PAGE	**PSYCHOLINGUISTICS BOOKS**
71	■ **Language Is Species Specific** • If we define ***communication*** loosely as a way to convey messages between individuals, we can generalize that every species has a communication system of some sort. • إذا قمنا بتعريف التواصل بشكل عام بأنها وسيلة لنقل الرسائل بين الأفراد، يمكننا أن نعمم أن كل الأنواع لديها نظام أتصالات من نوع ما. • If the system is **species specific –** that is, if it is unique to that species – the system is likely to be part of the genetic makeup of members of the species. • إذا كان للنظام أنواع محددة ـ وهذا هو، إذا أنها فريدة بنوعها إلى تلك الأنواع ـ من المرجح أن تكون جزءا من التركيب الجيني من الأعضاء نوعا • Some communication behaviors arise in certain species even if the individual has never heard or seen adults perform the behaviors. • تنشأ بعض سلوكيات التواصل لأنواع معينة حتى إذا كان الفرد لم يسمع قط أو ينظر للبالغين بأداء السلوكيات. • Some kinds of crickets and other insects have such a system. • بعض أنواع الصراصير والحشرات الأخرى لديها مثل هذا النظام. Other communication systems, like language for humans and bird song for some species of birds, can be acquired only if the young animal has the opportunity to experience the system in use
74	• they result from the way the human brain organizes and processes linguistic information: **language universals are a product of human neurology.** • أنها تنجم عن طريقة عمل الدماغ البشري المنظم والمعالج للمعلومات اللغوية: **عموميات اللغة هي نتاج لعلم أعصاب الإنسان** • Thus, a person's ability to acquire and use language is as natural as a person's ability to walk or a bird's ability to fly. • بالتالي، قدرة الشخص على اكتساب واستخدام اللغة الطبيعية مثل قدرة الشخص على المشي أو قدرة الطيور على الطيران. Thinking of language in this way is similar to the way we think about having hair or walking bipedally, two aspects of being human that are rooted in our biology. • A fundamental goal of linguistics is to describe Universal Grammar, which consists of all the absolute universals of human languages plus a description of their parameters of variation. • يمثل أحد الأهداف الأساسية لعلم اللغة لوصف نحوي عالمي، الذي يتكون من جميع العموميات المطلقة من اللغات البشرية، بالإضافة إلى وصف معاييرها في الاختلاف.

- Universal Grammar represents the "blueprint" or "recipe" for human language that every person is born with.

  - النحو العالمي يمثل "مخطط" أو "وصفة" للغة الإنسان لكل شخص ولد بها.

- All languages have phonology, morphology, syntax, and a lexicon.

  - جميع اللغات لديها علم الأصوات، مورفولوجيا، بناء الجملة، والمعجم.

- All languages possess rules and principles that allow their speakers to combine meaningless phonetic or gestural segments to create meaningful words and sentences.

  - كل اللغات تملك قواعد ومبادئ تسمح للناطقين بها على الجمع بين القطاعات الصوتية أو الدلالية لتشكيل معنى الكلمات ذات معنى والأحكام.

- All languages have an inventory of phonemes, phonotactic constraints on the way words can be formed, and phonological and morphological rules. Moreover, all languages have a recursive syntax that generates complex sentences, and because of this every human being has the capacity for unlimited linguistic creativity. Finally, all languages have a lexicon, which stores information about words by distinguishing form and meaning. Thus, the general organization of all human languages is the same. If languages were not biologically based, there would be no necessity for them all to have a similar organization – and we would expect great variation from language to language in terms of their internal organization. The general organization of language is not the only aspect of linguistic universality. The general properties of grammatical rules are the same for all languages. For instance, in phonology the rules for syllable structure are shared by all languages, although some languages place limitations on syllable structures that other languages do not (as we discussed in Chapter 2, with examples from Spanish and Japanese). Similarly, in syntax there are restrictions on movement that are universal, and syntactic rules in all languages are structure dependent. We can turn the concept of universality around and consider impossible languages and impossible rules. No human language could exist in which only simple sentences were used for communication, without the capacity to form complex ones. There are occasional attempts to categorize a language as being primitive. For example, the linguist

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Daniel Everett has argued along these lines for Pirahã, a language spoken by hunter-gatherers in northwestern Brazil (Everett 2005). Everett's evidence includes a claim that Pirahã syntax lacks embedding, a charge that the language does not have complex syntax. More careful investigation of the facts about Pirahã syntax has strongly countered Everett's claims: the language does have recursive constructions (Nevins, Pesetsky, and Rodrigues 2009). It is possible, of course, that at some point our hominid ancestors had a language that consisted only of simple sentences, but that would be speculation, because researchers do not know what the language of protohumans was like (Evans 1998); the lack of fossil evidence about protohuman language is hard but not impossible to overcome, given advances in our understanding of the neural and genetic mechanisms for language (Fitch 2005). What is certain is that no language spoken by *Homo sapiens* – modern humans – could be so restricted as to not contain recursion. A corollary of this is that there is no such thing as a primitive human language. The languages spoken in communities of modern-day hunter-gatherers are as rich and complex as the languages of the most industrially and technologically advanced communities, and they all possess human linguistic universals. The same is true of vernacular (non-standard) languages, of languages without writing systems, and of languages that are signed: they are organized in the ways we have described in Chapter 2. To examine directly whether humans can acquire rules that do not conform to Universal Grammar, a group of researchers attempted to teach a possible and an (impossible) made-up language to a polyglot savant – a person with an extraordinary talent for acquiring languages (Smith, Tsimpli, and Ouhalla 1993). For this investigation, the extraordinary language learner, Christopher, was exposed to Berber (a language spoken in North Africa, but which Christopher had never learned) and Epun (a language the experimenters invented for the study, containing rules that violated certain aspects of Universal Grammar). The researchers found that while Christopher learned Berber easily, he found it difficult to learn certain types of rules in Epun, particularly rules that violated structure dependency.

- **<u>Language Need Not Be Taught, Nor Can It Be Suppressed</u>**

Lenneberg's third criterion is about how biological systems consist of processes that are differentiated (develop) spontaneously as the individual matures. This has two correlates in language acquisition:

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matter what kind of cultural and social situation they grow up in. Children from impoverished circumstances with indifferent parental care eventually acquire a fully rich human language, just as do pampered children of affluent, achievement-oriented

parents. The biologically driven processes of language acquisition even drive the creation of new languages. Judy Kegl, Ann Senghas, and colleagues (Kegl 1994; Kegl, Senghas, and Coppola 1999; Senghas, Kita, and Özyürek 2004) describe how a signed language has developed in the deaf community of Nicaragua, as the natural product of language learning mechanisms. In the late 1970s, when schools for educating deaf children in Nicaragua were first opened, the deaf community had no systematic gestural system for communication, other than "home signs" that varied greatly from person to person. (A home sign is a sign or sign sequence made up by an individual.) Given the opportunity to interact more regularly with each other, deaf children began to develop agestural system to communicate. As a result of continued use (both in and out of school), that system eventually expanded into a rudimentary sign language with systematic properties. The language now has over 800 users, and Senghas and colleagues report that the youngest signers are also the most fluent and produce the language in its most developed form.

- The process of language birth witnessed in the case of Nicaraguan Sign Language resembles the process through which **pidgins** turn into **creole languages**.

- إن عملية ميلاد اللغة تشهد في قضية نيكاراغوا لغة إشارة تشبه العملية التي من خلالها pidgins تحولت إلى لغات creole

- A pidgin is a communication system consisting of elements from more than one language.

- pidgin هو نظام تواصل الذى يتكون من عناصر لأكثر من لغة واحدة

- A pidgin emerges in situations of language contact, when people who speak different languages come up with ways to communicate with each other.

- Pidgin يظهر في حالات أتصال اللغة، عندما الناس يتكلمون لغات مختلفة للتوصل الى سبل للتواصل مع بعضها البعض.

- Pidgins have simplified structure and a lexicon consisting of words from the various languages of their speakers. Importantly, a pidgin has no native speakers: its users have learned the communication code as adults, and their ability to use it will be uneven.

- Pidgins تبسط هيكل ومعجم المكون للكلمات من لغات مختلفة للناطقين بها. الأهم من ذلك، pidgin لا يوجد ناطقين بها: تعلم مستخدميها رمز التواصل مثل البالغين، وقدرتهم على استخدامه يكون متفاوتا.

- When the pidgin becomes **nativized** – that is, when children begin to acquire it as their native language – the grammar stabilizes and becomes more complex, the lexicon grows, and the language is on its way to becoming a creole.

- عندما pidgin تصبح nativized - وعندما يبدأ الأطفال للحصول على لغتهم الأصلية - تستقر قواعد اللغة ويصبح أكثر تعقيدا، المعجم ينمو، واللغة هي في طريقها إلى أن تصبح creole.

■ **Children Everywhere Acquire Language on a Similar Developmental Schedule**

- **يكتسب الأطفال اللغة فى كل مكان على جدول نمو مشابه**

There is a remarkable commonality to the milestones of language acquisition, no matter where in the world children acquire

	language. Dan Slobin of the University of California at Berkeley has devoted his entire
78	career to the cross-linguistic study of language acquisition and wrote a seminal essay entitled "Children and language: They learn the same all around the world" (Slobin 1972). Like the milestones of motor development (infants roll over, sit up, crawl, and walk at similar ages everywhere), the milestones of language acquisition are also very similar. Babies coo in the first half of their first year and begin to babble in the second half. The first word comes in the first half of the second year for just about everyone. In all societies, babies go through a one-word stage, followed by a period of early sentences of increasing length; finally, complex sentences begin. By the age of 5 the basic structures of the language are in place, although fine-tuning goes on until late childhood. Children all over the world are sensitive to the same kinds of language properties, such as word order and inflection. They make remarkably few errors, but their errors are of a similar type. While there is much individual variation in the age at which children acquire aspects of language, that variation is conditioned by individual characteristics of the child rather than by the language being acquired or the culture in which the language is used. One would never expect to hear, for instance, that Spanish-speaking children do not use their first word until they are 3, or that acquisition of Spanish syntax is not completed until adolescence. Nor would one expect to hear that infants in Zimbabwe typically begin speaking at the age of 6 months and are using complex sentences by their first birthday. There is clearly a developmental sequence to language acquisition that is independent of the language being acquired – although, as we will see in some detail in Chapter 4, some features of language are acquired more easily and earlier than others. In fact, those aspects of language that are easier and those that are more difficult are similar for all children. All children learn regular patterns better than irregular ones, and they actually impose regularities where they do not exist. For instance, children learning English will regularize irregular past tenses and plurals, producing things like *eated* and *sheeps*. All children make similar kinds of "errors" – no matter what language they are acquiring. Not only is the sequence of development similar for all children, the process of acquisition is similar as well. This is exactly what one would expect if the acquisition of a mental system is being developed according to a genetically organized, species specific and species-universal program. Lenneberg's fourth criterion, claiming that certain aspects of behavior emerge only during infancy, points to an important property of language acquisition: • for children everywhere there seems to be a critical period in the acquisition of their first language. • يبدو الأطفال بكل مكان أن هناك فترة حرجة لاكتساب لغتهم الأولى.
81	Yet Nicaraguan signers had an important environmental stimulus: each other. For a biological system, the environmental input is a stimulus that triggers internal development. We will come back to this in more detail in Chapter 4, when we discuss what characteristics of the language in the environment are necessary for language development. ■ **Anatomical and Physiological Correlates for Language** • **الاقتران التشريحي والفسيولوجي للغة** • The most fundamental biological fact about language is that it is stored in the brain, and, more importantly, that language function is localized in particular areas of the brain. • الحقيقة البيولوجية الأكثر جوهرية حول اللغة هو أن يتم تخزينها في الدماغ، والأهم من ذلك، يتم ترجمة أن وظيفة اللغة في مناطق معينة من الدماغ. This is hardly a new idea, going back at least to Franz Joseph Gall, the eighteenth-century neuroanatomist who developed the field of phrenology. Gall believed that various abilities, such as wisdom, musical ability, morality, and language, were located in different areas of the brain and could be discovered by feeling bumps on a person's skull. Gall was, of course, wrong about the bumps, but it seems to be true that some neutrally based abilities, such as language, have specific locations in the brain. • The first conclusive demonstration that language was localized in the brain took place in 1861 when a French neurologist named Paul Broca presented to the Paris Anthropological Society the first case of **aphasia** • أجريت أول تظاهرة قاطعة على أن اللغة مترجم في الدماغ عام 1861 عندما طبيب أعصاب فرنسي يدعى بول بروكا قدم الى جمعية باريس الأنثروبولوجية أول حالة لفقدان القدرة على الكلام

- Aphasia is a language impairment linked to a brain lesion. Broca had a patient who had received a blow to the head with the result that he could not speak beyond uttering *Tan, Tan*, and, thus, Broca called him Tan-Tan.

- الحبسة هو ضعف اللغة مرتبط آفة الدماغ. وبروكا مريض تلقى ضربة على الرأس وكانت النتيجة أنه لا يمكن أن يتكلم وراء النطق تان، تان، وبالتالي، ودعا بروكا له Tan-Tan

Upon autopsy, he was found to have a lesion in the frontal lobe of the left hemisphere of his brain. Ten years later a German neurologist named Carl Wernicke reported a different kind of aphasia, one characterized by fluent but incomprehensible speech (Dingwall 1993). Wernicke's patient was found to also have a left hemisphere lesion, farther back in the temporal lobe.

- **Neurolinguistics** is the study of the representation of language in the brain, and the discovery of aphasias led to the birth of this interdisciplinary field.

- Neurolinguistics هو دراسة تمثيل اللغة في الدماغ، واكتشاف الحبسة المؤدى إلى ولادة هذا الحقل المتعدد التخصصات.

- The two predominant kinds of aphasia are still called by the names of the men who first described them, as are the areas of the brain associated with each.

- اثنين من الأنواع السائدة للحبسة لا تزال تسمى من قبل أسماء الرجال الذين أول من وصفوهم، وكما هي مناطق دماغ مرتبطة بكل منها

- **Broca's aphasia**, also known **as *non-fluent aphasia***, is characterized by halting, effortful speech; it is associated with damage involving Broca's area in the frontal lobe of the left hemisphere.

- Broca's aphasia معروف أيضا باسم حبسة غير بطلاقة، تتميز من خلال الوقف، والكلام effortful، وترتبط مع الضرر التي تنطوي على منطقة بروكا في الفص الجبهي من نصف الكرة المخية الأيسر

- **Wernicke's aphasia**, also called ***fluent aphasia***, is characterized by fluent meaningless strings; it is caused by damage involving Wernicke's area

- Wernicke's aphasia وتسمى أيضا بطلاقة الحبسة، تتميز بطلاقة أوتار المعنى ؛ سببه الضرر التي تنطوي على منطقة فيرنيكه

| 84 | Aphasia is not a simple or clear-cut disorder. There are many different kinds of aphasia in addition to those classified as fluent and non-fluent, and many different behaviors that characterize the various clinical types of aphasia. Furthermore, much more of the left hemisphere is involved with language than just Broca's and Wernicke's areas; the area all along the Sylvian fissure, deep into the cortex, is associated with language function. Consequently, the localization of the damage for Broca's or Wernicke's patients does not always neatly correspond with the classical description (De Bleser 1988; Willmes and Poeck 1993).People with aphasia differ greatly in the severity of their symptoms, ranging from mild impairment to a global aphasia where all four language modalities – auditory and reading comprehension, and oral and written expression – are severely impaired. |

■ Language lateralization

- To say that language is lateralized means that the language function is located in one of the two hemispheres of the cerebral cortex.

- أن أقول أن اللغة هي وسيلة lateralized وأن مهمة اللغة تقع في احد من اثنين من نصفي القشرة الدماغية.

For the vast majority of people, language is lateralized in the left hemisphere. However, in some people language is lateralized in the right hemisphere, and in a small percentage of people language is not lateralized at all, but seems to be represented in both hemispheres. The hemisphere of localization is related to handedness, left-handed people being more likely than right-handed people to have language lateralized in the right hemisphere.

- Exactly why this should be the case is unclear, but, as illustrated in Figure 3.2, control of the body is **contralateral**: the right side of the body is controlled by the left motor and sensory areas, while the left side of the body is controlled by the right motor and sensory areas.

- بالضبط لماذا ينبغي أن يكون هذا هو الحال غير واضح، ولكن، كما هو موضح في الشكل 3.2، السيطرة على الجسم هو **المقابل**: يتم التحكم بالجانب الأيمن من الجسم عن طريق محرك اليسار والمناطق الحسية، بينما يتم التحكم بالجانب الأيسر من الجسم بواسطة محرك الأيمن والمناطق الحسية.

- Thus, left-handed people have right dominant motor areas, while right-handed people have left-dominant motor areas.

- بالتالي، أشخاص اليد اليسرى لديهم مناطق المحرك المهيمن الأيمن ، في حين أن أشخاص اليد اليمنى لديهم مناطق المحرك المهيمن الأيسر

Many investigations of hemispheric lateralization for language are based on studies of patients about to undergo brain surgery. In these cases, surgeons must be certain where their patients' language functions are localized so these areas can be avoided and an aphasic outcome prevented. Some procedures used to determine the localization of language in the brain are rather invasive.

- One common procedure for determining the hemispheric location of language functions in preoperative patients is the **Wada test**.

- احد الإجراء المشتركه لتحديد الموقع النصفي لوظائف اللغة للمرضى قبل الجراحة هو اختبار وادا.

- In this procedure, sodium amytol is injected into one of the two hemispheres of a patient's brain.

- بهذا الإجراء، يتم حقن صوديوم amytol في واحدة من اثنين من نصفي دماغ المريض.

The patient is asked to count or name pictures presented on an overhead

88	- In an experiment that tested whether participants could match simple sentences presented to the right hemisphere with pictures they had been shown, participants could not distinguish between the (a) and (b) versions of sentences like the following

- في التجربة التي تختبر ما إذا كان المشاركون قد تطابق الجمل البسيطة المعروضه على النصف الأيمن مع الصور التي ظهرت، يمكن للمشاركين أن لا يميز بين (أ) و (ب) وإصدارات الأحكام كما يلي

a. The boy kisses the girl.
b. The girl kisses the boy.
a. The girl is drinking.

b. The girl will drink.
a. The dog jumps over the fence.
b. The dogs jump over the fence.

- Thus, while the right hemisphere may possess some rudimentary lexical information, it is mute and does not represent the phonological, morphological, and syntactic form of language.

- هكذا، في حين أن النصف الأيمن قد يمتلك بعض المعلومات المعجمية البدائية، فكتم ولم يمثل النموذج الصوتي، الصرفي، والنحوي للغة

- Further evidence of the dominance of the left hemisphere for language comes from studies of <mark>**dichotic listening**</mark>.

- أدلة أخرى عن هيمنة النصف الأيسر للغة يأتي من دراسات الاستماع dichotic.

- In this kind of experiment, participants are presented auditory stimuli over headphones, with different inputs to each ear.

- بهذا النوع من التجربة، وقدم المشاركون المنبهات السمعية عبر سماعات الرأس، مع مختلف المدخلات إلى كل أذن.

For instance, the syllable ba might be played into the right ear, while at the same exact time da is played to the left ear.

- The participant's task is to report what was heard. On average, stimuli presented to the right ear are reported with greater accuracy than the stimuli presented to the left ear.

- مهمة المشارك هو إبلاغ ما سمع. بالمعدل ، يتم الإبلاغ عن المحفزات المقدمة إلى الأذن اليمنى مع دقة أكبر من المحفزات المقدمة إلى الأذن اليسرى.

- This is known as the <mark>**right-ear advantage**</mark> for language.

- هذا يعرف ميزة الأذن اليمنى للغة

- It occurs because a linguistic signal presented to the right ear arrives in the left hemisphere for decoding by a more direct route than does a signal presented to the left ear.

- يحدث ذلك لأن الإشارة اللغوية المقدمة إلى الأذن اليمنى تصل للنصف الأيسر للفك بطريق مباشره أكثر مما يفعل الإشارة المعروضة على الأذن اليسرى

- From the left ear, the signal must travel first to the right hemisphere, then across the corpus callosum to the left hemisphere (Kimura 1961, 1973).

- من الأذن اليسرى، يجب الإشارة تذهب أولا إلى النصف الأيمن، ثم لجميع أنحاء الجسم الثفن إلى النصف الأيسر

Thus, information presented to the right ear is decoded by the left hemisphere earlier than the information presented to the left ear. The right-ear advantage exists only for linguistic stimuli. Non-speech signals produce no ear advantage, and musical stimuli demonstrate a left-ear advantage (Kimura 1964. Lateralization apparently begins quite early in life. Evidence suggests that the left hemisphere is larger than the right before birth, and infants are better able to distinguish speech from non-

speech when the stimuli are presented to the left hemisphere. Early language, however, appears not to be lateralized until the age of about 2. If the left hemisphere is damaged in infancy, the right hemisphere can take over its function. This ability of parts of the young brain to assume functions usually associated with other areas is called

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model proposes that it is not possible for the child to acquire underlying features of language – such as the components of grammar, universal principles, and features of variation – without the biologically based UG. As we explained in Chapter 2, the surface representation of language is not adequate to provide information about the abstract, structural features of language. The model we advocate here, then, is one in which learning strategies operate on the child's linguistic input and allow it to be organized according to universal principles to create a grammar of the target language. We can summarize this section by pointing out that children approach the task of language acquisition with a sophisticated toolkit that makes them extremely biased learners; as Ray Jackendoff puts it, children possess "preconceptions" about language acquisition which ultimately "give them the right solutions" (Jackendoff 2002: 84). Human biology supplies knowledge of universal principles for organizing language and knowledge of the handful of ways languages can vary, and limits the way the input is processed by means of general principles of acquisition. Thus equipped, children can take input from the environment to rapidly and efficiently acquire the language or languages around them.

■ **Characteristics of the Language in the Environment**

- The primary purpose of a child's linguistic environment is to provide information about the language the child is acquiring.

- الغرض الأساسي من البيئة اللغوية للطفل هو توفير معلومات حول اللغة واكتساب الطفل.

- Psycholinguists call this type of information **positive evidence**.

- Psycholinguists تطلق على هذا النوع من معلومات الأدلة الإيجابية

- It supplies the data that the child needs in order to set parameters and develop a grammar that is adult-like.

- التي تزود البيانات التي يحتاج الطفل من أجل تعيين المعلمات وتطوير النحو الذي هو مثل الكبار.

Obviously, the main providers of input are the people who interact with the child: parents, caretakers, siblings, and any other children or adults engaging in routine linguistic interactions with the child. In this section we consider the general characteristics of caretaker speech.

- We stress that children need to be talked to: experiencing input provides children with **positive evidence** about how the language works.

- نحن نؤكد على أن الأطفال بحاجة إلى أن التحدث : تعاني مدخلات يوفر الأطفال مع أدلة إيجابية حول كيفية عمل اللغة.

But to what extent do children need to be talked to in specific ways? There are some important facts about language acquisition that limit significantly how we view the role of the language in the environment: every child in every known culture acquires language with similar ease, by going through similar stages at about the same rate. This implies that any characteristics of the input in the environment that

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Another characteristic of speech directed to children is that it consists of short, highly grammatical, and semantically simple sentences. These characteristics have not been studied cross-linguistically as thoroughly as has the prosody of speech to infants. However, they do seem typical of the way many caretakers in the English-speaking world address young children. Studies attempting to relate specific features of child language to specific characteristics of caretaker speech have been unsuccessful (Gleitman, Newport, and Gleitman 1984), and there is no evidence that children spoken to in typical child-directed speech acquire language with any greater facility than children who receive more adult-like input. However, speech with the characteristics of childdirected speech is probably easier to understand, and is thus a better vehicle for positive evidence. Importantly, speech addressed to children, while it might be semantically simple, is not syntactically or morphologically simple. Children must receive positive evidence about the full variety of syntactic and morphological forms in their language, and caretaker speech provides much of that evidence. Since child-directed speech is semantically simple, it is a good vehicle for communicative interaction between caretaker and child, which is critical for language acquisition. To summarize this section, we emphasize two important points about the role of input in language acquisition. First, interactive input is necessary: Jim and Glen were not able to acquire spoken English simply by experiencing language via television, although Glen did learn a few words (Sachs, Bard, and Johnson 1981). This observation has been confirmed experimentally,

in a study of American 9-month-old children exposed to a foreign language, Mandarin Chinese (Kuhl, Tsao, and Liu 2003). In the study, children exposed to a live speaker performed much better, when tested on their perception of sounds specific to Mandarin, than children whose exposure to the same speaker was pre-recorded (presented via a television set or only as audio). Clearly, interactive experience with language enhances acquisition. Second, interactive experience is all that is needed: Jim and Glen did not receive any special instruction, reward, or correction, and neither did the children exposed to Mandarin in the study by Kuhl and colleagues.

■ **Developmental Stages مراحل النمو**

- We have mentioned several times in the preceding pages that children everywhere develop linguistically at similar rates and experience similar developmental milestones.

- ذكرنا عدة مرات في الصفحات السابقة أن الأطفال في كل مكان تطور لغويا بمعدلات مماثلة واجهت مراحل تطور مماثل.

In this section we describe the major

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demonstrating that, in order to distinguish between the languages in the environment, bilingual infants rely on phonetic information that they extract from the input (Werker and Byers-Heinlein 2008.(Recall the broad rhythmic distinctions between languages described in Chapter 2. Languages like English and Dutch are stress-timed, whereas languages like Spanish and Catalan are syllable-timed. It turns out that newborns can discriminate languages from different rhythmic classes (e.g., English and Spanish), but not from the same rhythmic class (e.g., Spanish and Catalan); however, by 4 or 5 months infants can distinguish even between languages of the same rhythmic class. All infants are able to discriminate languages in their environment from unfamiliar languages, but an interesting difference has been documented between monolingual and bilingual infants: bilinguals will take longer to attend to a stimulus in one of their native languages than to a stimulus in an unfamiliar language, while monolinguals will take longer to orient to an unfamiliar language than to their native language (Bosch and Sebastiān-Gallés 1997. Presumably, the delay has to do with the time it takes the bilingual baby to identify which of the two native (and familiar) languages is being presented. Bilingual babies, then, might need to attend to the speech of their environment differently than monolingual babies do, because it necessarily contains information about two languages, rather than just one. The study cited earlier about 4-month-olds' attentiveness to muted talking faces, by Weikum et al. (2007), also demonstrated that in older babies, 8-month-olds, only the bilinguals still successfully discriminated between English and French. By the end of their first year of life— particularly when exposure to the two languages is regular and sustained – bilingual babies have developed a system that distinguishes between all of the phonemic contrasts in each of their languages, although the details of how they get there are still not well understood)Werker and Byers-Heinlein 2008.

- In the first half of the first year of life infants interact in a variety of ways with their caretakers, but their vocalizations are primarily soft coos and gurgles that are not at all like actual language. In the second half of the first year, true **babbling** begins.

- بالنصف الأول من السنة الأولى من حياة الأطفال الرضع يتفاعلون بعدة طرق مع القائمين على رعايتهم، ولكن الالفاظ هم في المقام الأول coos لينة والغرغرة ليست على الإطلاق مثل اللغة الفعلية. بالنصف الثاني من السنة الأولى، يبدأ الهذيان الحقيقي.

- Babbling consists of single syllables at first, always consisting of a consonant and a vowel.

- يتكون الهذيان من مقاطع واحدة بالبداية، وتتكون دائما من حرف ساكن وحرف علة.

Usually the consonant is a stop consonant and the vowel is /a/. At first the babbles will be strings of similar syllables, like baba baba. Later, the babbles will become more varied, e.g., baga bada. This type of babbling is called segmental babbling because the vocalizations sound like phonemic

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is to formulate the message into a set of words with a structural organization appropriate to convey that meaning, then to transform the structured message into intelligible speech. The hearer, on the other hand, must reconstruct the intended meaning from the speech produced by the speaker, starting with the information available in the signal. In this and the next three chapters, we will describe the information processing operations performed rapidly and unconsciously by the speaker

and the hearer, as well as the mental representations constructed by those operations. It is worth emphasizing that a hearer's successful recovery of a speaker's intention when uttering a sentence involves shared knowledge that goes well beyond knowledge of language and well beyond the basic meaning of a sentence – a topic we will explore in Chapter 8. But before we can examine contextualized language use, we describe the operations that use knowledge of language in encoding and decoding linguistic signals. This chapter focuses on production. Since the mid-1970s, production has gradually become a central concern in the study of language performance (Bock 1991), alongside the study of perception. The sections that follow provide an introduction to some of that research. We will first discuss the components of a general model for language production. We will then describe the mental mechanisms that constrain how speakers encode ideas into mental representations of sentences, which are eventually uttered, written, or signed. The chapter concludes with details on how those mental representations are transformed into an acoustic speech signal.

■ A Model for Language Production نموذج لإنتاج اللغة

- The production of a sentence begins with the speaker's intention to communicate an idea or some item of information.

- إنتاج الجملة يبدأ مع اعتزام المتكلم إلى توصل الفكرة أو بعض بند المعلومات

- This has been referred to by Levelt (1989) as a **preverbal message**, because at this point the idea has not yet been cast into a linguistic form.

- قد أشار إلى هذا من قبل Levelt كرسالة preverbal، لأنه بهذه المرحلة لم يتم حتى الآن تلقي الفكرة إلى شكل لغوي

- Turning an idea into a linguistic representation involves mental operations that require consulting both the lexicon and the grammar shared by the speaker and hearer.

- تحول فكرة إلى تمثيل لغوي ينطوي على عمليات عقلية تتطلب استشارة كل من المعجم والنحو مشترك من قبل المتكلم والسامع

Eventually, the mental representation must be transformed into a speech signal that will be produced fluently, at an appropriate rate, with a suitable prosody. There are a number of steps to this process, each associated with a distinct type of linguistic analysis and each carrying its own particular type of information. Figure 5.1 summarizes, from left to right, the processing operations performed by the speaker.

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- levels of production planning comes from analyses of **speech errors** (**also called slips of the tongue**) by Garrett (1980a, 1980b, 1988,(Fromkin (1971, 1980, 1988), and others.

- مستويات تخطيط الإنتاج تأتي من تحليلات أخطاء الكلام (وتسمى أيضا زلات اللسان) من قبل غاريت وغيرهم

- This research draws on speech error corpora, collected by the investigators, by noting the occasions when they or their interlocutor produced a speech error.

- يستند هذا البحث على خطأ خطاب corpora ، التي تم جمعها من قبل المحققين، بالإشارة إلى مناسبات عندما المحاور أنتج خطأ بالكلام.

- **An interlocutor** is a participant in a conversation.

- **An interlocutor** هو أحد المشاركين في المحادثة

- Other evidence comes from studies using a range of techniques to elicit speech production under controlled laboratory conditions;

- أدلة أخرى تأتي من الدراسات باستخدام مجموعة تقنيات لانتزاع إنتاج الكلام تحت المراقبة المختبرية؛

- the objective of such work is to examine how fluent speech is produced, and what conditions cause fluent speech to break down.

- الهدف من هذا العمل هو دراسة كيف يتم إنتاج الخطاب بطلاقة، وما الظروف المسببة لتحطيم الكلام بطلاقة.

- <mark>**Production in bilinguals and second language learners**</mark>

- الإنتاج الثنائي للغة ومتعلمي اللغة الثانية

Few adjustments need to be made to the working model in Figure 5.1 to account for production by people who speak two or more languages. We need to assume that a bilingual has two language-specific grammars, and a lexicon with language-specific entries, and we need to specify how these language-specific knowledge repositories are activated (or deactivated) . but that is all.

- When a bilingual is speaking in a <mark>**unilingual mode**</mark> (only one language), only one of the grammars is consulted to build structural representations, and the active languages lexical entries are activated.

- عند يتحدث ثنائي اللغة بوضع أحادي اللغة (لغة واحدة فقط)، واستشارة واحدة فقط لقواعد النحو لبناء التمثيلات الهيكلية، ويتم تنشيط اللغات بالموقع للمقالات المعجمية.

- When in <mark>**a bilingual mode**</mark>)when the bilinguals two languages are being used in the same conversation,(access to both grammars and lexical items from both languages must be possible (Grosjean 2001).

- عندما يكون في وضع ثنائي اللغة (عندما يتم استخدام ثنائي اللغة كلغتين بنفس المحادثة)، والوصول إلى كلا من قواعد النحو والعناصر المعجمية من اللغتين يجب أن يكون محتمل.

Models of bilingual language production, like de Botپfs (2004) or Greenپfs (1986), incorporate mechanisms to control activation of the language or languages of the conversation)or inhibition of the language or languages not being used.(Choosing what language (or languages) to activate during a conversation is guided by the speakerپfs communicative intent and other nonlinguistic variables like conversation participants, topic, and context.)For more discussion of language choice, see Chapter 8.) The process resembles how a monolingual chooses between speaking formally or informally. Importantly, the steps for production continue to be the same in both the unilingual and the bilingual mode of production, and for monolingual and bilingual speakers: lexical items are selected; a syntactic structure is built; a phonological representation is generated. However, knowledge of two languages has at least two important consequences for language production: it permits intentional switching from one language to the other, and it triggers occasional unintentional slips into a language not active in the conversation.

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- One type of alternation between languages in bilingual speech <mark>**is code-switching**</mark>.

- نوع واحد من التناوب بين اللغات في الكلام ثنائي اللغة code-switching

- Code-switching is switching between two codes (two languages, or two distinct dialects of the same language) within the same discourse.

- Code-switchingيتم التبديل بين اثنين من رموز (لغتين، أو اثنين من لهجات مختلفة من اللغة نفسها) داخل نفس الخطاب.

- A switch can take place between sentences (intersentential code-switching).

- تحول يمكن أن يحدث بين الجمل (intersentential رمز التبديل).

- A switch can also occur within the same sentence intrasentential code-switching), at clause boundaries, or at smaller phrasal boundaries.

- يمكن أيضا أن يحدث التحول ضمن نفس الجملة intrasentential رمز التبديل)، في حدود شرط، أو في حدود أصغر الجمل الفعلية.

- A third category, tag-switching, involves the insertion of frequently used discourse markers, like so, you know, I mean, etc. .

- فئة ثالثة، وعلامة التبديل، وينطوي على الإدراج لعلامات الخطاب المستخدمة بشكل متكرر، مثل ذلك، كما تعلمون، أعني، الخ

The example in (1), produced by a Spanish–English bilingual)cited by Romaine (1995: 164)), illustrates all three types of code-switching; the underlined phrases are translated below the example: … (1)they tell me 'How'd you quit, Mary?' I don't quit I … I just stopped. I mean it wasn't an effort that I made a que voy a dejar de fumar por que me hace daͦo o this or that uh-uh. It's just that I used to pull butts out of the waste paper basket yeah. I used to go look in the … b se me acaban los cigarros en la noche. I'd get desperate c y ahيvoy al basurero a buscar, a sacar, you know. a 'that I'm going to quit smoking because it's harmful to me or' b 'I run out of cigarettes at night' c 'and so I go to the trash to look for, to get some out' Code-switching is a discourse style that is most typical in bilinguals who are highly proficient speakers of both languages (Poplack 1980), which is not surprising: producing utterances that alternate between two languages requires sustained activation of the grammars and lexicons of each language, and of the rules that govern grammatical switching. Code-switching generally serves a communicative function (Myers-Scotton 1988). A bilingual may switch to the other language to emphasize something just said, to quote something or someone, or to modify a statement further; code-switching can also be used to include or exclude an interlocutor, or to signal power relations between interlocutors. In the example in (1), the speaker switches into Spanish for the more personal parts of her message. In some bilingual speech communities, the default communication style when in a bilingual mode involves frequent alternation between two languages (Myers-Scotton 1988.(Code-switching is guided by the same production mechanisms involved in unilingual production. Research examining large code-switching corpora has demonstrated that naturally occurring code-switching is highly principled behavior (Myers-Scotton 1993). As such, code-switching offers insights about the cognitive architecture that supports bilingualism.

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- In Chapter 2 we used the phenomenon of **borrowing**, in which a word from one language is incorporated into the lexicon of another, to illustrate how a borrowed word might be transformed to conform with the phonotactic constraints of the incorporating language.

- بالفصل 2 استخدمنا ظاهرة الاقتراض**borrowing** ، التي أسست كلمة من لغة إلى معجم آخر، لتوضيح الكيفية التي يمكن أن تتحول كلمة اقترضت لتتوافق مع القيود phonotactic للغة دمج

- Borrowing is also a feature of bilingual language use, and it is sometimes difficult to distinguish from code-switching.

- الاقتراض أيضا سمة من استخدام لغة ثنائية اللغة، ومن الصعب أحيانا التمييز بين رمز التبديل.

- One difference between the two is the degree of integration of the guest word in the host language.

- فارق واحد بينهما هو درجة تكامل الكلمة ضيف في اللغة المضيفة.

- A borrowed word (also called a *loan*) typically undergoes both orthographic and phonological adaptation into the host language;

- كلمة المقترضة (تسمى أيضا القرض) وعادة ما يخضع كل من التكيف الهجائي والصوتي إلى اللغة المضيفة؛

- the example in (2a) illustrates orthographic adaptation (the loan in English is not capitalized and loses the umlaut over the third vowel). Loans are sometimes translated into an equivalent word in the host language, and are then **called *loan translations* or *calques*** ; an example is in (2b).

- المثال في (A2) يوضح التكيف الهجائي (لا يتم تكبير القرض بالإنجليزية ويفقد علامة تشكيل حرف العلة الثالثة). بعض الأحيان يتم تحويل القروض إلى ما يعادل كلمة باللغة المضيفة، ومن ثم تسمى الترجمات قرض أو المنسوخة؛ مثال هو في (B2).

- Bilinguals often borrow to fill lexical gaps in one of their languages. Loanwords sometimes become established in the language, and even monolinguals will begin to use them.

- بكثير من الأحيان ثنائي اللغة اقتراض لسد الثغرات المعجمية في احد لغاتها. تصبح الكلمات المستعارة أحيانا منشئ باللغة، و حتى بدأ monolinguals لاستخدامها.

(2) a. doppelganger
'ghostly counterpart of a person'
(from German *Doppelgänger*)
b. thought experiment
(from German *Gedankenexperiment*)

- It is important to <u>distinguish between deliberate alternations</u>, like code-switching or borrowing, <u>and unintentional non-native-like elements</u> in the speech of a second language learner.

- من المهم أن نميز بين تناوبات متعمدة، مثل رمز تبديل أو الاقتراض، والعناصر غير الأصلية مثل غير مقصوده في خطاب متعلم اللغة الثانية.

- A second language grammar may differ – slightly or dramatically – from the grammar of a native monolingual speaker. No doubt, you have heard second language learners speak with an accent, use words in ways that do not match native speakers' intuitions, and even produce sentences with unusual syntax.

- قد تختلف قواعد اللغة الثانية ـ قليلا أو بشكل كبير ـ من النحوي المتكلم أحادي اللغة الأم. لا شك، كنت قد سمعت متعلمي اللغة الثانية يتحدث بلكنة، واستخدام الكلمات بطرق لا تتطابق حدس الناطقين بها "وحتى إنتاج أحكام لبناء جملة غير عادية.

- Non-native-like production by second language learners can be the result of rules from the first language being incorporated into the second language, a phenomenon called **transfer**.

- غير الأصلي مثل إنتاج من قبل متعلمي اللغة الثانية يمكن أن يكون نتيجة لقواعد اللغة الأولى التي يجري إدراجها باللغة الثانية، وتدعى ظاهرة النقل

- Non-native-like production can also be linked to the use of acquisition strategies like overgeneralization

  - ويمكن أيضا الغير أصلية مرتبطة مثل إنتاج إلى استخدام استراتيجيات الأكتساب مثل overgeneralization

- ■ **Planning Speech Before It Is Produced**

- **التخطيط الكلام قبل أن يتم إنتاجه**

- Producing a sentence involves a series of distinct operations and representations: lexical, syntactic, morphological, and phonological. The following sections discuss some of the evidence that has led researchers to posit these different levels of production planning.

- إنتاج الجملة ينطوي على سلسلة من العمليات المتميزة والتمثلات: المعجمية والنحوية، الصرفية، والصوتية. تناقش المقاطع التالية بعض الأدلة التي أدت الباحثين لأفتراض مستويات مختلفة من تخطيط الإنتاج

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Accessing the lexicon

- As mentioned above, the process of language production begins with an idea that is encoded into a semantic representation.

  - كما ذكر أعلاه، فإن عملية إنتاج اللغة تبدأ مع فكرة أن يتم ترميز التمثيل الدلالي

- This sets in motion a process **called lexical retrieval**. Remember that the lexicon is a dictionary of all the words a speaker knows.

- هذه مجموعات في الحركة عملية تسمى استرجاع المعجمية. تذكر أن المعجم هو قاموس من كل الكلمات يعرفها المتكلم.

- A lexical entry carries information about the meaning of the word, its grammatical class, the syntactic structures into which it can enter, and the sounds it contains)its phonemic representation).

- إدخال المعجمية يحمل معلومات حول معنى الكلمة، فئتها النحوية، والتراكيب النحوية التي يمكن أن تدخل، وأصوات تحتوي على (تمثيلها فونيمي).

A word can be retrieved using two different kinds of information: meaning or sound. The speaker retrieves words based on the meaning to be communicated and has the task of selecting a word that will be appropriate for the desired message. The word must also be of the appropriate grammatical class (noun, verb, etc.) and must be compatible with the structure that is being constructed. It is most certainly not the case that the structure is constructed before the words are selected, nor are all the words selected before the structure is constructed. In fact, the words and the structure are so closely related that the two processes take place practically simultaneously. Ultimately, the speaker must retrieve a lexical item that will convey the correct meaning and fit the intended structure. This means that a speaker must enter the lexicon via information about

meaning, grammatical class, and structure, only later to retrieve the phonological form of the required word. The hearer's task, which will be discussed in detail in the next chapter, is the mirror image of the speaker's. The hearer must process information about the sound of the word and enter his lexicon to discover its form class, structural requirements, and meaning. Important psycholinguistic questions concern the organization of the lexicon and how it is accessed for both production and comprehension. The speed of conversational speech varies by many factors, including age (younger people speak faster than older people), sex (men speak faster than women), nativeness (native speakers are faster than second language speakers), topic (familiar topics are talked about faster than unfamiliar ones), and utterance length (longer utterances have shorter segment durations than shorter ones); on average, though, people produce 100 to 300 words per minute (Yuan, Liberman, and Cieri 2006, (which, at the slower end, is between 1 and 5 words (or 10 to 15 phonetic elements) per second. (Notice that this includes the time it takes to build syntactic and phonological representations and to move the articulators, not just time actually spent in lexical retrieval.) Clearly, the process of accessing words is extremely rapid.

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share a great many aspects of meaning. Love and hate are both verbs that refer to internalized feelings one person can have about another; the only difference between them is that they refer to distinct (and opposite) feelings. Speech errors often involve the production of forget instead of remember, give instead of take, and so on

- Sometimes words that sound alike are implicated in speech errors, like the following:

- أحيانا الكلمات التي تبدو على حد سواء متورطة في أخطاء الكلام، مثل ما يلي:

a. If you can find a gargle around the house} If you can find a garlic around the house{...

b. We need a few laughs to break up the mahogany.
}We need a few laughs to break up the monotony{.

c. Passengers needing special assistance, please remain comfortably seated until all passengers have complained … uh, deplaned.

- In these errors, the grammatical class of the intended and the intruding word is the same, even though the meaning is completely different.

- بهذه الأخطاء، والطبقة النحوية مقصوده وكلمة التطفل نفسها، حتى وإن كان المعنى مختلف تماما

- Errors like these suggest that words are organized by phonological structure, forming "neighborhoods" of words that sound similar. Semantically based and phonologically based errors, like those in (3) and (4), respectively, provide evidence for the distinction between two components of lexical representations discussed in Chapter 2: meaning based and form-based.

- أخطاء مثل هذه الكلمات تشير إلى أن تنظم وفقا للهيكل الصوتي، وتشكيل "الأحياء" من كلمات تبدو مماثلة. استنادا لأخطاء لغويه واستنادا phonologically، مثل تلك الموجودة في (3) و (4)، على التوالي، تقدم دليلا للتمييز بين عنصرين من تمثيلات المعجمية التي نوقشت في الفصل 2: يعني القائم والقائم على النموذج.

- A phenomenon in lexical retrieval that has fascinated psycholinguists for decades is the **tip-of-the-tongue phenomenon** .

- ظاهرة استرجاع المفردات التي سحرت psycholinguists لعقود هي ظاهرة بلاغ بين اللسان.

- A tip-of-the-tongue state occurs when the speaker knows the word needed

but cannot quite retrieve it.

- يحدث حالة بلاغ من اللسان عندما يعرف المتكلم الكلمة المطلوبة ولكن لا يمكن استرداد تماما.

It is a very uncomfortable mental state, and when people experience it, they might say "I've got that word right on the tip of my tongue!" What people experience during a tip-of-the-tongue state offers a glimpse into the steps involved in lexical retrieval. Typically, people have access to the meaning- based part of the lexical representation, but experience a tip-of-the-tongue state when they fail to find a fully specified form-based representation (Bock and Levelt 1994). However, people typically know something about the word they are unsuccessfully searching for. They can often think of the initial or final sounds or letters, how many syllables it has, where primary stress is located, and even words that sound similar. People experiencing a tip-of-the-tongue state will often also perform gestures that are suggestive of the meaning of the word, though it is not necessarily the case that gesturing helps retrieval (Beattie and Coughlan 1999).

| 144 | While no one really understands tip-of-the-tongue states, it is a phenomenon that demonstrates that when people enter the lexicon through meaning, in order to produce a word, a great deal of information may be available even if the entire representation of the word is not retrieved. Tip of- the-tongue states, of course, are a rare occurrence, as are lexical retrieval errors like the ones in (3) and (4). Usually lexical retrieval produces an appropriate set of words required for the speaker's sentence. |

■ **Building simple sentence structure**بناء بنية الجملة البسيطة

- Levelt (1989) refers to the creation of sentence structure during sentence planning as **grammatical encoding**.

- Levelt يشير إلى إنشاء بنية الجملة أثناء التخطيط الجملة كما ترميز النحوية.

- For this the speaker must consult the internalized grammar to construct structures that will convey the intended meaning.

- لهذا المتكلم يجب استشارة النحو المنضوية لبناء الهياكل التي من شأنها أن تنقل المعنى المقصود.

- Again, speech errors provide information about some of the characteristics of the representations that are constructed. We know, for instance, that words are represented as separate units. Speech errors like the ones in (5) provide evidence for this:

- مجددا، وتوفير المعلومات حول أخطاء خطاب بعض من خصائص تمثيل يتم بناؤها. ونحن نعرف، مثلا، أن يتم تمثيل الكلمات كوحدات منفصلة. أخطاء الكلام مثل تلك الموجودة في (5) تقدم أدلة بهذا

a. I left the briefcase in my cigar.
{I left the cigar in my briefcase.}
b. … rubber pipe and lead hose …
{… rubber hose and lead pipe …}

- These examples illustrate a common type of error, **exchange errors**; the exchange units here are two words.

- توضح هذه الأمثلة نوع شائع من الخطأ، وأخطاء الصرف؛ وتبادل الوحدات لنوعان من الكلمات.

- **Word exchange errors** never occur between content words and function

words and are usually limited to words of the same grammatical class, nouns in the case of the examples above.

- لا تحدث أخطاء تبادل كلمة أبدا بين كلمات المحتوى والكلمات الدالة وتقتصر عادة على كلمات من نفس الفئة النحوية، الأسماء في حالة الأمثلة أعلاه.
- An exchange error can involve units larger than individual words.
- خطأ الصرف يمكن أن تنطوي على وحدات أكبر من كلمات فردية.
- Such errors provide evidence that sentences are organized structurally during language production.
- توفير أخطاء كهذه أدلة على أن يتم تنظيم الأحكام هيكليا خلال إنتاج اللغة.
- Constituents that are larger than words, but which are units in the hierarchical organization of the sentence, can exchange with one another. <u>Consider the following error:</u>
- المكونات التي هي أكبر من الكلمات، ولكن هي وحدات في التنظيم الهرمي للجملة، ويمكن تبادل بعضها البعض. أنظر في الخطأ التالية

The Grand Canyon went to my sister.
{My sister went to the Grand Canyon.}
- A noun phrase, *the Grand Canyon*, has changed places with another noun phrase, *my sister*.
- الجملة الإسمية، جراند كانيون، غير الأماكن مع جملة إسمية أخرى ، *my sister*

Thus, a constituent larger than an individual word has moved. Movement of two words that are not part of the

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same constituent is never observed. An error such as *The grand my sister to canyon went would never be produced. In speech errors, syntactically defined constituents are moved, and the resulting sentences are always structurally well-formed sentences of English.

- Exchange errors also demonstrate the existence of a level of representation where bound morphemes are represented separately from their stems, as the following examples illustrate
- تبين أيضا أخطاء الصرف تبادل وجود مستوى التمثيل حيث يتم تمثيل الصرفية متعددة بشكل منفصل من الجذر، كما توضح الأمثلة التالية

a. He had a lot of guns in that bullet.
}He had a lot of bullets in that gun{.
b. You ordered up ending.
}You ended up ordering{.
c. We roasted a cook.
**}We cooked a roast{.**
d. … gownless evening straps…
…}strapless evening gowns{…

- In (7a), gun and bullet have been exchanged, but the plural morpheme –s appears in the intended structural position.

- في (A7)، تم تبادل gun و bullet ، لكن يبدو أن جمع المورفيم-S يظهر في الموقف الهيكلي المقصود.

- In (7b), the words end and order have been exchanged, but the morphemes –ed and –ing appear in their intended structural positions.

- في (B7)، يتم تبادل الكلمات end و order ، ولكن يبدو أن الصرفية، ed و ing– تظهر في مواقفها الهيكلي المقصود

- The same type of analysis applies to(7c), in which roast and cook have been exchanged, but the morpheme –ed has not moved.

- نفس النوع من التحليل ينطبق على (C7)، التي تم فيها تبادل roast و cook ، ولكن المورفيم-إد ed– لم تتحرك

- These examples suggest that while speech errors may produce sentences with odd meanings, they rarely produce structurally bizarre sentences.

- هذه الأمثلة تشير إلى أنه في حين قد ينتج عن أخطاء خطاب الجمل ذات المعاني ، فإنها نادرا ما تنتج جمل غريبة هيكليا.

- The error in (7b), for instance, was not *You ordering up ended, as it would have been if the bound morphemes and the stem had formed a unit at the time of exchange.

- الخطأ في (B7)، مثلا، لم يكن * You ordering up ended ، كما كان يمكن أن يكون إذا كان منضم الصرفية والجذعية قد شكلت وحدة في وقت الصرف.

- How are errors like those in (7) possible? Free morphemes, and the bound morphemes that attach to them, are separate units in the mental representations built during sentence production.

- كيف هي أخطاء مثل تلك الموجودة في (7) ؟ الصرفية الحرة، والصرفية المنضمه أن نعلق لهم، هي وحدات منفصلة في تصوراتهم الذهنية التي بنيت خلال إنتاج الجملة

Inflectional morphemes, like –s, –ed, and –ing, are added to specific structural positions, based on the syntax of the sentence, rather than based on the words they eventually attach to. The error in (7d) suggests that much the same applies to derivational morphemes, like –less. There is a level of representation at which free and bound morphemes are represented separately. Errors like those in (7) also suggest that morphemes are added to the mental representation before morph phonological rules operate to specify the phonetic form by which the morpheme will be realized. The example in (7c) is particularly relevant. (Notice that (7c) might initially appear to contradict the observation that only words of the same grammatical class are exchangeable, since cook is a verb and roast is a

| 146 | THE SPEAKER: PRODUCING SPEECH |

المتحدث: خطاب المنتجة
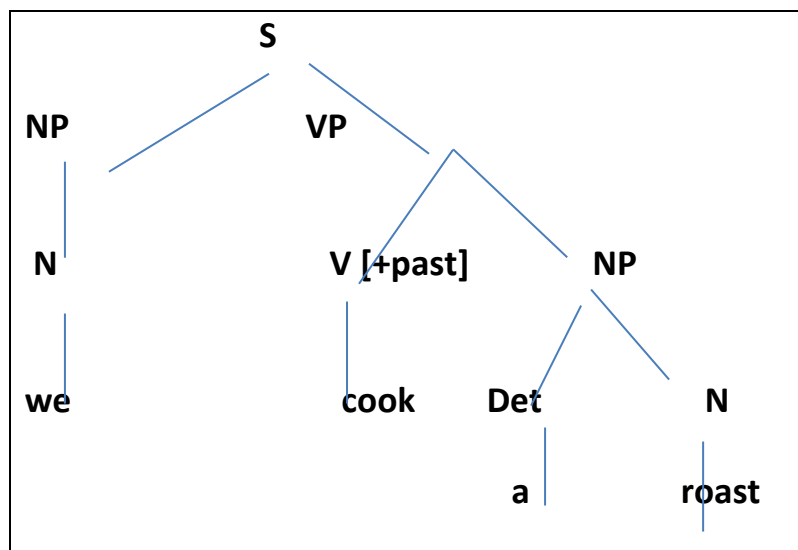
S= Sentence (= Clause)
NP= Noun Phrase
VP= Verb Phrase
Det = Determiner
N= Noun
V= Verb
(+past) = Past Tense Feature

Representation of a past tense morpheme before the application of morph phonological rules noun. However, both words can be either a noun or a verb, so the example is not a contradiction. The past tense morpheme –ed differs in the way it is pronounced depending upon the final segment of the verb to which it is attached. The past tense morpheme on cook surfaces as [t,[while on roast it surfaces as [id]. In the speech error in (7c), the past tense feature is "spelled out" according to morphophonological rules attaching it to roast. Clearly, roast and cook were exchanged before morphophonological rules applied. The exchange error resulting in (7c) thus provides evidence for a level of representation as shown in Figure 5.2, where past tense is an abstract feature in the syntactic structure, but the morpheme that marks past has not yet been added to the word cook. The words were exchanged at a processing level before morphophonological rules had applied. If the exchange error had occurred at a later processing stage, the sentence would have been uttered as *We roast a cooked.

- ## Such a speech error would never occur.

- لن يحدث مثل هذا الخطأ بالخطاب .

- ## The following speech error illustrates a similar interplay of morphology and phonology:

- يوضح خطأ الكلمة الآتية تفاعل مماثل من التشكل وعلم الأصوات

If you give the nipple an infant…
}If you give the infant a nipple{...

- ## In this example, nipple and infant have been exchanged before the morphophonological rule specifying the pronunciation of the indefinite determiner has applied.

- في هذا المثال، تم تبادل nipple و infant قبل الحكم morphophonological لتحديد نطق determiner إلى أجل غير مسمى وقد طبقت

The determiner would have been pronounced a before nipple, but instead became an, given the initial segment of *infant*. Had the exchange error occurred after the application of the morphophonological rule, the resulting sentence would have been *If you give the nipple a infant*.

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■ **Creating agreement relations** أنشاء اتفاق للعلاقات

The errors we have described so far illustrate aspects of sentence planning related to placing lexical material in structural positions in a syntactic representation. There is another class of errors, which has been studied extensively in English and several other languages, involving subject–verb agreement. These errors are informative about the role of agreement features in production planning and execution. Agreement is a requirement of the grammar, with some very language-specific properties. English requires that verbs and their subjects agree in number (and person).

- Since English has limited morphology, number agreement is only marked (by a bound morpheme) on verbs with third person singular subjects, like (9a), or on subjects when they are plural, like (9b):

- منذ الإنجليزية لديها التشكل محدود، تم وضع اتفاق عدد فقط (من قبل المورفيم المنضم) على الأفعال مع الشخص الثالث لموضوعات المفرد، مثل (A9)، أو على موضوعات تكون بصيغة الجمع،مثل (B9):

a. **The bridge closes at seven.**
b. **The bridges close at seven.**

- Other languages have richer morphology for agreement, and require not only agreement of number and person features, but also of gender features. (Examples of some of these are in Chapter 2.)

- لغات أخرى لديها مورفولوجيا أغنى للاتفاق، وتتطلب ليس فقط اتفاق عدد وملامح الشخص، ولكن أيضا من ميزات الجنسين. (أمثلة لبعض من هؤلاء في الفصل 2.)

- Many languages require agreement between verbs and their subjects, and some languages also require agreement between verbs and their objects. For an English speaker, producing sentences with grammatical number agreement is relatively straightforward, with one important exception.

- العديد من اللغات تتطلب الاتفاق بين الأفعال ومواضيعهم، و أيضا تتطلب بعض اللغات اتفاق بين الأفعال وأشيائهم الخاصة . ليتحدث الإنجليزية، وتنتج الأحكام مع اتفاق عدد نحوي واضح ومباشر نسبيا، بإستثناء واحد مهم.

- When a plural feature intervenes between a singular subject and its verb, the phenomenon of **plural attraction** can trigger an error, like the following:

- عندما تدخل ميزة الجمع بين الموضوع المفرد والفعل ، الظاهرة الجاذبية للجمع يمكن أن تؤدي إلى الخطأ، مثل ما يلي:

a. **The time for fun and games are over.**
b. **The illiteracy level of our children are appalling.**

In a landmark series of experiments, Bock and Miller (1991) presented English speakers with pre-recorded audio sentence preambles like the ones in (11); the participants' task was to complete the sentences as quickly as possible.

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- compared speech initiation times associated with sentences with a simple subject NP, such as (12a), to sentences with complex subjects, such as (12b) (which contains a relative clause), and found that speech initiation times for sentences with complex subjects were significantly longer than for sentences with simple subjects.

- بدء مقارنة مرات لخطاب مرتبط بالجمل مع NP بسيط الموضوع، مثل (A12)، إلى أحكام مع موضوعات معقدة، مثل (B12) (والذي يتضمن بند نسبي)، ووجدت أن أوقات بدء الكلام عن أحكام مع موضوعات معقدة كانت أطول بكثير من جمل مع مواضيع بسيطة

(12) a. The large and raging river …

b. The river that stopped flooding …

This finding, replicated by Tsiamtsiouris and Cairns (2009), indicates that planning complex sentence structure recruits more computational resources than does planning simple structures. In the production of complex sentences, the clause appears to be the primary planning unit. Most speech errors that involve two elements – like the exchanges discussed above, and some other error types discussed below – take place within a single clause. This suggests that sentences are organized in clause-sized bundles before they are produced. Not surprisingly, clause boundaries have been identified as loci for sentence planning. Numerous studies report more pauses at the beginnings of clauses than within them (Boomer 1965; Ford 1978; Beattie 1980; Butterworth 1980), indicating the presence of planning processes. McDaniel, McKee, and Garrett (2010) elicited sentences containing relative clauses from children and adults, and found that pauses clustered at the clause boundaries. Evidence for increased production planning cost associated with subject–object relative clauses (described in Chapter 4, sentence (7a)) comes from a study by Tsiamtsiouris, Cairns, and Frank (2007), who report longer speech initiation times for sentences with subject–object relatives than for sentences with object–subject relative clauses (like (7b) in Chapter 4). Tsiamtsiouris and colleagues (2007) also observed longer speech initiation times for passive sentences than active sentences, suggesting that producing sentences that are out of canonical word order increases planning cost.

- The phenomenon of <u>**syntactic priming**</u> provides further insight into the mechanisms of production planning.

- ظاهرة <u>**priming**</u> النحوية توفر مزيد من التبصر في آليات تخطيط الإنتاج.

- Bock (1986) and Bock and Griffin (2000) described an effect they referred to as <u>**syntactic persistence**</u>, by which a particular sentence form has a higher probability of occurrence if the speaker has recently heard a sentence of that form.

- وصف بوك (1986) وبوك وغريفين (2000) تأثير أنها يشار إلى استمرار النحوية، الذي شكل جمل معينة لديها أعلى احتمال حدوثها إذا كان المتحدث قد سمع مؤخرا حكم لهذا النموذج.

For example, if you call your local supermarket and ask *What time do you close?*, the answer is likely to be something like *Seven*, but if you ask *At what time do you close?*, the response is likely to be *At seven* (Levelt and Kelter 1982). Speakers (and hearers) automatically adapt themselves to

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languages, with bilinguals or second language learners, have confirmed that the structure of an utterance heard in one language can affect the structure of an utterance produced in another language (Loebell and Bock 2003; Hartsuiker, Pickering, and Veltkamp 2004). The study of syntactic priming between languages contributes to current models of the type of cognitive architecture that supports some of the linguistic behaviors bilinguals can engage in: code-switching, borrowing, and transfer (Loebell and Bock 2003). If structures in one language can prime structures in another language, the two languages of a bilingual are not impermeable and fully separate; instead, the same language production mechanism (susceptible to what the system has previously perceived) is recruited for language production, regardless of the language of the utterance.

■ Preparing a phonological representation

● **إعداد التمثيل الصوتي**

● The <u>mental representation</u> of a sentence that serves as input to the systems responsible for articulation (speech, writing, or gestures) is phonological.

● التمثيل العقلي من الجملة هي بمثابة مدخلات للأنظمة المسؤولة عن صياغة (الكلام، الكتابة، أو لفتات) هو الصوتية.

Some examples of slips of the tongue discussed earlier reflect the application of morphophonological rules, as a phonological representation for a sentence is prepared during production. There is an entire class of speech errors involving units of analysis that are smaller than phrases or words or morphemes, and these errors shed further light on the nature of the phonological representations built during language production.

● <u>Consider the following</u>**أنظر في ما يلي** ●

a. hass or grash {hash or grass}

b. I can't cook worth a cam. {I can't cook worth a damn.}

c. taddle tennis {paddle tennis}

● The example in **(a)** is an example of a **segment exchange error**, in which the exchange is between two phonological elements: the final consonants in the two words.

● المثال في (أ) هو مثال على خطأ صرف الجزء، الذي هو تبادل بين اثنين من العناصر الصوتية: الحروف الساكنة النهائي في الكلمتين

● In **(b),** we have an example of a **perseveration error**, in which a segment (in this case the /k/ of *can't*) perseveres and intrudes in a later word (so the speaker utters *cam* rather than *damn*).

● في (ب)، لدينا مثال من خطأ الاجتهاد، والتي شريحة (في هذه الحالة /k/ of *can't*) يثابر ويتطفل في كلمة واحدة بوقت لاحق (بالتالي فإن المتكلم ينطق *cam* بدلا من *damn*).

● In **(c),** the example is of an **anticipation error**, in which a speech sound that has not yet been produced (the /t/ of *tennis*) intrudes in an earlier word.

● في (ج)، ومثال على ذلك هو وجود خطأ الترقب، الذي يتطفل على صوت الكلام الذي لم يتم حتى الآن أنتاجه (/t/ of *tennis*) في كلمة في وقت سابق.

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181 | hearer uses knowledge of language to rule out *stlice* (on phonotactic grounds, since [stl-] is an impossible syllable onset for English) and *sklice* (if not on phonotactic grounds, then surely because [skl-] is such an infrequent onset – occurring in rare and oddly spelled words like *sclerosis* – that it is dispreferred relative to the more frequent [spl-]). The phoneme restoration illusion is stronger when the sound being replaced and the sound used to fill in the gap are close acoustically (Samuel 1981); for example, replacing an [s] with a cough – a sound with lots of high-frequency noise – is more effective than replacing an [s] with a tone, and it doesn't work if the [s] is replaced by silence. The illusion is also stronger with obstruent consonants than it is with vowels. The effectiveness of phoneme restoration depends as well on whether the word carrying the missing sound is presented in isolation or inside a sentence. The phenomenon of phoneme restoration demonstrates the perceptual system's ability to "fill in" missing information, while actively trying to recover meaning from an acoustic signal: what we hear is sometimes not what we perceive.

- The explanation for the effectiveness of phonological illusions lies in the operation of the lexical retrieval system.

- التفسير الفعالي للأوهام الصوتية يكمن في تشغيل نظام استرجاع المعجمي.

- It locates words using as much acoustic information as is available.

- انه يقع الكلمات باستخدام معلومات صوتية وأكبر قدر متاح

- After a word has been retrieved, its full phonological representation is checked against what has been heard.

- بعد أن تم استرجاع الكلمة ، يتم فحص تمثيلها الصوتي كامل ضد ما سمعت.

- This is called **<u>post-access matching.</u>** If the match is good enough, the word is accepted as correct and the full phonological representation from the lexicon becomes the percept.

- هذا ما يسمى مطابقة بعد الوصول. إذا كانت التطابق جيد بما فيه الكفاية، ويتم قبول الكلمة الصحيحة كما التمثيل الصوتي الكامل من المعجم يصبح مدرك

- This process allows even a degraded acoustic signal to provide enough information to allow retrieval to take place; the phonological details are then filled in by the phonological information associated with that lexical item.

- هذه العملية تسمح حتى للإشارة الصوتية المتدهورة توفير معلومات كافية للسماح لاسترجاع أتخاذ المكان، ثم يتم ملء التفاصيل الصوتية لتوفير المعلومات الصوتية المرتبطة بهذا البند المعجمي.

Taking this view into account, plenty of acoustic information was available in the above examples for the words *legislatures* and *splice* to be accessed and to survive the post-access check. Thereafter, the [s] in *legi_ latures* and the [p] in *s_lice* were "heard" based on the invariant phonemic information obtained from the lexicon, rather than from the initial acoustic signal. The fact that people can perceive the phonetic structure of nonsense words (e.g., *plice*) demonstrates that speech perception based solely on the acoustic signal is indeed possible, with no assistance from the lexicon (by definition, nonsense words are not stored in the lexicon, so they cannot engage post-access matching). However, the existence of phonological illusions, like phoneme restoration, demonstrates how the perceptual system can cope when it encounters inadequate acoustic information. In fact, all of these illusions demonstrate the constructive nature of all speech perception, not just perception

| 187 | **<u>The Role of Orthography</u>** دور قواعد الإملاء |

As we move into the next major topic for this chapter, lexical retrieval, we should address an important question that has probably crossed your mind: what about reading? People living in literate societies spend much of their time decoding language in written form. How different is decoding words in writing from decoding words in speech? Researchers concerned with how written language is decoded have found that phonology plays a crucial role in decoding words while reading, but so does orthography (Frost and Ziegler 2007).

- **<u>The orthography</u>** of a language is its writing system, including the characters (graphemes) it uses and the set of conventions for spelling and punctuation.

- The orthographyهو نظام الكتابة، بما في ذلك الأحرف (حرف من حروف اللغة) إنه يستخدم ومجموعة من الاتفاقيات الإملائية وعلامات الترقيم.

- The basis of reading is the ability to decode individual words; this involves matching each orthographic symbol (each grapheme) with a phoneme.

- أساس القراءة هو القدرة على فك شفرة الكلمات الفردية، وهذا ينطوي على مطابقة كل رمز الهجائي (كل حرف من حروف اللغة) مع الصوت.

Programs for literacy and reading readiness that focus on training in phoneme-to-grapheme correspondences have been very successful. This fact provides evidence of how closely linked reading is to phonology. The form-priming experiments described later in this chapter offer more evidence of the fact that phonological forms are recovered for words, even when we are reading them. The involvement of phonology in reading has been confirmed even for languages with writing systems that represent morphemes rather than sounds, like Chinese (Perfetti, Liu, and Tan 2005). Thus, retrieving words presented in writing involves reconstructing their phonological representations. There is also some evidence that people's knowledge of orthography can mediate how they access their lexicon. For example, one study found that speakers of French were less likely to be able to identify the phoneme /p/ in words like *absurd* than *lapsus*, because in the former, pronounced [apsyrd], the /p/ is spelled with the letter *b* (Halle, Chereau, and Seguí 2000). Another study measured how well Hebrew–English bilinguals performed in a phoneme deletion task, involving monosyllabic words that sound exactly alike in the two languages, like [gʌn] (*gun* in English, "garden" in Hebrew) or [bʌt] (*but* in English, "daughter" in Hebrew) (Ben-Dror, Frost, and Bentin 1995). Importantly, English uses three letters (each corresponding to one of the phonemes) to represent these words, but Hebrew only represents the consonants: גן (*gn*) for "garden" and בת (*bt*) for "daughter". Participants were asked to listen to the words and delete the first sound; words in each language were presented separately. Native English speakers (for whom Hebrew was a second language

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- Word list for simulated lexical decision task.

- قائمة الكلمات لمحاكاة مهمة القرار المعجمي.

- For each string, write Y if it is a word of English, N if it is not.

- لكل string ، اكتب Y إذا كانت الكلمة في الإنجليزية، N إذا لم تكن

CLOCK DOCTOR ZNER FLOOP
SKERN NURSE TABLE FABLE
BANK TLAT URN MROCK
MOTHER PLIM HUT BAT

- They will see throughout the experiment, a subset of those is of interest to the investigator: those words contain a contrast being investigated in the experiment.

- سوف يرون في كافة مراحل التجربة، مجموعة فرعية من تلك هي التي تهم المحقق: هذه الكلمات تحتوي على النقيض ليجري التحقيق في التجربة.

To simulate how a lexical decision task works, consider the 16 letter strings in Table 6.1, and write Y or N next to each one, to indicate for each whether it is a word of English. Try to write your responses as quickly as possible. You probably wrote N next to six of the letter strings, and might have even noticed that you responded to three of them very quickly – TLAT, ZNER, and MROCK – and to the other three somewhat more slowly – SKERN, PLIM, and FLOOP.

- All <u>six strings are non-words in English</u>, but the <u>first three violate</u> the phonotactic constraints of the language.

- جميع strings الستة غير قابلة للكلمات في الإنجليزية، ولكن أول ثلاثة تنتهك القيود phonotactic للغة.

- **Impossible non-words**, like TLAT, ZNER, and MROCK, are rejected very rapidly in a lexical decision task.

- Impossible non-words مثل TLAT, ZNER, وMROCK مرفوضة بسرعة كبيرة في مهمة القرار المعجمي.

- It is as if the lexical retrieval system were carrying out a phonological screening of sorts, not bothering to look in the lexicon when the string is not a possible word in the language.

- هو كما لو كان نظام استرجاع معجمي تم إجراء الفحص الصوتي من نوع ما، لا يكلف نفسه عناء البحث في المعجم عندما string ليست كلمة ممكنه في اللغة.

- In contrast, **possible non-words**, like SKERN,PLIM, and FLOOP, take longer to reject, as if the retrieval system conducted an exhaustive, ultimately unsuccessful, search for their entries in the lexicon.

- بالمقابل، ممكن غير الكلمات، مثل SKERN، PLIM، وFLOOP، يستغرق وقتا أطول للرفض، كما لو أجرى نظام استرجاع وشامل، ونجح بنهاية المطاف، بالبحث عن مشاركاتهم في المعجم

Experimental evidence for the distinction in lexical access between possible and impossible non-words is abundant; one interesting example is a brain imaging study that used positron emission tomography (PET) to measure blood flow changes in the brain while people were presented with real words (BOARD), possible non-words (TWEAL), impossible strings of characters (NLPFZ), and strings of letter-like forms – "false fonts" (Petersen et al. 1990). Petersen and colleagues found that the same areas of the brain are activated in response to real words and possible non-words, and that these areas are different from those activated in response to impossible non words and "false fonts" strings.

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- **The cohort model of lexical access**

- نموذج cohort للوصول المعجمي

- Models about lexical access help us understand more about the rapid and unconscious retrieval of words from the lexicon.

- النماذج عن الوصول المعجمي تساعدنا بفهم المزيد عن الأسترجاع السريع واللاوعي لكلمات من المعجم

- One such model, the **cohort model of lexical access** (Marslen-Wilson and Tyler 1980; Marslen-Wilson 1987) accounts for many facts about lexical retrieval and helps summarize a number of facts related to lexical access described in the preceding sections.

- أحد النماذج من هذا القبيل، ونموذج **cohort** للوصول المعجمي حسابات لكثير من الحقائق للاسترجاع المعجمي ويساعد على تلخيص عدد من الوقائع المتصلة الوصول المعجمي موضحا في الأقسام السابقة

- A word's **cohort** consists of all the lexical items that share an initial sequence of phonemes.

- تتألف كلمة **cohort** لجميع العناصر المعجمية التي تشترك في تسلسل أولي من الفونيمات.

- According to the cohort model, acoustic information is rapidly transformed into phonological information, and lexical entries that match the stimulus phonologically are *activated*.

- وفقا لنموذج cohort ،يتم تحويل المعلومات السمعية بسرعة إلى معلومات صوتية، ومقالات معجمية التي تطابق التحفيز ليتم تنشيطها phonologically.

After the first syllable of a word is received, all the lexical entries in its cohort will be activated; after the second syllable is received, a subset of those will remain activated (when an entry ceases to match, it deactivates).

- Finally, at some point – before the end of the word, if the target word is unambiguous – a single lexical entry will be uniquely specified, and it will be retrieved.

- أخيرا، في مرحلة ما ـ قبل نهاية الكلمة، إذا كان الهدف هو الكلمة لا لبس فيه ـ الإدخال المعجمي سيتم لتحديد فريد، وسيتم استرجاعه.

- This is called the **recognition point** for the word, and on average it occurs within 200 to 250 milliseconds of the beginning of the word.

- هذا ما يسمى نقطة الاعتراف للكلمة، والعائد على متوسط حدوثه في غضون 200 و 250 ميلي ثانية من بداية الكلمة.

- Of course, if a word is ambiguous and has more than one lexical entry, there will be no recognition point before the end of the word, so all entries that are pronounced the same will be retrieved.

- بالطبع، إذا كانت الكلمة غير واضحة، ولها مدخل معجمي أكثر من واحد، لن يكون هناك اعتراف لنقطة قبل نهاية الكلمة، لذلك سيتم استرداد كافة الإدخالات التي يتم النطق نفسه.

The fact that words can be retrieved before they are completed has been demonstrated by Holcomb and Neville (1991) in an event-related potentials (ERP) experiment. Recall from Chapter 3 that there is a brain response, the N400, associated with the presence of semantic anomaly in a sentence. Holcomb and Neville (1991) showed that the N400 begins long before the entirety of a semantically anomalous word has been heard. According to the cohort model, an initial cohort of phonologically similar words is activated and, by the word's recognition point, one is selected and integrated into the representation of the sentence being constructed. If this results in a semantic anomaly, given the context, an N400 wave is the neurophysiological result. The cohort model predicts that the initial part of a word will be more important for lexical access than its end, a prediction that has been confirmed by a number of different kinds of experiments. Mispronunciations at the beginnings of words are detected more accurately than are mispronunciations at the ends of words (Cole, Jakimik, and Cooper 1978). The phoneme restoration effect is also more robust when the missing phoneme is in the middle or at the end of a word rather than at the beginning (Marslen-Wilson and Welsh 1978). Final

196	consonants are also much more frequently involved in slips of the ear than are initial consonants (Bond 2005). The cohort model (as well as other similar ones about lexical access) assumes that every word in the lexicon has some resting level of activation. Stimulation by matching phonological information increases a word's level of activation. When activation reaches some threshold level, the word is retrieved and is then available for use for subsequent processing (be this making a lexical decision, or incorporating the word into an ongoing sentence). The notion of activation helps account for the observed frequency effects in lexical retrieval. High-frequency words have a higher resting level of activation than do low-frequency words. Since retrieval depends on a lexical item reaching some threshold of activation, high-frequency words will reach that threshold faster than low-frequency words. The phenomenon of priming is also accounted for by the concept of activation. A prime increases the activation of words related by either form or meaning, enhancing their retrieval.

- A factor that affects retrieval times for words is **neighborhood density.**
- من العوامل التي تؤثر مرات استرجاع للكلمات هو كثافة **neighborhood density.**
- A word's **neighborhood** consists of all the lexical items that are phonologically similar. Some words have larger cohorts than others:
- تتألف كلمة **neighborhood** لجميع العناصر المعجمية التي تشبه phonologically. بعض الكلمات لها أفواج أكبر من غيرها

the word *cot* has many words that are phonologically similar to it, so it is said to come from a dense neighborhood; in contrast, the neighborhood for a word like *crib* is more sparse. Words with larger phonological neighborhoods take longer to retrieve than those from smaller neighborhoods (Connine 1994). The finding is reasonable: more phonological information is required to specify uniquely a word from a dense neighborhood than from a sparse neighborhood. Another factor that has been found to affect retrieval is the similarity between the phonological information in the input and the phonological representation of the word in the lexicon. A priming experiment by Connine, Blasko, and Titone (1993) explored this factor, by using nonwords to prime actual words. Connine and colleagues created what they called minimal and maximal non-words, by replacing the initial phoneme of words by a phoneme that was minimally or maximally different from the original. For example, based on *doctor*, *toctor* is a minimal non-word (/t/ and /d/ are both alveolar stops), while *zoctor* is a maximal non-word (/z/ is a fricative, while /d/ is a stop). Both base words (*doctor*) and minimal non-words (*toctor*) facilitated retrieval of semantically related targets (like *nurse*), but maximal non-words (*zoctor*) did not have this priming effect. Recall that when we discussed phonemic restoration, we pointed out that the acoustic representation of the deleted phoneme must be similar to the actual phoneme for restoration to take place. This is because lexical retrieval (and post-access

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Study Questions

1. Why is co-articulation so important for speech perception?

2. When comparing the syllables [di], [da], and [du], what is meant by the statement that the initial consonant [d] exists in the speaker/hearer's mind but not in the physical speech signal?

3. What are the sources of variability in speech? How does speech perception overcome acoustic variability to create a mental percept?

4. Explain categorical perception, making reference to Figure 6.5. How does the hearer's linguistic competence influence his perceptual categories?

5. What does it mean to say the perceptual system is constructive?
How do phonological illusions support this claim?

6. What are some ways that speech perception in a second language differs from speech perception in the native language of a monolingual?

7. What are some of the differences between languages in the way that suprasegmental information is used during speech perception?

8. What is the role of phonology during reading? What is the role of orthography? Do these two systems operate independently?

9. What is the difference between bottom-up and top-down processing? When do psycholinguists think that top-down processing is used by the hearer? Is this a conscious decision on the part of the hearer?

10. How does the frequency and ambiguity of lexical items affect subjects' performance on a lexical decision task? Do these variables have the same effect when words are processed in sentences?

11. What are "garden path" sentences? Why are they of interest to psycho linguists?12. Lexical processing in sentence comprehension involves two operations: retrieval and selection. How do Swinney's crossmodal priming experiments demonstrate these processes with respect to ambiguous lexical items?

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- ELAN, thus, is the brain's response to **word category errors,** that is, when the category of a new word does not fit into the current structure being built by the parser.

- ELAN، وبالتالي، هو استجابة الدماغ على فئة أخطاء الكلمة، وهذا هو، عندما فئة من كلمة جديدة لا تنسجم مع البنية الحالية التي يجري بناؤها من قبل المحلل.

- The brain responds slightly differently to **<u>morphosyntactic violations</u>**:
- يستجيب الدماغ بشكل مختلف قليلا لانتهاكات morph syntactic:

a. *The elected official hope to succeed.

b. The elected official hopes to succeed.

- Subject–verb agreement violations, like the one in (5a) compared to (5b), elicit a LAN, involving negativity around 300–500 milliseconds after the onset of the anomaly (Osterhout and Mobley 1995).

- انتهاكات اتفاق الفعل بالموضوع - مثل واحد في (A5) مقارنة (B5)، تثير LAN، التي تنطوي على سلبية حول 300-500 ميل- ثانية بعد بدء الشاذ.

Ungrammaticality, like word category errors and morphosyntactic violations, also elicits a P600 – an ERP component involving positivity at around 600 milliseconds (Osterhout and Holcomb 1993). We will see later in this chapter that the P600 is also a characteristic brain response to garden path sentences (introduced in Chapter 6), which are grammatical but hard to process for structural reasons. All of these ERP components are different from the N400 component, which is elicited by semantic anomalies. That the brain should have such specific responses to different types of syntactic anomalies, which in turn differ from responses to semantic anomalies, is strong evidence of the psychological reality of syntactic structure building during sentence comprehension.

■ <u>**The clause as a processing unit**</u>الشرط باعتباره وحدة معالجة

Recall from Chapter 2 that a clause consists of a verb and its arguments. (In the tree-diagramming notation introduced in Chapter 2, a clause is an S-node.) A given sentence can include an independent clause and one or more dependent clauses. Each clause corresponds to an integrated representation of meaning and an integrated representation of structure, so clauses are reasonable candidates for processing units. Clauses correspond to manageable units for storage in working memory during processing. In Chapter 5, we described research in sentence production suggesting that clause-sized units are used in planning. It is not surprising that clauses – units containing a verb plus its arguments –also play a role in perceptual processing. Decades ago *click displacement studies* confirmed the idea that clauses constitute processing units (Fodor and Bever 1965; Garrett, Bever, and Fodor 1966). These studies worked on the principle of perceptual displacement that was briefly mentioned in Chapter 6, in the
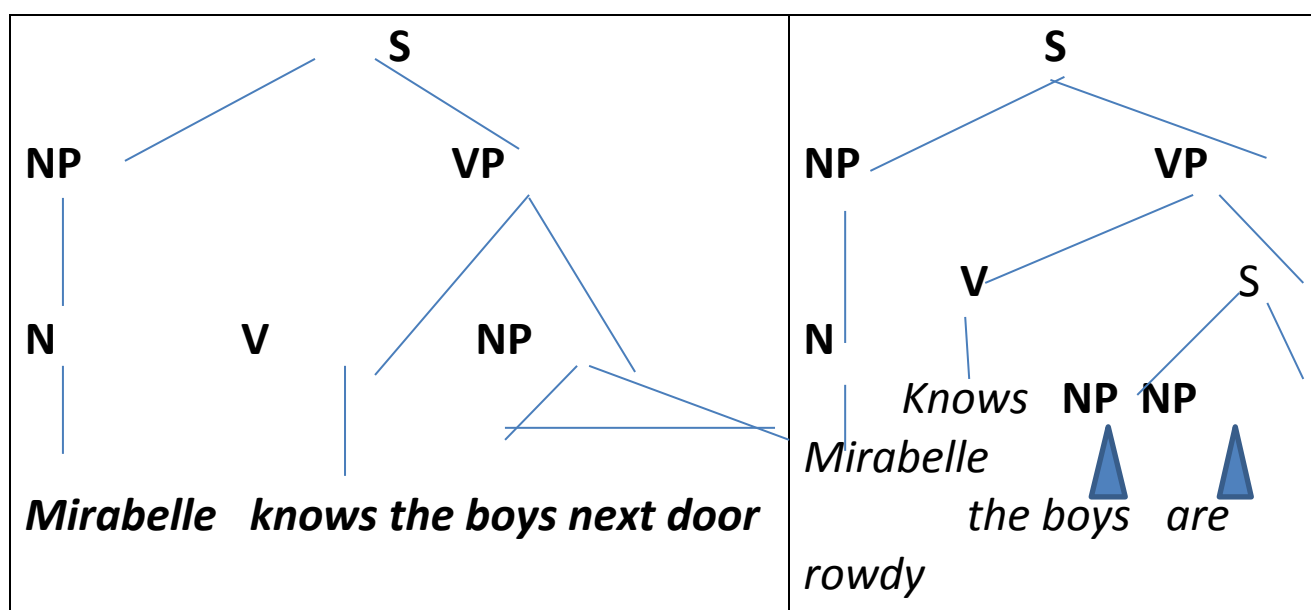
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Figure 7.1

- The simple sentence in (7a) consists of a single clause, while the complex sentence in (7b) contains two clauses – an independent clause (*Mirabelle knows* [*something*]) and a sentential complement **(the boys are rowdy);**

- الجملة البسيطة في (A7) تتكون من شرط واحدة، في حين أن الجملة المعقدة في (B7) تحتوي على عبارتين - الشرط المستقل (*Mirabelle knows something*) والتكملة (*the boys are rowdy*)؛

- Figure 7.1 provides diagrams for the two sentences.

- يقدم الشكل 7.1 رسوم بيانية للجملتين

The work of the parser is, logically, facilitated when important syntactic constituents, like clauses, are marked explicitly in the signal. Clause boundaries can be marked by function words (like *that* or *who*),by punctuation (commas or periods), and by prosody (pitch movements or pauses). In (7b), the boundary between the two clauses is not marked.

- Compare it to the following, where the complementizer *that* identifies the beginning of the new clause:

- قارن ذلك ما يلي، حيث يحدد complementizer بداية الشرط الجديد:

c. Mirabelle knows that the boys are rowdy.

Many investigations – Hakes (1972), for example – have demonstrated that more computation resources are recruited in processing sentences like (7b) than sentences like (7c). Sentences with marked clause boundaries incur less psycholinguistic processing cost than do sentences with unmarked clause boundaries.

■ Structural ambiguity

- Deconstructing the incoming signal into individual clauses and computing their internal structure is not the only task that the parser faces during sentence processing.

- تفكيك الإشارة الواردة في الشروط الفردية والحوسبة هيكلها الداخلي ليست هي المهمة الوحيدة التي تواجه المحلل أثناء معالجة الجملة

- It must deal with the **structural ambiguity** of many sentences.

- يجب أن تعامل مع الغموض الهيكلي لكثير من الجمل.

- In earlier chapters we discussed **globally ambiguous** sentences, like the following:

- بالفصول السابقة ناقشنا الأحكام الغامضة على الصعيد العالمي، مثل ما يلي:

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- Global ambiguities provide insight into sentence processing, and so do **local ambiguities**.

- يوفر الغموض العالمي نظرة ثاقبة لمعالجة الجملة، وهكذا يتم**local ambiguities**

- We have already seen a locally ambiguous constituent, in the sentence in (7b), where the NP *the boys* could initially be either the object of *knows* or the subject of a new clause.

- لقد رأينا مسبقا المكون غامض محليا، في الجملة في (B7)، حيث NP *boys* يمكن أن يكون بالبداية إما كائن من *knows* أو موضوع لشرط جديد

- The ambiguity is local, because information coming later in the sentence serves to **disambiguate.**

- الغموض المحلي، وذلك لأن المعلومات تأتي بوقت لاحق في الجملة لتعمل على**disambiguate** أزالة غموض

- As soon as you get to the next word (*are*), the first structural alternative is ruled out.

- بمجرد تحصل على الكلمة التالية (*are*)، يحكم البديل الهيكلي لأول مرة.

- Local ambiguities are everywhere. To illustrate this for yourself, try to complete the phrase below as many different ways as you can think of:

- الغموض المحلي بكل مكان. لتوضيح هذا بنفسك، لمحاولة إكمال الجملة أدناه كما العديد من الطرق المختلفة كما تفكر:

(9) The student told the professor that …There are many possible continuations; all of the following are structurally very different:
(9) a. … he wanted a better grade.
b. … taught the course that he wanted a better grade.
c. … really unbelievable story.

- In (9a), *that* is a complementizer; introducing a sentential complement; in (9b) *that* is a relativizer introducing a relative clause. In (9c), *that* is a demonstrative adjective introducing a noun phrase.

- في (B9) وهذا هو relativizer إدخال شرط متعلق. في (C9)، وهذا هو صفة برهانية لعرض الجملة الإسمية

- Sometimes local ambiguities are resolved very quickly and go completely unnoticed.

- أحيانا يتم حل الغموض المحلي بسرعة جدا ويذهب دون أن يلاحظها أحد تماما

- This is probably the case for the local ambiguity in (7b). Other times, however, a local ambiguity can lead to **a garden path**, as in the sentence below (Bever 1970):

- ربما هذا هو الحال بالنسبة للغموض المحلي في (B7). وفي أحيانا أخرى، مع ذلك، يمكن للغموض المحلي أن يؤدي إلى **garden path** ، كما بالجملة أدناه:

(10) The horse raced past the barn fell.

- (Before you continue reading, try to identify the local ambiguity in (10); it will help you explain why the sentence is a garden path.)

- (قبل مواصلة القراءة، في محاولة لتحديد الغموض المحلي في (10)، سوف نساعدك على شرح السبب في أن الحكم هو **garden path**.)

- The structure in (10) includes a **reduced relative** clause, a construction we

discussed in Chapter 2, with examples like the following:

- الهيكل في (10) يتضمن بندا نسبي مخفض، وبناء على نقاشنا في الفصل 2، مع أمثلة مثل ما يلي:

(11) Danielle emailed me a photograph of the Corvette raced at the Daytona Speedway.

- In (11), the reduced relative clause is *raced at the Daytona Speedway*. In (10), the reduced relative clause is *raced past the barn* – reduced from *which was raced past the barn*.

- في (11)، تسابق الشرط النسبي منخفض في *Daytona Speedway*. في (10)، وتسابق الشرط النسبي منخفض بالماضي – منخفضة من *which was raced past the barn*.

As noted in the previous section, the parser's work is facilitated when a new clause is marked explicitly by a

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THE HEARER: STRUCTURAL PROCESSING

during the morning and *seen during the morning*. However, only (16a) should provoke a garden path, because *watched* can be a simple past or a past participle, but *seen* cannot be a simple past. Juffs found that the second language learners, like native speakers, were misled by the local ambiguity, as reflected in reading time patterns that were similar across the different groups of participants. Both native and non-native speakers experience a garden path effect with sentences that contained ambiguous verbs like *watched*, but not with sentences with unambiguous participles like *seen*.

■ Attaching new constituents ربط المكونات الجديدة

So far we have described how the parser deals with local ambiguities for which one of the structures is syntactically simpler than the other. For such local ambiguities, the parser chooses the simpler alternative, by application of minimal attachment. There are some ambiguities whose alternative structures are equally syntactically complex.

- Such ambiguities can be resolved by a structure building strategy **called late closure.**

- هذا الغموض يمكن حلها عن طريق استراتيجية لبناء الهيكل يسمى late closure

- This strategy prompts the parser to integrate new words received from the lexical processor into the syntactic constituent that is currently being processed.

- يطلب الاستراتيجية محلل لدمج كلمات جديدة وردت من المعالج المعجمي للمكون النحوي التي يجري حاليا تجهيزها.

Put another way, the parser has a preference to attach new material to more recent constituents rather than constituents that are farther away (*Recency Preference*, Gibson et al. 1996), because this is a computationally easier alternative. The name of the strategy is traced back to an early formulation (Frazier and Fodor 1978), which proposed that the parser keeps the constituents it is working on open as long as possible.

- The application of the late closure strategy is behind many unintended interpretations of sentences in the popular press, like the following two headlines:

- تطبيق استراتيجية أواخر الإغلاق هو وراء العديد من التفسيرات غير المقصودة لأحكام الصحف الشعبية، مثل العناوين التاليه:

(17) Physicists are thrilled to explain what they are doing to people.
(18) Two Sisters Reunited after 18 Years in Checkout Counter

- In both of these, the final prepositional phrase attaches inappropriately to a recent constituent, resulting in a funny interpretation.
- في هذين، عبارة الجر النهائي تعلق بشكل غير لائق للمكونة الأخيرة، مما أدى إلى تفسير مضحك
- For (17), applying late closure results in an interpretation that suggests physicists are using human subjects in their laboratories; for (18), you might wonder what store has checkout lines with a wait of up to 18 years. Late closure can account for the processing cost associated with sentences like the following:
- لـ(17)، تطبيق النتائج بوقت متأخر يغلق بالتفسير الذي يشير الفيزيائيون لأستخدام الآدميين في مختبراتهم، لـ(18)، فقد كنت أتساءل ما مخزن لديها لخطوط الخروج مع الانتظار لمدة تصل إلى 18 عاما. إغلاق الأواخر يمكن حساب تكلفة المعالجة المرتبط الأحكام كما يلي:

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contribution to an ongoing conversation could then preempt complete processing of complex structure.

- Experiments by Fernanda Ferreira and colleagues (Ferreira and Patson 2007) suggest that, sometimes, people build syntactic representations that are just **"good enough."**
  - التجربة التي كتبها فرناندا فيريرا وزملاؤه (فيريرا وباتسون 2007) تشير إلى أن، في بعض الأحيان، الأشخاص لبناء التمثيلات النحوية هي مجرد "جيدة بما فيه الكفاية."
- **Consider the following examples:**اطلع على الأمثلة التالية:

a. While Mary bathed the baby played in the crib.

b. *While Katie fixed the car hit a fire hydrant.

- The sentence in (22a) is difficult to parse, because *the baby* is initially taken to be the direct object of *bathed*, rather than the subject of *played*.
  - الجملة في (A22) من الصعب تحليلها، لأن أتخذ في البداية *baby* أن يكون كائن مباشر من *bathed* ، بدلا من موضوع *played*.

Ferreira and colleagues have found that participants asked to read such sentences, when asked about the correct interpretation, respond in ways that suggest they did not ultimately build a correct structure. For example, if asked *Did Mary bathe the baby?* they will incorrectly answer *Yes* (Ferreira, Christianson, and Hollingworth 2001). Apparently, the parse in which *the baby* is the direct object of *bathed* persists. Other experimental results support this idea: participants will correctly judge ungrammatical sentences like (22b) only about one-third of the time (Ferreira and Patson 2007). Notice that (22b) is ungrammatical because the verb *fix* requires a direct object, and the verb *hit* requires a subject; there is only one NP, *the car*. Compare (22b) to the grammatical sentence, *While Katie fixed her hair the car hit a fire hydrant*.

■ **Filling gaps**سد الثغرات

- Another function of the syntax is to move elements of a sentence around, obeying universal restrictions on movement and language particular rules.
  - وظيفة أخرى من بناء الجملة هو تحريك عناصر الجملة حولها، طاعة لقيود عالمية على حركة ولغة قواعد معينة.

- An element that has been moved is called <mark>**a filler,**</mark> and it has left a <mark>**gap**</mark> at its original position.

- أحد العناصر التي تم نقله ما يسمى fillers ، وأنه قد ترك فجوة في موقعه الأصلي

- In order to create structures that represent sentence meaning, when it encounters a filler, the parser must identify the location for its gap.

- من أجل أنشاء الهياكل التي تمثل معنى الجملة، عندما يواجه filler ، يجب على parser المحلل تحديد موقع الفجوة

- In the following sentences, *which car* is the filler:

(23) a. Which car did Mike drive?

b. Which car did Mike force off the road?

c. Which car did Mike force Mary to buy?

- Finding the gaps can be a very simple process, as with (23a) or (23b), where the gap is obviously in the direct object position, right after the verb, *drive* and *force*, respectively. Matching fillers and gaps can get

- يمكن العثور على ثغرات عملية بسيطة للغاية، كما هو الحال مع (A23) أو (B23)، حيث الفجوة واضحه في الموضع الكائن مباشرة، مباشرة بعد الفعل، *force - drive* ، على التوالي. يمكن الحصول عليها مطابقة fillers والفجوات