the point as follows in Part V of his *Discourse on Method*:

'It is a very remarkable fact that there are none so depraved and stupid, without even excepting idiots, that they cannot arrange different words together forming of them a statement by which they make known their thoughts; while, on the other hand, there is no other animal, however perfect and fortunately circumstanced it may be, which can do the same'.

3.2.2.2 Pragmatic competence

When speaking to fellow Dreamworlders, Alice is often unsure about the right way to say things. For example, about how to address the Mouse that she finds swimming in the pool of salt tears (wept earlier by herself when, for a while, she was nine feet high):

"'Would it be of any use, now," thought Alice, "to speak to this mouse? Everything is so out-of-the-way down here, that I should think very likely it can talk: at any rate, there's no harm in trying." So she began: "O Mouse, do you know the way out of this pool? I am very tired of swimming about here, O Mouse!" (Alice thought this must be the right way of speaking to a mouse: she had never done such a thing before, but she remembered having seen, in her brother's Latin Grammar, "A mouse - of a mouse - to a mouse - a mouse - O mouse!'" [AIW 41]

And Alice often feels less than happy about the way in which others speak to her. The bluntness of the hookah-smoking Caterpillar, for example, is one such source of irritation to her:

"'You!" said the Caterpillar contemptuously. "Who are *you*?" Which brought them back again to the beginning of the conversation. Alice felt a little irritated at the Caterpillar's making such *very* short remarks, and she drew herself up and said, very gravely, "I think you ought to tell me who *you* are, first." [AIW 68]

On closer inspection, there does not seem to be anything wrong with Alice's grammatical competence. And the same goes for that of the brusque Caterpillar. Their

problems lie in a different area: they get into trouble with using English appropriately. These problems reflect limitations of their pragmatic competence. Not knowing how to address somebody appropriately, opening a conversation with a stranger by asking the blunt question 'Who are *you*?', and insisting to be told first by the questioner who he/she is --- these are symptoms of pragmatic incompetence.

But what is pragmatic competence in general terms? On an inclusive characterization, **pragmatic competence** is a speaker-hearer's tacit knowledge of the conditions governing the appropriate use of language. A particular linguistic form is used appropriately if it is the right means for making clear a particular intention of the speaker-hearer's or for serving a particular purpose of the speaker-hearer's. A blunt question such as 'Who are *you*?', evidently, is not an appropriate means for finding out the identity of a stranger and for establishing, at the same time, a basis for further interaction of a cordial and cooperative sort.

To get a clearer picture of what pragmatic competence is, let us consider some of the things known by a speaker-hearer who is able to use his/her language appropriately. Such a person tacitly knows, amongst other things, how

- to perform basic speech acts such as making assertions, asking questions, giving commands, making promises, conveying requests, issuing threats, and so on. Alice is quite competent in this last area, being able to shut up the noisy Daisies with the whispered *If you don't hold your tongues, I'll pick you!*, a threat which made several of the pink Daisies turn white. [AIW 202]³⁰
- to use language cooperatively by saying what is required by the purpose or direction of a conversation.³¹ A speaker can even ask questions in an uncooperative way, as Alice does when she asks the Cat a question without giving it enough information about how to answer the question. To her question, for instance, *Cheshire Puss, would you tell me, please, which way I ought to go from here?*, the Cat can only reply *That depends a good deal on where you want to get to.*³² [AIW 88]
- to mean more than he/she says. For example, in response to Alice's impertinent *Oh, please mind what you are doing [when handling your baby]*, the Duchess says, seemingly irrelevantly, *If everybody minded their own business the world would go around a deal faster than it does,*

whereby she means "Mind your own business" [AIW 84]. Metaphor, irony, sarcasm and so on are regularly used for meaning more than is said.³³

- **to behave properly in conversations:** beginning and stopping to speak in the right way, correctly taking and yielding turns to speak, making repairs when necessary, not saying impolite or face-threatening things, and so on.³⁴ In this last area, Alice alas is rather naive. For example, in complaining about her size to the Caterpillar she says ... *three inches is such a wretched height to be*, thereby insulting the three-inch Caterpillar.³⁵

- **to use language humorously** --- something at which the White King, for one, is no good. Thus, having asked the White Queen rhetorically '.... *you never had fits, my dear, I think?*', he goes on to say with a smile *Then the words don't fit you*'. The response to this pun says a lot about the King's pragmatic competence:
"There was a dead silence.
"It's a pun!" the King added in an angry tone, and everybody laughed.' [AIW 160]
Having to tell people that one has just made a linguistic joke is, sadly enough, an unmistakable symptom of pragmatic incompetence.

Some people can do more things with language than others can, having been trained to professionally perform such special speech acts as baptizing, marrying, knighting and sentencing other people. As may be expected, in Looking-Glass Country the conditions on successfully performing speech acts are rather more involved than in the real world of language. In the latter world, for example, passing a sentence presupposes that a verdict about an accused person's guilt has already been given. But in the mirror-image world, these two speech acts are performed in the reverse order. Thus, having made the unfunny pun on the word *fit*, the King hastily says, for about the twentieth time that day, *Let the jury consider their verdict* To which the Queen responds *No, no!* ... *Sentence first - verdict afterwards*. All that Alice's outraged *Stuff and nonsense!* ... *The idea of having the sentence first!* gets her from the Queen is a waspish *Hold your tongue!* and the even more vicious *Off with her head!*

What is clear from this little bit of court-room drama is that, to be able to perform a speech act successfully, the speaker-hearer has to know and obey certain conditions on

the kind of speech acts in question. These conditions do not apply to special kinds of speech acts such as passing sentences only. They apply also to the various kinds of basic speech acts, as is illustrated by the following bit of wayward conversation in the course of the Mad Teaparty:

"Have some wine," the March Hare said in an encouraging tone.

Alice looked all round the table, but there was nothing on it but tea. "I don't see any wine," she remarked.

"There isn't any," said the March Hare.' [AIW 93-94]

In saying to Alice *Have some wine*, the March Hare acts insincerely: he knows that he is unable to deliver on his offer. In so doing, he violates the sincerity condition for offers. This condition, which holds for promises too, reads as follows: To carry out the speech act of promising sincerely, the promiser must intend to carry out the act that he/she promises to do.³⁶

Note that pragmatic competence has been characterized above from the speaker's perspective. The ingredients of pragmatic competence have been illustrated with examples of what a pragmatically competent speaker tacitly knows about using his/her language appropriately. This choice of illustration has been made for expository reasons only: pragmatic competence is just as crucial to hearing (in the sense of comprehending) as it is to speaking. Appropriateness is just as much in the 'ear' of the hearer as it is in the 'tongue' of the speaker.³⁷

3.2.2.3 The conceptual system

The third component of knowledge of language is, on Noam Chomsky's view, a **conceptual capacity** or **conceptual system**. This system permits us to perceive, to categorize, to symbolize and perhaps even to reason. Without the knowledge embodied in this system, speakers would, moreover, be unable to plan and put together preverbal messages. And hearers without such knowledge would be unable to recover and unpack such messages.

Linguists know much less about the conceptual system than about the other two components of knowledge of language. What will be said below about this system, accordingly, is in more than one way suggestive only. To get some idea of how the conceptual system may figure in perception, categorization, symbolization and reasoning, let us consider a hilarious conversation involving the White King, Alice and

one of the King's messengers. (Still remember the Fetcher and the Carrier whom we met in par. 3.1.1.2 above?) Waiting for his messengers to arrive, the King asks Alice to look along the road and to tell him if she can see either of them.

"I see nobody on the road," said Alice.

"I only wish *I* had such eyes," the King remarked in a fretful tone. "To be able to see Nobody! And at that distance too! Why, it's as much as *I* can do to see real people, by this light!" [TLG 279]

And a little later, after a messenger's arrival:

"Who did you pass on the road?" the King went on, holding out his hand to the Messenger for some more hay. [Having devoured the last of the Messenger's ham sandwiches, the King munched away at his hay.]

"Nobody," said the Messenger.

"Quite right," said the King: "this young lady saw him too. So of course Nobody walks slower than you."

"I do my best," the Messenger said in a sullen tone. "I'm sure nobody walks much faster than I do!"

"He can't do that," said the King, "or else he'd have been here first. " [TLG 281-282]

This conversation illustrates, amongst other things, how people --- real people too --- can go about conceptualizing the world with the aid of language. Hence it illustrates certain aspects of people's conceptual system or capacity. To begin with, with the aid of the linguistic forms 'people seen on the road' and 'people passed on the road', the King creates two classes without any members, two null classes. And, amusingly but confusingly, he furthermore exploits the potential ambiguity of a word, *nobody*, for naming --- and hence symbolizing --- a non-existent member of these classes. Through this act of naming or symbolizing, the King reifies a non-existent individual, thereby turning a nobody into a somebody, cleverly called 'Nobody'. And a somebody can, in principle, be seen (or not seen) and passed (or not passed) if he happens (not) to be in a particular place on a road. Or at least other people (Alice and the Messenger) can be made to believe that they have (not) been in a position to see or pass them. Finally, it becomes possible to reason about whether the 'Nobody' somebody could indeed have been seen (or not) and passed (or not) on the road in question.³⁸

We come next to the role played by people's conceptual system in the planning, putting together and recovery of preverbal messages, first mentioned in par. 3.1.1.1 above. Many such messages are about entities involved in events or about events involving entities. And it has to be made clear in what specific ways the entities are connected to the events. That is, a message has to be put together in such a way that it is clear what parts or roles are played by the entities in the events. Consider, for example, the message conveyed by *The Cheshire Cat sat on Alice's lap*. To construct or retrieve this message, a speaker-hearer must know various things of a conceptual sort, including

- general things: Sitting is an event done by someone or something, on a certain thing, at a certain place, at a certain time, for a certain period, in a certain way and so on. But sitting is not an event (normally) done to someone or an event (normally) done with the aid of something.
- specific things: The Cat --- and not Alice --- does the sitting. The sitting takes place on Alice's lap, and not on the Cat's and so on.

For organizing messages such as the one under consideration, the conceptual system provides a range of **thematic roles**, including those of Agent, Patient, Instrument, Theme, Benefactive, Experiencer, Source, Goal and Location. In the message under consideration, the nature of the Cat's involvement in the sitting is made clear by conceptualizing the Cat as being the Agent. The connection between Alice's lap and the sitting, by contrast, is captured by representing Alice's lap conceptually as the Location. Thematic roles, accordingly, serve to structure messages by answering such questions as 'Who did what to whom?' and 'Why, where, when and how?'. Someone's conceptual system includes his/her tacit knowledge of how to structure messages in terms of thematic roles.³⁹

Getting back to the higher apes of a paragraph ago, it is believed that chimpanzees may have parts of the conceptual system considered above. This would account for the ability of chimps to communicate symbolically at an elementary level. Sarah, for example, was taught to manipulate tokens on a magnetized board, using and recognizing a mauve triangle as the symbol for 'apple', a red square as the symbol for 'banana', a pale blue star as the symbol for 'insert' and so on. But, though highly trained apes can understand simple symbolized messages such as 'if apple, then chocolate', we have seen above that they lack man's computational (linguistic) system. This is the system, let us recall, which allows people to form infinitely many expressions. When the computational system is linked to the conceptual system, we get,

on Noam Chomsky's view, the basis for free thought. This linking, he believes, forms the greatest step in human evolution, the step that has made humans unique.⁴⁰

3.2.3 Location

But where could one look for the three components that make up knowledge of language? In the mind, Noam Chomsky argues. To him, to know a language is to be in a certain mental state. More specifically, he considers a speaker-hearer's knowledge of language to be the steady, attained state of a particular mental faculty: the **language faculty**. Knowledge of language on Chomsky's view, moreover, represents a particular kind of mental state: the kind that has a structure. So what does this mental structure consist of? On Chomsky's earlier view, of a system of rules and principles that generate mental representations of various types. We see then that, like the speech production and speech comprehension systems, knowledge of language is considered a mental or cognitive system. To gain a better understanding of the idea that knowledge of language is a mental state, we will in par 3.3 look a bit closer at what has been called above 'the language faculty'.⁴¹

3.2.4 'Intuitive' interlude

Unfinished as it is, our exploration of language capacities has already yielded a welcome spin-off: it has given us a better idea of the sources, origins or causes of intuitive linguistic judgements. About what the Dodo would grandly call the 'aetiology' of such judgements.

Grammatical competence, we have seen in par. 3.2.2.1, is a first of these sources. Thus, the utterance **Say I what mean I* is judged unacceptable because it --- or rather the sentence underlying it --- violates a particular grammatical rule of English.

Addressed by Alice to the White Queen, the question *Why is Your Majesty such a bitch?* would be unacceptable too. Not because it violates a rule of grammar, though. The unacceptability of this question springs, rather, from its breaking a constraint that forms part of people's pragmatic competence: the constraint requiring them to speak politely to their queen and/or king.

Neither a grammatical rule nor a pragmatic constraint, however, is violated by an utterance like *I can remember things before they happen*. Yet, this utterance is odd because it says something that is conceptually out of order. With the exception of the

White Queen --- who has a memory that works both backwards and forwards --- people cannot conceptualize remembering as a process or state in which the mind has impressions of events that still have to happen. The oddness of this utterance springs from the fact that what it conveys clashes with a constraint forming part of people's conceptual system. Similarly, the utterance *Alice puts the Looking-Glass book* is odd because people cannot conceptualize an event of putting in which someone does not put something somewhere, or on something, or the like.

But what about the utterance *The cat the executioner the queen employed beheaded grinned?* Or *The King's horses galloped through the Queen's rose garden stumbled?* Speakers of English find both utterances such as these two odd or unacceptable; yet neither violates a grammatical rule, a pragmatic constraint or a constraint of the conceptual system. Recall that, in par. 2.3.1.2, it was observed that comprehending these utterances requires very hard work. The judgement that these utterances are odd or unacceptable springs from the parsing problems that they cause speaker-hearers: it is hard to work out how the words are grouped into phrases because they are perceptually so complex. This means that the judgement that these utterances are odd has its source in speaker-hearers' speech-perception system.⁴²

Which brings us to the general point: intuitive linguistic judgements can have one or more of various sources. These possible sources include a speaker-hearer's grammatical competence, his/her pragmatic competence, his/her conceptual system and his/her speech-comprehension system. If an utterance violates a rule or constraint in any of these linguistic capacities, it is intuitively judged **unacceptable**. To some unacceptable utterances linguists accord a special status: those utterances that are unacceptable because the sentences underlying them violate one or more grammatical rules or principles. These utterances --- or rather, to be exact, the sentences underlying them --- are regarded by linguists as **ungrammatical**.⁴³

3.3 The language acquisition capacity

Have you ever tried to teach your cat to talk? Well, Alice did, once. Before tumbling into Needle's Eye World, --- you see --- she tried to teach Dinah, her cat, some basic English so that they 'might have some pleasant little discussions together' [TNE 4]. And, by using some unconventional means, she got Dinah to 'recite the alphabet':

'Clever Dinah mastered the vowels in no time at all - for, even if they came out in a tumble, and Alice couldn't be certain she heard each one distinctly, Dinah's maeiou-ing never failed to put them in the correct order. The consonants proved much harder, except for 'm', and a *very* pronounced 's' whenever Alice tweaked her tail ...' [TNE 5]

But in spite of Alice's ingenuity and her pupil's cleverness, Dinah's English didn't really get off the ground. According to Gilbert Adair, Dinah never learned one single word, showing no curiosity whatsoever in *Aardvark*, the first word in Alice's dictionary. And Alice's repeating over and over *The cat sat on the mat* left Dinah cold, even though sitting on a mat was exactly what Dinah did best in the world. Dinah's knowledge of English remained zero. Poor clever Dinah, of course, never had a chance, to begin with. Why not?

Knowledge of language presupposes a more fundamental capacity, the capacity to acquire such knowledge: the **language acquisition capacity**. This capacity --- Noam Chomsky claims --- is **species-specific**: it is restricted to human beings and, as such, forms the initial state of their language faculty. According to this claim, knowledge of language is something in the real wide-awake-world: something beyond the reach of all whizz-chimps, all clever cats and the like. The **language faculty** --- with its initial state and its final state --- is our capacity to acquire and use knowledge of language.⁴⁴

In par. 3.2, we explored the final state of the language faculty, namely knowledge of language. Below, we will focus on the initial state of the language faculty --- that is, on the language-acquisition capacity. In so doing, we will let ourselves be guided by two questions. Our first guiding question: What is the general nature of the language acquisition capacity? Our second guiding question: What are the specific properties of the language acquisition capacity?

3.3.1 Innateness

Many children grow up under less than ideal conditions --- yes, even children in dream worlds. Even in Wonderland, for example, we find the Duchess giving her baby a violent shake at the end of every line of a lullaby she sings to it. And these lines, as you may see for yourself, do not exactly ooze tender loving care:

"Speak roughly to your little boy,
And beat him when he sneezes:
He only does it to annoy,
Because he knows it teases."

"I speak severely to my boy,
And beat him when he sneezes:
For he can thoroughly enjoy
The pepper when he pleases!" [ATW 85]

Yet, cold-hearted as the Duchess may be, at least she speaks and sings to her baby. And from the way in which the baby howls, evidently the poor thing hears the Duchess loud and clear.

This means that the royal baby is better off than certain real-world children: children who have to grow up in complete linguistic isolation. These include children who are born deaf and children who are not spoken to at all by deranged parents, who may even punish their children for attempting to make linguistic noises of their own accord. The consequences of growing up under these subhuman conditions are severe: linguistically isolated children do not learn to speak in the natural way. From a human point of view, this is no less than a tragedy. From a linguistic point of view, at the same time, it is instructive: it shows that, in order to acquire its mother tongue in a natural way, a child has to be exposed to utterances of the language in question. The child's contact with the utterances of its mother tongue makes up its **linguistic experience**. And, collectively, the utterances to which the child has been exposed form the **stimulus** for its acquisition of its mother tongue.

Now, in view of two aspects of the child's linguistic experience, the knowledge of language acquired by it has a rather remarkable property. Let us zoom in on this remarkable property by considering those two aspects of the child's linguistic experience.⁴⁵ On the one hand, the child, throughout its linguistic experience, is exposed to numerous unacceptable utterances: slips of the tongue, unfinished utterances, utterances broken up by pauses, utterances consisting of no more than false starts, utterances with endings that do not match beginnings, utterances realizing ungrammatical or conceptually deviant sentences and so on. Not only Mad Hatters produce wayward utterances such as the following; normal people also do:

'I'm a poor man and most things twinkled after that - only the March Hare said -'

'After that I cut some more bread-and-butter -' [AIW 148-149]

Because the child is exposed to such deviant utterances, its linguistic experience forms an imperfect or **degenerate stimulus** for language acquisition. Somehow, nevertheless, children are not misled by the degeneracy of the stimulus: they do not unconsciously acquire grammatical rules for producing such unacceptable utterances as if these were the norm. Rather, in spite of the degeneracy of the stimulus, every normal child acquires the linguistic knowledge which enables it to produce acceptable utterances.⁴⁶

On the other hand, the child's linguistic experience contains no evidence at all for certain bits of the knowledge of language acquired by it. This may be illustrated with reference to the English rule for forming simple questions such as 1b which are the *yes/no* questions corresponding to statements such as 1a:

- 1a *The Hatter is innocent.*
- b *Is the Hatter innocent?*

In its very simplest form, the *yes/no* question rule reads as follows: 'Move *is* to the front of the sentence.' But such a rule won't do, of course; for it will give 2b, rather than 2c, as the *yes/no* question corresponding to 2a:

- 2a *The Hatter who is mad is innocent.*
- b **Is the Hatter who mad is innocent?*
- c *Is the Hatter who is mad innocent?*

This simplest form of the *yes/no* question rule expresses a structure-independent operation: it requires a scanning of the complex sentence to find one particular word, but pays no attention to the various structures into which the various words of that sentence enter. A less inadequate version of the rule would read as follows: 'Switch the subject noun phrase of the main clause (that is, the noun phrase occupying the first position within the main clause) and its auxiliary (that is, the verb in the second position of the main clause).' This formulation of the rule expresses a structure-dependent operation. To carry out a structure-dependent operation, attention must be paid to the way in which the words form larger units, known as 'phrases', and to the positions in which these phrases occur.⁴⁷

Interestingly, in acquiring the right *yes/no* question rule, children do not produce unacceptable questions such as 2b. This means they do not use the simplest, structure-independent version of the rule. They seem to know that the correct question rule --- like syntactic rules in general --- is structure-dependent. But, significantly, this bit of information is not present in the utterances to which children are exposed. This means, then, that the stimulus is impoverished in this regard. That is to say, children acquire their language on the basis of an impoverished stimulus. But how on earth is it possible for children to acquire crucial bits of knowledge of their first language if there is no direct evidence for such knowledge in the stimulus?⁴⁸

This is an important question. So let us consider another example of an unlearned ingredient of children's knowledge of language. Consider the following utterances:

3a *Alice ate the dry biscuit.*

b *Alice ate.*

4a *The Hatter is too upset to talk to the King.*

b *The Hatter is too upset to talk to.*

The utterance 3b is understood in the same way as the utterance 3a. In both of the underlying sentences, *ate* takes an object denoting something that is eaten: a dry biscuit in the case of 3a, something unspecified in the case of 3b. But the utterance 4b cannot be interpreted in the same simple way on the analogy of 4a. That is, the utterance 4a means that the Hatter is so upset that he (the Hatter) cannot talk to the King. But the utterance 4b, by contrast, means that the Hatter is so upset that someone (an arbitrary person) cannot talk to him (the Hatter). So, though superficially resembling 3a and 3b respectively, 4a and 4b are interpreted quite differently. And children know this: they unerringly interpret utterances such as these correctly. And yet, in their experience of English, there is no direct evidence indicating this difference.⁴⁹

Which brings us to the remarkable property of knowledge of language alluded to above: mother-tongue speaker-hearers know more about their language than they could have learned. Their knowledge of their native language includes important things for which there is simply no evidence in the degenerate and impoverished stimulus. Someone's knowledge of his/her first language is, in technical terms, underdetermined by his/her linguistic experience of his/her first language.

As Alice's partners at the Mad Tea Party could have pointed out to her, 'I know what I learn' is not the same thing as 'I learn what I know'. Had they been aware of the fact that the stimulus for first language acquisition is degenerate and impoverished, they could have unsettled poor Alice even further. They could, for instance, have pointed out to her that 'I know what I have learned' is not the same thing as 'What I know, I have learned'. But how is it possible to know more than one has learned? Specifically, what might be the source of people's unlearned knowledge of their first language? Noam Chomsky's reply is that a significant part of this knowledge is innate: children are born with a sizable chunk of knowledge of language. The innate component of knowledge of language is made up of those aspects of knowledge of language for which there is no evidence in the child's stimulus for language acquisition. In fact, therefore, the child does not need to learn these aspects. Rather, the child is endowed with these aspects at birth. They collectively form the initial state of the child's language faculty. In short: the child's innate knowledge of human language serves to bridge the gap between its linguistic experience and that knowledge of language which makes up the steady or attained state of its language faculty.

From a developmental point of view, knowledge of language is clearly made up of two components: an innate and an experiential one. The **experiential component** --- comprising the evidence or data about its mother tongue --- accounts for the child's acquisition of a specific language. The **innate component** --- representing the child's linguistic endowment --- allows it to acquire any language as its mother tongue, on condition that the child has been sufficiently exposed to it. The experiential component, it should be stressed, both triggers and guides the child's language acquisition. Even in dream worlds, after all, one would hardly expect to bump into toddlers who acquire language B (say, English) on the basis of exposure to utterances of language A (say, French).⁵⁰

3.3.2 Genetic determinedness

But in what sense can bits of knowledge of language be innate? To approach this question, let us consider something very curious that happened to the Duchess's baby soon after she had flung the howling child into Alice's arms. After a while, the little thing started to grunt, its nose became 'very turn-up' and its eyes got 'extremely small for a baby'. And a bit later, when Alice looked closely at it again, she saw that the baby had turned into a pig, something she accepted philosophically since 'If it had grown up it would have made a dreadfully ugly child: but it makes rather a handsome pig.' [A/W 87]

Babies turning into pigs, and people finding that quite unremarkable --- such is the stuff of dream worlds, we surely all agree. And why do we all agree? Because in the real world, the development of newborn individuals is governed by the genes inherited from their parents, genes that are characteristic of their species. The genetic make-up of a human baby determines, for example, that a small snub of a nose will develop into a typical adult nose and not into a porcine snout. A baby doesn't have to learn how to develop an adult nose. Nor does it have to 'monitor' or 'manage' the development of such a nose. It inherits this nose as part of its genetic make-up. A baby is genetically endowed with an adult nose of a particular shape.

Humans, it is believed by Noam Chomsky and others, do not inherit physical features and capacities only. They inherit mental features and faculties too, including certain parts of their knowledge of language. Specifically, Chomsky believes that the initial state of the language faculty is innate in the sense that it forms part of the genetic make-up or genotype of humans. That is, certain bits of knowledge of language are directly encoded in people's genes. Under the triggering and stimulation of the child's linguistic experience, the initial state of the language faculty develops eventually into a state --- the "attained state" --- which represents the child's knowledge of his/her (first) language or (in other words) his/her mental grammar. On this view, language acquisition accordingly is not a learning process at all. It is rather a biological growth or maturation process. This is why people can know important parts of their language without having had to do what would be impossible anyway: to learn these parts on the basis of a degenerate and impoverished stimulus.

The idea that important parts of knowledge of language are genetically determined and grow in a biological sense makes it possible to understand various aspects of first language acquisition. These include the following:

- Language acquisition is restricted to humans.
- People know more of their language than they could have learned.
- Any normal child can acquire any language as his/her mother tongue.
- A child acquires his/her first language faster than he/she can learn much simpler other systems such as arithmetical ones.
- Though acquiring their first language under widely different circumstances, children acquire their language at the same rate and in the process go through the same stages.

- First language acquisition neither requires nor benefits from conscious learning or deliberate teaching.

It is impossible to understand these phenomena if it is assumed that a child acquires his/her mother tongue in the same way as he/she learns traffic rules, chess, history, arithmetic and so on. What is acquired in all these other cases depends to a great extent on what the child is offered in the way of learning material (that is, the stimulus), on the conscious efforts made by the child to learn the offered material, on the teaching skills of the child's instructors, on the child's motivation and general intellectual capacities and so on. Suppose, for instance, that the Mock Turtle and the Gryphon had to learn in their history (or, rather, 'Mystery') course when, how and by whom Wonderland had been first discovered. Suppose too that their lessons or textbooks offered no information on these matters. Under these circumstances they clearly could not learn a thing about the discovery of Wonderland; its *history*, to them, would truly remain a *mystery*. Yet, without having been offered any information on the structure-dependent nature of grammatical rules, children acquire the correct, but non-obvious rules such as the one for forming *yes/no* questions. In sum: the poverty and the degeneracy of the stimulus crucially affect 'ordinary' learning, but they have no effect on language acquisition. To the nature of 'ordinary' learning, we will turn in par. 3.3.3 below.⁵¹

We first have to consider something about the genetic basis of the language acquisition capacity that you may have been wondering about all along. To say that the language acquisition capacity is genetically based --- does this mean that there are such things as language genes? Or, as the question has also been phrased, are there among the roughly 100,000 human genes one or more that control grammar, genes that contain the instructions for the development of what has been metaphorically called the 'grammar organ'? No genes responsible for building this mental organ itself have so far been identified. But there is evidence indicating the existence of genes that build parts of the brain controlling grammar. These genes affect the development of the neural circuitry or wiring --- made up of networks of multiply interconnected neurons or nerve cells --- that underlies parts of the mental grammar.

When there is something wrong with the genes under consideration, the mental grammar is disrupted too. This is clear from the tragic history of the members of the House of Diamonds whose English offended the White Queen so much that she had them all taken care of by the Executioner. The Diamonds would say such grammatically ill-formed things as the following:

- 5 It's a quarrelling gardeners, they are.
- 6 The Cook remembered when she hurts herself the other day.
- 7 The Jury call the Queen because the King fall off the bench.
- 8 The Gardeners paint four rose.
- 9 Alice is swim in the pool of tears.

Though their intelligence was normal, the Diamonds frequently got their pronouns, plural suffixes, past tense suffixes and so on wrong. Deliberately planning their utterances, they spoke slowly, finding conversation hard work. The Diamonds suffered the hereditary --- that is, genetically-based --- language impairment known as Specific Language Impairment (SLI). Running in families, this condition indicates that there are genes whose effects are specific to the development of neural circuits underlying certain parts of grammar.⁵²

Genetically determined aspects of knowledge of language are by their very nature characteristic of the human species. This means that these aspects of knowledge of language are common to or shared by all humans. Genetically determined aspects of knowledge of language have accordingly been called **linguistic universals** by Noam Chomsky and his associates.⁵³

3.3.3 Language-specificity

We have seen above that the language acquisition capacity is species-specific: it sets humans apart from cats, apes, pigs, and other kinds of creatures. This capacity, in addition, is **language-specific** --- in two ways.

To introduce you to the first of these ways I will let you in on something that Lewis Carroll kept away from his readers. The Duchess's pig-child (or child-pig, if you prefer) had a twin sister who didn't miraculously turn into a pig too. Rather, she grew up to become a talkative, elfin-faced girl. Called Chatterbox by the Duchess, she would tell stories such as the following to the Cook, to Alice, or for that matter, to anyone who cared to listen:

"This is a story about chocolates. Once upon a time, in Chocolate World there used to be a Chocolate Princess. She was such a yummy princess. She was on her chocolate throne and then some chocolate man came to see her. And the man bowed to her and he said these words to her. The man said to her, "Please,

Princess Chocolate, I want you to see how I do my work. And it's hot outside in Chocolate World, and you might melt to the ground like melted butter. And if the sun changes to a different color, then the Chocolate World - and you - won't melt. You can be saved if the sun changes to a different color. And if it doesn't change to a different color, you and Chocolate World are doomed."

Chatterbox learned English in the normal way and became a fluent conversationalist. Strangely, though, she couldn't learn such simple ordinary things as tying her shoes, telling left from right, adding two numbers, making simple drawings and so on. With an IQ of about 50, Chatterbox was what is nowadays called a *linguistic idiot savant*: a good talker but a poor thinker. Linguistic idiot savants, thus, are in a sense opposites of sufferers of SLI who, we have seen, are (reasonably) good thinkers but poor talkers.⁵⁴ Linguistic idiot savants, too, show --- and this is the interesting point here --- that people's language acquisition capacity is distinct from their capacity to learn other, non-linguistic things. On the one hand, the former capacity does not use general learning mechanisms, multi-purpose learning strategies or general problem solving techniques. Specifically, language is not acquired by using general principles of learning such as those embodied in association, abstraction, induction, hypothesis formation and so on. Recall that, in acquiring the *yes/no* question rule, children do not first try out the simple rule 'Move *is* to the front of the sentence'. Had language been acquired inductively, this would have been the obvious rule to try out first. On the other hand, whatever principles are used in language acquisition, they are not used for the acquisition of non-linguistic things as well. That is, the language acquisition capacity is a special-purpose mental capacity. Had this not been so, no linguistic idiot savants such as Chatterbox would be around.⁵⁵

The first way in which people's language acquisition capacity is language-specific, then, concerns its distinctness from other, nonlinguistic, learning capacities. The second way involves the specificity of what has been called the 'constitutive principles' of this capacity. This can be illustrated with reference to utterances such as the following:

- 10a Each of the croquet players likes the others.
- b The croquet players like each other.

- 11a Each of the croquet players expects the others to win.
- b The croquet players expect each other to win.

In these pairs of utterances, it is clear, the expression *each ... the others* and the expression *each other* have the same meaning. But consider now the following pair of utterances:

12a Each of the croquet players expects Alice to beat the others.

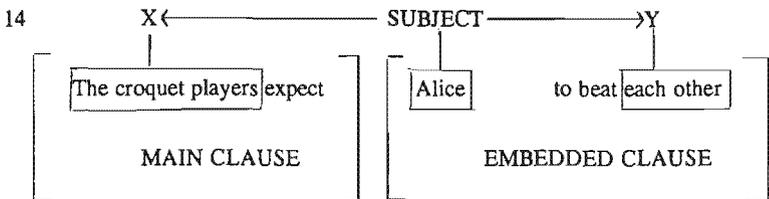
b *The croquet players expect Alice to beat each other.

Speakers of English intuitively judge 12b to be unacceptable. But why? The conventional answer is that 12b violates a specific linguistic principle which (very) roughly says the following:

- 13 If (a) X and Y are explicit or understood components such as names, pronouns, anaphoric elements, etc.,
- (b) X is a component of a main clause and Y is a component of a clause embedded in this main clause, and
- (c) the embedded clause has a subject which is distinct from Y,

then X and Y cannot be linked by a linguistic rule.

The linking forbidden by 13 occurs in the case of 12b, as is clear from 14:



The linguistic principle 13 is an innate component of the knowledge which speakers have of English: they could not have acquired 13 on the basis of their linguistic experience. Moreover, 13 is specific to language in the sense that it does not derive from some more general principle of communication, cognition or perception or from any other nonlinguistic faculty.⁵⁶

In sum: the language acquisition capacity --- or initial state of the language faculty --- is language-specific in two ways. It does not embody uniform multipurpose principles of learning, accommodation, assimilation, association, induction and so on. Nor are its constitutive principles derived from more general nonlinguistic principles. On account of its being language-specific in these two ways, the language acquisition capacity has been considered to be **modular**. That is, this capacity is claimed to be a separate module of mind or (in other words) a separate cognitive system.⁵⁷

3.3.4 Parameterization

Suppose that a publisher (in a dream world!) offered you a fat fee for writing a new Alice story. How would you go about doing this? Well, if I were in your shoes, I would first want to get a good idea of the general features that characterize all the existing Alice stories in regard to content, structure, language and so on. And then I would want to know how these general features are manifested in the case of the various individual Alice stories. On this approach --- not a highly creative one, I hasten to admit --- each individual Alice story becomes a collection of variations on (or manifestations of) a limited number of themes (or general features).

Thus, all Alice stories begin by Alice dosing off and entering a dream world through some extraordinary kind of opening: a rabbit hole, a mirror, the eye of a needle. In every dream world, Alice meets an assortment of curious talking animals, birds, insects and plants as well as some members of the House of Cards. And in each of these worlds, Alice gets involved in strange social or public events: a croquet game, a trial, a chess game, a caucus race, an election and so on. In every dream world, moreover, Alice gets drawn into funny conversations touching on deep logical, philosophical and linguistic ideas or questions. And Alice's fellow-conversationalists typically use linguistic devices such as punning, imposing their personal discipline on or control over language, emphasising the importance of names, using words to determine or control (patterns of) nonlinguistic events, breaking rules of normal conversation and so on.⁵⁸

'But what has the general nature of Alice stories to do with language capacities?', you may rightly wonder. Well, these two things may seem utterly unlike at first sight. In fact, however, they lend themselves to a comparison. And the comparison can help us understand better how the innate principles embodied in speaker-hearers' language acquisition capacity (that is, in the initial state of the language faculty) relate to the rules making up speaker-hearers' grammatical competence (that is, a component of the attained steady state of the language faculty). This relationship, you see, is rather like

that between the general themes characterizing all Alice stories and the specific variations on these themes found in the individual stories.

Here is a linguistic example to help clarify the point. One of the innate principles embodied in the language acquisition capacity reads (in a highly simplified form) as follows:

- 15 A phrase consists of a head word and, amongst other things, a number of smaller, role-bearing phrases.

In accordance with this principle, a verb phrase such as *gave the stolen tarts to Alice* (in a sentence such as *The Knave gave the stolen tarts to Alice*), consists of a head (verb) *gave*, a first smaller phrase *the stolen tarts* bearing the thematic role of Theme and a second smaller phrase *to Alice* bearing the thematic role of Beneficiary. Note that principle 15 does not state that the head (verb) *precedes* the role-bearing phrases. Why not? Because this is an English variation and, as such, has to be expressed by a rule of English grammar. Principle 15 holds for all human languages and, in some, the head (verb) *follows* the role-bearing phrases. In Japanese, for example, the verb phrase corresponding to *gave the stolen tarts to Alice* would be the literal equivalent of *the stolen tarts to Alice gave*. Japanese chooses the variation in which the head verb follows the role-bearing phrases, a fact expressed by a rule of Japanese grammar.

So 15 represents a simplified version of an innate, hence universal, linguistic principle or 'super-rule'. This principle has what is known as an open parameter concerning the order of the head relative to the role-bearing phrases in the verb phrase. Speakers of English fix this open parameter by choosing the 'head first' option or variation; speakers of Japanese fix this parameter by choosing the 'head last' option or variation. Like all other languages, English and Japanese are thus structured in terms of the innate, universal principle 15. The two languages differ in the way in which their speakers set the open word-order parameter. And the different settings are reflected in differences between the rules of English and the rules of Japanese grammar. A rule of grammar, on this view, represents a parameter fixing or setting. And rules of grammar are, in a sense, derivative entities or 'epiphenomena': phenomena that result automatically from events (namely, parameter fixing) that involve deeper entities (namely, principles).⁵⁹

3.4 Architecture of the capacities layer

The layer of language capacities resembles the rabbit-hole down which Alice tumbled into Wonderland in an interesting way. As she fell down this hole, Alice noticed that its sides were filled with cupboards and bookshelves:

'... here and there she saw maps and pictures hung upon pegs. She took down a jar from one of the shelves as she passed: it was labeled "ORANGE MARMALADE," but to her great disappointment it was empty: she did not like to drop the jar, for fear of killing somebody underneath, so managed to put it into one of the cupboards as she fell past it.' [AIW 26-27]

In her fall, Alice plunged past various layers of cupboards and shelves, which means of course that the rabbit-hole was in a sense a layered hole. And interestingly enough, the layer of language capacities displays a like kind of architecture: it is a layered layer. (Come to think of it, the Wonderland counterpart of a layered layer could well be a holed hole!)

Now the layer of language capacities, so we have found, is made up of three sublayers: those of processing systems, of knowledge of language and of the language acquisition capacity. These sublayers are linked to each other in essentially the same way as the four main layers of the world of language are. The link is that of conceptual necessity. For, as we have seen, language processing systems conceptually presuppose knowledge of language and, in turn, knowledge of language conceptually presupposes a language acquisition capacity. The existence of the capacities located in the three sublayers has, in addition, been amply confirmed by empirical linguistic inquiry.

Which brings us to another point of resemblance. A remarkable feature of Alice's plunge down the rabbit-hole is how very long it went on for:

"I wonder how many miles I've fallen by this time?" she said aloud. "I must be getting somewhere near the centre of the earth. Let me see: that would be four thousand miles down, I think -". [AIW 27]

Obviously, Alice didn't stand(!) a chance of getting a proper look at everything that she passed on the way down: the extraordinarily deep hole simply had too many things lining its sides.

In our macroscopic survey of language capacities, we find ourselves caught up in a process too much like Alice's plunge. The layer of language capacities has turned out to be remarkably rich in ingredients. So rich that a first macroscopic survey simply cannot focus on more than the primary components of this layer: the language processing systems, knowledge of language and the language acquisition capacity. Any proper look at secondary capacities, abilities and skills --- for example, those presupposed by reading and writing, and also those involved in the various modes of speaking, listening, reading and writing --- will accordingly have to await a less Alice-like, more leisurely, probe of the layer of language capacities.⁶⁰

NOTES

- 1 The processing involved in the production and comprehension of spoken utterances is conventionally called 'speech processing'. The expression 'language processing' applies to the processing involved in reading/writing, signing/'seeing' and (silent) mouthing/lipreading as well.
- 2 This is the view articulated by Levelt (1989:8ff.) in his comprehensive work on speaking. In this section on linguistic processing, I will be drawing heavily on Levelt's work.
- 3 The following diagram has been taken over from Levelt 1989:9. Levelt presents it as 'a blueprint for the speaker'.
- 4 For overviews of work done on components of the speech-production system see, in addition to Levelt 1989, also Allport et al. (eds.) 1987, Kempen (ed.) 1987, Garrett 1988, Garman 1990:chap. 7, Levelt (ed.) 1993.
- 5 See Garman 1990:429-432 for some discussion of specific anomia and related other language pathologies.
- 6 For a survey of the major positions on the nature of the relationship between 'language' production and 'language' comprehension see MacKay et al. 1987.
- 7 For overviews of work on components of the speech-comprehension system see, for example, Frazier 1987, Flores d'Arcais 1988, Altman (ed.) 1989, Garman 1990:chaps. 4-6, Singer 1990, Miller 1991, Forster 1991, Garrett 1991.
- 8 For an account of the anatomy and physiology of the vocal tract see, for example, Crystal 1987:124-131, Garman 1990: 94-99. For an account of the anatomy and physiology of the auditory system see Crystal 1987:142-144, Garman 1990: 52-64.
- 9 For the idea that the mind is a symbolic system see, for example, Johnson-Laird 1988:34-35. This idea has been developed into (various versions of) the representational theory of the mind, for some technical discussion of which see Haugeland (ed.) 1981. For a discussion of what is called the 'symbolic architectures of cognition' see Newell, Rosenbloom and Laird 1989. For a highly readable characterization and illustration of the concept of mental representation see Pinker 1994:73-82.
- 10 For some discussion of central claims of the computer model of the mind and of some of its limitations see, for example, Colby 1978, Moor 1978, Marshall 1980:106-107, Gardner 1985:40-41, 118-130, Johnson-Laird 1988: chaps. 2 and 3. For more recent discussion of the computer model of the mind, see Bloch 1991, Dennett 1991:435ff., Edelman 1992:218ff. and Chomsky 1993:42-44. On the computational nature of mental processes see further the references

in note 20 below. On the view that the mind represents the functional aspect of the brain see, for example, Chomsky 1987a:1-6, Botha 1992:94-97. On the general distinction between the mental and the material/physical see Chomsky 1987a:5, 1989:5, 1993:35ff., Salkie 1990:80.

- 11 For a discussion of the functional specialization and domain specificity of various of the processes involved in
 - (a) (speech) production see, for example, Levelt 1989:14-15, Marshall 1984:234-236;
 - (b) (speech) comprehension see, for example, Fodor 1983:47-52, Marshall 1984:218-219, Mann and Liberman 1983, Mattingly and Liberman 1985, Darwin 1991, Liberman 1991.In addition, various contributions to Allport et al. (eds.) 1987 - e.g., Monsell 1987, Funnell and Allport 1987, Keele 1987, Gordon and Meyer 1987 and MacKay 1987 - flesh out the view that much of the processing involved in the production and perception of utterances is done by 'functionally separable subsystems.'
- 12 For a discussion of the autonomy of some of the processes involved in the production of utterances see Levelt 1989:14-16. Autonomy is attributed by Fodor (1985: 1) to processes involved in the comprehension of utterances too. The idea of informational encapsulation is discussed in some detail in Fodor 1983:64-86.
- 13 See Levelt 1989:20-21 for an illuminating discussion of the automaticity of various processes involved in speaking and also for more of the specifics of the non-automatic nature of conceptualizing and monitoring.
- 14 See Fodor 1983:52-55 for a discussion of mandatoriness as a property of some of the processes involved in the comprehension of utterances.
- 15 For some discussion of the idea that parsing is a dumb process, see for example J.D. Fodor 1985:8, Frazier 1978 and Frazier and J.D. Fodor 1978. For a clarification of the distinction 'dumb vs smart' see J.A. Fodor 1985:1-2. (Elsewhere, I refer to J.A. Fodor simply as 'Fodor'.)
- 16 The quotation given above is from Fodor 1983:64. See also Fodor 1983:61-64 for specifics of the fastness of the processes involved in speech comprehension, and Levelt 1989:22 for some observations on the fastness of processes involved in speech production.
- 17 This rough account of the incremental processing of *The Cat sat on a branch for a while* is fashioned after Levelt's (1989:25-26) account of the processing of the utterance *John played in Amsterdam last week*. The figure used above for giving a (very) rough graphic representation of the incremental nature of the processing

- of *The cat sat on a branch for a while* is based on a similar figure found in Levelt 1989:25. The latter figure is after Kempen and Hoenkamp 1987. For a discussion of what incremental processing in general involves, see for example Levelt 1989:24-27 and Garman 1990:173-175.
- 18 From overviews such as Garman's (1990:320ff.), it is clear that the comprehension of utterances also involves both serial and parallel processing. Whereas some psycholinguists (e.g., Carroll, Tanenhaus and Bever (1978)) have developed what are known as 'serial models of speech comprehension', others (e.g. Marslen-Wilson, Tyler and Seidenberg (1978)) have developed what they call 'parallel models'.
- 19 For the conception of modularity presented above see Fodor 1983, 1985. For (critical) discussion of Fodor's conception of modularity see, for example, Gardner 1985, 1985:133ff., Dennett 1984, Marshall 1984, Putnam 1984, Shallice 1984, Jackendoff 1987:260ff., Arbib 1989, Cain 1989, Ross 1990, Chandler 1993, and the open Peer Commentary in *The Behavioural and Brain Sciences*, Vol. 8 (1985:6-33). See also Fodor 1985 for a reply to this commentary. For a variety of contributions to a workshop called 'Modularity in knowledge representation and natural-language understanding' see Garfield (ed.) 1987.
- 20 For the assumption that much of the processing involved in speech processing is computational see Fodor 1983, 1985. For a similar view of speech production see Levelt 1989:67. For a nontechnical account of the view that the mind is a symbolic system see, for example, Johnson-Laird 1988:chap. 2. A more technical account of this view - including the idea of computability - may be found in, for example, Pylyshyn 1984, 1989. For the technical idea that a mental computation has to respect certain semantic conditions see Fodor 1983:5.
- 21 As will become clear in par. 3.2, the two speech-processing systems crucially interact with linguistic capacities as well.
- 22 For an explication of the distinction between knowledge of language and the ability to use language see, for example, Chomsky 1980a:51-52, 1986:9, Taylor 1988:148-153, Botha 1989:47-49.
- 23 For Chomsky's distinction between competence and performance see, for example, Chomsky 1965:4, 1980a:203-205, 225, Botha 1989:91-94. For some criticisms of this distinction and also some rebuttals of these criticisms see, for example, Newmeyer 1983:35 ff., Taylor 1988:154ff.
- 24 For some discussion of the distinction between conscious knowledge and unconscious, tacit or implicit knowledge, and for a characterization of the

- nature of unconscious knowledge see, for example, Chomsky 1980a:69ff., 241ff., 1986:270ff, 1993:21ff., Botha 1989:55-57.
- 25 For some discussion of the idea that knowledge of language is not justified or grounded knowledge see Chomsky 1980a:93-95, 1980b:57, Stich 1980:39, Botha 1989:58-61.
- 26 As we proceed, it will become clear that this view of the componential make-up of knowledge of language is due to Noam Chomsky.
- 27 For further illustration of the lexical and combinatorial aspects of grammatical competence see Pinker 1994:83ff.
- 28 This view - which is credited to Wilhelm von Humboldt - has been given a modern articulation by Noam Chomsky (1987a:16-17, 1987b:7, 1987c:13, 1988b:4-5). For some further discussion, see Botha 1992:109-111 and Pinker 1994:84.
- 29 For some discussion of the nature of grammatical competence see Chomsky 1980a:54-59, 224-225, 1982:19-21, Botha 1989:74-76. For the species-specific nature of grammatical competence see, for example, Chomsky 1980b:57-58, 1982:19-21, Botha 1989:74-76. For the distinction between grammatical competence and the symbolic systems taught to apes, see Chomsky 1980a:239-240, 1983:315-316 and Botha 1989:79-81. For an instructive discussion of work that reveals the inability of higher apes to acquire human language see Pinker 1994:334-342.
- 30 For a discussion of the nature and properties of the various kinds of speech acts see, for example, Searle 1969, 1979, Levinson 1983:226ff., Mey 1993:109ff., Schiffrin 1994:49ff.
- 31 For a discussion of the maxims governing the cooperative use of language, see for example Grice 1975, 1978, Levinson 1983:100-118, Mey 1983:65ff. Some examples of these maxims have been considered in Botha 1994b:par. 2.2.2.
- 32 For a discussion of this linguistic episode see Hardy 1989:229.
- 33 For some discussion of the phenomenon of 'meaning more than what is said' - technically called 'the phenomenon of implicature' - see for example Levinson 1983:97ff., Mey 1993:99ff.
- 34 Some of these aspects of conversation 'management' are illustrated in Botha 1994b:par. 2.2.2.
- 35 For some discussion of this example see Hardy 1989:227.
- 36 For the sincerity condition see, for example, Searle 1969:57ff., Levinson 1983:51, 103-105, Mey 1993:120-123.
- 37 For a general characterization of the nature of pragmatic competence see Chomsky 1980a:59, 224-225, Botha 1989:74-75. For an interesting attempt to

- give a provisional characterization of the make-up of pragmatic competence see Kasher 1991:136-141.
- 38 For some discussion of Lewis Carroll's amusing use of the concept of the 'null class' see Holmes 1971:161-162.
- 39 For a discussion of the nature and properties of thematic roles (or relations) see, for example, Jackendoff 1972:chap. 2, Frawley 1992:197-248.
- 40 For a concise account of central properties of the symbolic behaviour of individual higher apes see Aitchison 1989:37-38, Pinker 1994:335-342. For Chomsky's views on the conceptual capacities of higher apes see Chomsky 1980a:57-58, 1982:19-21.
- 41 For Chomsky's view that knowledge of language is a structured mental state see, for example, Chomsky 1980a:49-50.
- 42 For some elaboration of the point that perceptual complexity may trigger unacceptability judgements see, for example, Bever 1970, 1974, Botha 1981:227-232, 1994b:par. 2.3.1.2, Aitchison 1989:203-216.
- 43 For some discussion of the diversity of the sources of (un)acceptability judgements, see the references in note 42 above. On the distinction between grammaticality and acceptability see Chomsky 1965:10-11, Botha 1989:185-186.
- 44 For Chomsky's characterization of the language faculty and of its initial state (which embodies the language acquisition capacity, also called the 'language acquisition device' or 'universal grammar') see, for example, Chomsky 1980a:65, 187, 1981a:34-35, 1983:109, 1986:25-26, Botha 1989:16-17, 25ff.
- 45 For some specifics of how stimulus deprivation affects the language acquisition of children see, for example, Curtiss 1990, Newport 1990. For an introductory discussion of the phenomenon under consideration see Pinker 1994:290-296.
- 46 For Chomsky's characterization of the degeneracy of the stimulus see Chomsky 1980b:42, Botha 1989:19.
- 47 For Chomsky's characterization and illustration of structure (in)dependence see, for example, Chomsky 1975a:57ff., 1983:315-320, Piattelli-Palmarini 1994:327-328. For a less technical account of this characteristic of language see, for example, Aitchison 1989:29-30, Pinker 1994:40-43.
- 48 For Chomsky's views on the poverty of the stimulus see, for example, Chomsky 1980a:34-36, 1980b:42, 1986:xxv, 6-7, 1993:24ff., Botha 1989:13, 19-20, 181-182.
- 49 For the examples discussed above see Chomsky 1986:8, 1993:24.

- 50 For some discussion of the nature and (problematic) properties of innate knowledge see Chomsky 1980a:96, 1980b:51, Edgley 1970:28ff., Botha 1989:61-62.
- 51 For Chomsky's views on the genetic basis of innate knowledge of language see Chomsky 1980a:31ff., 65ff., 241, 245, 1983:73, 12-125, 179, 1986:xxv-xxvi, Botha 1989:16, 25-35. For a broader perspective on the genetic basis of (knowledge of) language see Pinker 1994:chap. 10.
- 52 The Diamonds are the dream world counterparts of a real British family afflicted by SLI. The utterances 5 - 9 are modelled on utterances actually produced by members of this family. For an account of the nature of the genetically based language affliction of this family see Gopnik and Crago 1991, Pinker 1994:48-50, 323-325.
- 53 For Chomsky's view of linguistic universals see, for example, Chomsky 1980a:28-29, 1983:263, 1986:23, Botha 1989:130-135.
- 54 Chatterbox is a clone of a real world linguistic idiot savant called 'Crystal' whose linguistic and other capacities are discussed in Bellugi et al. 1991, 1992 and Pinker 1994:52-53. Persons such as Crystal have a form of retardation called 'Williams syndrome'. As children, they are short and slight, have elfin-like faces, have an IQ of about 50, cannot learn to perform simple ordinary tasks but are fluent conversationalists and able to understand complex sentences. The story attributed here to Chatterbox was in fact told by Crystal at the age of eighteen.
- 55 For the language-specificity of the language acquisition capacity see, for example, Chomsky 1980a:47, 245, 1983:110, 320ff., 1986:4, Botha 1989:29-31, 109-113.
- 56 The account given above of the language-specificity of the linguistic principle 13 is based on Piattelli-Palmarini 1994:328-330, which offers a fuller discussion of the case and also some references to recent literature dealing with it.
- 57 For Chomsky's views of the modularity of the initial state of the language faculty and of the language-specificity of its constitutive principles see Chomsky 1981b:5, 1983:113-117, Botha 1989:111. For arguments to the effect that basic characteristics of the language faculty are 'mirrored in' other human mental capacities - such as a '(universal) musical grammar' and a 'visual grammar' - see Jackendoff 1994:chap. 13.
- 58 This illustrative description of 'general themes' and 'specific variations' as characteristics of the Alice stories by Lewis Carroll and Gilbert Adair is based on studies such as Hardy 1989, Holmes 1971, Spacks 1971.

- 59 For the view that the initial state of the language faculty incorporates a set of principles with open parameter values, the view that a grammar is a set of fixed parameters, and the associated view that language acquisition comes down to parameter fixing see Chomsky 1986:146, 150-151, 243. The illustration given above of the nature of principles and parameters is based on Pinker's (1994:106-112) informal account of Chomsky's principles-and-parameters conception of language.
- 60 For reading and writing as nonbasic means of language behaviour see Botha 1994b:41-47 and for some of the various modes of speaking, listening, reading and writing see Botha 1994b:47-51.

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