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Models of the mental lexicon

Abstract

This paper overviews models of how words are stored, accessed and retrieved from the mental lexicon, our complex and dynamic human word store in the brain, and novel approaches to the field. The models discussed encapsulate the organization and components of the mental lexicon as well as how the components are interrelated. Besides the direct (Morton's logogen, Marslen-Wilson's cohort) and indirect models (Forster's search model) focusing entirely on the mental lexicon, more recent models are also introduced where lexical processing is treated as a sub-dimension of a wider realm of mental processes.
Keywords: word, mental lexicon, lexical processing

1 Introduction

The mental lexicon, this human word store (Aitchison 1994), may be likened to a dictionary, but the differences between the two are multi-fold, involving content, the storage and the organization of words, as well as access to them (Martsa 2007). As Aitchison (1994) explains, dictionaries list words in neat, alphabetical order, while 'slips of the tongue' imply that, words in the mental lexicon are stored and looked up based on other features as well besides word initial sounds or spelling, involving the sound structure knowledge of the word, such as stress, vowel patterns and endings. An oft-cited metaphor of phonological access is sitting in a bath-tub. The so called 'bath-tub effect' implies a selective attention in the perception of words. Retention experiments have shown that word beginnings seem to be more prominent than word ends in the perception of sound differences, and less attention is paid to the middle segments (Aitchison 1994, Pinker 1999, 2007).

The fact that speakers often confuse words with similar meanings suggests that the organization of the human mental lexicon is probably more complex than that of a printed dictionary, especially in aspects of content. While the content of a print dictionary, once published, is fixed and static, the human mind is capable of flexibly adding new items and altering meanings or pronunciation at any moment, and while looking up a word in a heavy dictionary may prove to be a tedious enterprise, a speaker is able to find a word in the mental lexicon in a fraction of a second. Considering all these factors, however, the main difference between a dictionary and the mental lexicon is in the amount of information stored about each entry (Aitchison 1994).

Other frequently quoted metaphors of a possible image of the mental lexicon are the London underground system, a spider's web, the structure of an atom, or a library (Aitchison 1994, Gósy 1999, Pinker 1999, Singleton 1999, 2000). All models of the mind, however, have

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one thing in common: "they are simplified diagrams which encapsulate crucial features of something that is in reality considerably more complex" (Aitchison 1994: 36).

Researchers working on the borderlines of psychology, neuroscience and linguistics have developed several models on how words are represented in, accessed and retrieved from the mental lexicon (for overviews see Aitchison 1994, Emmorey & Fromkin 1988, Garman 1990, Garrod & Pickering 1999, Jackendoff 1993, Levelt 1989, Pinker 2007, Reeves, Hirsh-Pasek & Golinkoff 1998, Robinson 2001, Singleton 1999, 2000, Tannenhaus 1988, Wray 2002). The models discussed below address issues of what components the mental lexicon may comprise, as well as how these components relate to and co-operate with one another. The general distinction between direct and indirect models of lexical representation and processing may be pictured with two easily conceivable metaphors, explains Garman (1990). He portrays direct models as working like word processor software: to find a word in the computer database we need to type in as many letters of it as it is sufficient to distinguish it from other stored items.

On the other hand, an indirect model may be likened to looking up a word in a dictionary or a book in a library. This process involves more than a single step to find the required item. Representatives of the direct model are Morton's (1982) logogen model and Marslen-Wilson's (1987) cohort model, whereas Forster's (1976) search model exemplifies the indirect type. In the following section I am going to discuss these models briefly, before addressing issues raised by more recent approaches (Fodor 1983, Jackendoff 1993, Levelt 1989, Stubbs 2001, Wray 2002).

2 Morton's logogen model

The logogen model developed and later revised by the British psychologist John Morton in the 1960s and 1970s is based on the observed link between word recognition and word context in sentence completion tasks (Morton 1982). The model attempts to explain why words are better recognized and retrieved in certain contexts than in others. The word 'logogen' is coined from the Greek 'logos' meaning word, and 'genesis' meaning birth or coming to life from the Latin word 'generare' (Singleton 1999: 85). A logogen in Morton's model is a 'neural unit' in the nervous system where an 'event' takes place when "a lexical response becomes available" (Singleton 1999: 85). The logogen system thus is a set of mechanisms present for each word in an individual's mental lexicon, i.e. there is a separate logogen for every word in the lexicon (Caron 1992: 53).

There is a separate auditory logogen system for the analysis of perceptual acoustic input (what we hear), and a visual logogen system for analyzing perceptual visual input (what we see). Both are connected in a two-way link to the cognitive system which, in Morton's view, is a database of various kinds of semantic information including information on contextual probabilities (Singleton 2000: 171). The scattered uni-directional line from the auditory and visual systems refers to possible cases of producing output without consulting the cognitive system for semantic information, which, as Singleton (1999) points out, accounts for being able to pronounce non-word input presented either visually or auditorily. The response buffer, the fourth component uni-directionally connected to the logogen output system, then generates spoken or written production in response to the input. There are two thresholds regulating access to both the cognitive system and the response buffer after which the logogen 'fires' (i.e. a word is available as a response). When the threshold level of activation is reached and once fired, the level of activation decays gradually but never reaches the original state again.

This, on the one hand, seems to explain why a frequently used logogen is never completely deactivated again (frequency effect, Caron 1992: 53), as well as the effects of long-term semantic priming (Singleton 1999: 87–88), i.e. the activation of a logogen also entails the partial activation of other logogens close to it.

Citing evidence both from psycholinguistic experiments with students and data gained from aphasic (brain-impaired) patients, Emmorey and Fromkin (1988) assume a strong connection between the phonological and orthographic representation of words, which the logogen model does not allow. They claim that the so-called Fromkin or Modular coaddressing model is capable of bridging this gap by proposing separate but interconnected lexicons for orthographic and phonological representation, supplemented by a semantic lexicon linked to both.

Other criticism of the logogen model pointed out that it does not account for picture recognition and naming, which would necessitate the insertion of a "pictogen system" (Singleton 1999: 90), and on the other hand, the output system needs to be more complex, with distinct pathways for written, spoken and graphic output. The difficulty of defining the threshold levels of activation and the lack of evidence on why less frequent words may also be activated instead of more frequent items in the system have both implied a need for new attempts in modelling the mental lexicon to account for these phenomena.

3 Marslen-Wilson's cohort model

Moving away from the perspective of the dictionary metaphor of previous models, Marslen-Wilson (1999) proposes the Distributed Cohort Model of lexical processing. The word 'cohort' refers to a group of warriors in an ancient Roman legion and serves as a metaphor for Marslen-Wilson' model (1987). It postulates the existence of an auditory word recognition system in which as a reaction to the auditory input all the words in the mental lexicon that possess the same word-initial group of sounds become activated, then restricted step by step to the only word which matches the sound pattern of the input signal by dropping the mismatching candidates progressively. This process assumes the existence of a 'uniqueness point', the precisely identifiable point where the word is recognized as different from other members of the cohort, and identical with the input signal or non-words recognized as not matching any of the words in the mental lexicon.

Singleton (1999: 92) illustrates this process with the word *elephant* ['elifənt]. He explains that the word-initial cohort ['eli] for this word may include words like *elevate* or *element*, but not *elephantine* because of the word-initial stress. The point of uniqueness is presumably the recognition of the [f] sound as there is no other word in the English language which would begin with the sound ['elif]. Experiments on the recognition time of words have shown that recognition time is shorter if the uniqueness point comes early in the word and becomes longer if that point comes late (Wurm, Ernestus, Schreuder & Baayen: 2006).

Furthermore, Marslen-Wilson (1987) assumes that context plays an important role in word recognition and facilitates semantic processing. He claims that once the word initial sound cohort is established, semantico-pragmatic contextual information determines which members of the cohort are deactivated based on contextual mismatching. Emmorey and Fromkin (1988) cite evidence both for and against the fact that the beginnings of words are responsible for being easily accessible, but they add that their implications for the cohort model are still unclear.

Aitchison (1994: 217–218) points out that in this model a lot more words are activated than necessary, speakers need to use all kinds of information available to restrict the cohort to one word only, and they have to make the decision very fast, while the words are being uttered. As for the drawbacks of the model she mentions the rigid early version which is unable to cope with distorted word initial acoustic signals and claims that if a wrong decision is made, the wrong cohort may be activated. However, she refers to a more recent version of the model as being more flexible and overlapping with interactive activation models.

4 Forster's serial search model

The widely discussed serial search model was developed by the psychologist Kenneth I. Forster (1976), according to it the processes of lexical access in the human mind are best conceivable as similar to looking for a book in a library or a system of files on a bookshelf (Caron 1992: 51). When we need a specific book, usually we only have fragments of information about it, either the author's name or the title, sometimes both, or one with the year of publication or the name of the publisher. We then begin our search in the catalogue of the library, and after finding the relevant specification data we go to the shelves and browse the shelf-marks until we find the book in question.

According to the search model, lexical access is not different from a library in this respect (Forster 2006). We begin our search from various starting points according to what kind of information is available to us in the given situation, i.e. the phonological or the orthographic form, the morphological, syntactic or semantic characteristics of the word. This initial search takes place in the peripheral access files organized along one of these characteristics, corresponding to the different library catalogues. These access files contain lists of entries equipped with pointers (shelf-marks) directing to a master file, which can be envisaged as a collection of words containing cross-references among words interrelated by aspects of meaning.

On the effect of word category information on lexical activation, Forster explains that according to a cascaded activation model, activation spreads from "one level to another without waiting for resolution at the initial level" (2006: 35) and a word should initially activate the semantic properties of its neighbors. In his discussion he cites evidence from studies on word recognition tasks where a word or non-word similar to the exemplar words proved to take longer to reject (e.g., turple - turtle). Singleton (1999, 2000), however, points out that experimental studies have not shown without doubt that the mental lexicon works this way.

Emmorey and Fromkin (1988) explain that both the logogen model and the cohort model are interactive models of lexical processing as word recognition takes place on the basis of an interaction between the sensory input and semantic/syntactic contextual information, whereas Forster's search model assumes autonomous processes where contextual information is dealt with after processing the sensory input. However, neither the logogen nor the cohort model seem to account for the processing of non-linguistic information, while in Forster's search model this aspect is not neglected.

Although the above discussed models may differ significantly in their assumptions about the structure of the mental lexicon and the processes involved in lexical access, they have one characteristic feature in common: their focus is entirely the mental lexicon. The models to be discussed in the following sections seek to cover a wider realm of mental processes, where lexical processing is handled as a sub-dimension of a larger cognitive domain.

5 Levelt's blueprint model

Levelt's blueprint model of language production, often quoted as 'blueprint for the speaker' differs from the models discussed in that it addresses the aspects of language processing from perception to production. Levelt (1989: 181) claims that formulation processes are lexically driven and identifies two major components of the model divisible into several subcomponents: a declarative component refers to the 'knowledge that' (facts we know about the world and language), and the procedural component, the 'knowledge how', responsible for information about how to achieve specific goals with language.

The type of declarative knowledge required for language use includes information about the world (encyclopedia), information about situations (situational knowledge), and information about what style is appropriate in various circumstances (discourse model). Declarative knowledge also involves the lexicon having two major parts: lemmas and lexemes (Levelt 1989) or forms (Singleton 1999), i.e. semantico-grammatical and morphological information, respectively. As Singleton (1999) explains, lexical search thus takes place in a two-staged process, making Levelt's model comparable to Forster's search model.

As for procedural knowledge, the model has several subcomponents. The Conceptualizer is responsible for generating messages, micro-planning and monitoring the output. The Formulator gives the pre-verbal message a surface syntactic and phonological shape. The third component is named the Articulator responsible for speech based on the phonetic plan coming from the Formulator (Levelt 1989), while the Audition system analyses the input speech sounds. Finally, the Speech comprehension system makes sense of the phonetic information received.

In this model the lexicon has a central role in speech production and is envisaged as being linked to both the formulator and the speech production system. According to Levelt's lexical hypothesis (1989: 181), "the lexicon is an essential mediator between conceptualization and grammatical-phonological formulation, supporting the much debated concept of interpenetrating lexis and grammar." It entails, he explains, that nothing in a message triggers a syntactic form, there must be a mediating lexical item equipped with grammatical properties that generates a particular syntactic structure. Singleton (1999), however, highlights some of the problematic assumptions of the model. These problem areas, he points out, are the purely declarative categorization of the lexicon, its separation from encyclopedic knowledge and the question of the degree of autonomy the various components of the model possess.

6 Modularity and lexical processing

Prominent researchers propose that the human mind is modular in its functions and postulate the existence of a language module; however, their views about the content of the module overlap and oppose one another at the same time. Noam Chomsky (1957, 1968) is often referred to as the father of investigating language as mental representations and rules. His generative grammar shifts the focus of language study from external language (E-language), i.e. language performance, to internal language (I-language) that is the "states of mind/brain that enter into behaviour" (Carston 1990: 38). The study of I-language is "the study of a language as part of human biology, trying to find out what it is that each individual has, that enables that individual to participate in larger social interaction, or to perform discourse" (Andor 2004: 95) and Chomsky calls E-language everything else, that is not I-language.

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I-language comprises theoretical vocabulary and principles that "are defined independently of other cognitive systems" (Carston 1990: 40) and in this conception the theoretical constructs of linguistic theory denote real mental entities. This view is challenged by instrumentalists who claim that linguistic concepts are not mental primitives, therefore, grammars are not representations of something real and distinct, as Carston (1990) argues. She distinguishes autonomous mental systems and claims that language is one of them.

Chomsky (1968) proposes that there are distinct regions or faculties for deductive reasoning, arithmetics, problem solving, scientific theory formation and language. These input systems (input, as defined by Carston 1990: 42, based on Fodor's (1983) views, is a representation of a proximal stimulus) share certain qualities common to all modular structures, such as sensitivity only to a specific set of stimuli coming from the environment, format of representations specific to the system, a database and a set of principles directing the system, fastness and automaticity, limited access to data. Chomsky interviewed by Andor (2004) claims that language processing is similar in its modules to vision.

6.1 Fodorian modularity

The American cognitive linguist and philosopher, Jerry Fodor, in his theses on the modularity of language acquisition (1983) maintains that the human brain is modular, having distinct areas for vision and audition, motor functions and language. But whereas Chomsky investigates the modularity of language acquisition in connection with a language acquisition device (LAD), Fodor essentially focuses on processing language. He claims that both input systems and central systems (or the general cognitive system) are computational, the latter being modality and domain neutral and independent. He addresses issues such as the modularity of the modules, the existence of cross-modular connections, the relationship between the input and output functions of the modules, and the relationship between competence and performance. He posits that processes of the language module are domain specific, mandatory, inaccessible to consciousness, rapid, and have their own neural hardwiring, failure or breakdown patterns (as in aphasia) and specific developmental sequences.

As for the structure of the mental lexicon, Fodor (1983) assumes that it resembles a graph, where lexical items are nodes and are interconnected with other nodes in the lexical network, activated by the spread of excitation (stimulus). Excitation thresholds are lowered for the related nodes in the spread of excitation, thus resulting in decreased response times for connected items in lexical decision tasks.

He is particularly concerned with the question that the modules are informationally encapsulated, a cornerstone of his model, implying that general knowledge about the world or contextual information do not play a role in the operation of the module while processing is taking place, they only interact when the operation of a particular module is completed. In order to fend off criticism on the part of psycholinguists referring to results of experiments on sentence completion tasks (cloze procedures), Fodor limited his model to the concept of the language module as being a formal processor only, with no semantic role. However, Singleton (1999, 2000) argues, a more plausible position is necessary to explain context effects in word recognition, and as Asher and Pustejovsky (2000: 2) point out, the Fodorian atomistic lexicon fails to explain data about the interaction between pragmatics and semantics.

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6.2 Jackendoff's representational modularity

Challenging Fodor's modularity hypothesis, often referred to as F-modularity, Jackendoff (2000) proposes a variant called the representational modularity of the mind, which rejects Fodor's assumptions of informational encapsulation and domain specificity. He argues that without interface modules mediating between the modules and serving as links making communication between the separate modules possible, the various modules of the mind would be functionally disconnected, thus the perception of the world and behaving accordingly would be impossible.

As it appears from the above, Jackendoff (2000) is not completely opposed to the idea of modularity, he only proposes a distinction between two kinds of modules as necessary innovations to the original idea of F-modularity: integrative modules (responsible for integrating levels of representation) and interface modules (making communication among representations possible). Jackendoff claims that a step missing in Fodor's model is the possibility of converting one format of information into another, for instance, in speech perception the conversion of the perceived syntactic structure into semantic information. Without such interface modules, he claims, lip reading, reading texts, and understanding signed languages would not be possible.

Jackendoff (2000) describes three types of mental processes. First, processes, when a full representation in a certain format is created from fragments of structures (e.g., a syntactic parser, lexical items organized into a full syntactic structure, a sentence) are called integrative processes. Second, translation, or with a later term, interface processes convert one form of mental representation into another (e.g., the acoustical information of a speech signal into a phonetic representation, or a syntactic structure into propositional structure). Third, inferential processes compare full representation with each other or construct new representations in the same format (e.g., comparing two phonological representations to see if two words rhyme). Jackendoff concludes that "the locus of modularity is not large-scale faculties such as language perception (Fodor's view), but at the scale of individual integrative, interface, and inferential processors" (2000: 13).

Jackendoff (2000) abandons the idea of Chomskyan syntax-centered generative grammar and claims that syntax is but one of several generative components, and further clarifies the role of the lexicon. He argues against the Chomskyan view that lexical items are inserted into initial syntactic derivations, and then interpreted semantically and phonologically through processes of derivations. As an alternative he claims that in the process of perception auditory information is processed by the auditory-to-phonology interface module to create a phonological representation. Then, the phonology-to-syntax interface creates a syntactic structure, which is then, aided by the syntax-to-semantics interface module, converted into a propositional structure, i.e. meaning. For that reason, when a lexical item becomes activated, it does not only activate its phonology, but also its syntax and semantics and thus "establishes partial structures in those domains" (Jackendoff 2000: 25). The same but reversed process takes place in language production.

7 Connectionism (parallel distributed processing)

Parallel and serial models of processing differ in the number of analyses possible at the same time (Pickering 1999). While in a serial model (e.g., Forster 1976) one analysis is selected, a parallel model considers multiple analyses at the same time. An influential model of lexical

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processing known as connectionism, or in an alternative term parallel distributed processing, unlike the modularity hypothesis, postulates that different pieces of information are processed simultaneously (in parallel), independently from one another and on different levels (distributed). This assumption stands in opposition with Forster's serial search model, where the stages of operations build on and depend on one another. According to this model, the operations of language processing progress independently and envisage a "high degree of interactivity between semantic and formal processing" (Singleton 2000: 179).

Connectionists relish the 'brain' metaphor to language processing and challenge the Chomskyan/Fodorian view of the mental symbol paradigm (Colombo, Stoianov, Pasini & Zorzi 2006, MacWhinney & Leinbach 1991, Plunkett & Marchman 1993, Rummelhart & McClelland 1986). They not only claim that mental processes do not involve operations with symbols, but also propose that knowledge is represented in terms of synaptic connections and connection strength determines activation rather than rules or patterns. They propose that signals may not only be excitatory, but also inhibitory, and the spread of activation is bidirectional, moving forward and backwards. Thus, learning is seen as a by-product of information processing as a result of the strengthening of associations among units (Ellis 1994). Singleton (2000) explains that this view has generated fruitful debates on the issue and connectionism has now become more influential, taking account of semantic aspects of language processing in the brain.

A connectionist model inspired by the Marslen-Wilson cohort model is the interactive Trace Model proposed by Ellman and McClelland (1986). As Caron (1992: 57) points out, interestingly this model is able to account for word identification even in cases when the input is distorted or incomplete, as well as for the majority of the data gained from speech production research.

8 Towards an integrated model of the lexicon

As it appears from the above discussion, the mental lexicon is complex and its components are closely interrelated and interdependent. Experiments with patients who suffer brain injuries (aphasics) seem to supply evidence for the claims of the above discussed theoretical models by providing and justifying a basis of comparison between 'normal' and 'impaired' language processing. Research into neurolinguistics and psycholinguistics is an especially complex endeavor, thus, only some focal issues are sketched here. The majority of these studies appear to discuss issues of the structure of the language system (Jackendoff 2000, Garrett 2000, Pinker 2007, Turvey & Moreno 2006, Wray 2002), the interface of language comprehension and production (Hickok 2000, Nicole & Love 2000), lexis and structure (Blumstein & Milberg 2000, Caramazza 2000, Feldman, Basnight-Brown & Pastizzo 2006, Stockall & Marantz 2006, Swinney, Prather & Love 2000) and syntax and discourse (Avrutin 2000, Caplan 2000, Piñango 2000). In the next section I am going to touch upon some major issues on how words are stored in the mental lexicon, before moving on towards an integrated model developed by Wray (2002).

8.1 The organization of the lexicon

Investigating lexical learning Skehan (1998) assumes that language is more lexical than usually accepted. He claims that the rule-based approach to language "is an imposition of the linguist, and may not always be justified" (Skehan 1998: 31). This new view challenged the influential views of Chomsky that linguistic competence primarily involves the knowledge of grammatical rules which allow the language user to produce an infinite number of utterances.

However, Skehan highlights some advantages to the rule-based system: the underlying lexical elements or units need not be represented more than once in the brain, they only need to be well organized according the grammatical rules and "looked up wherever they are kept" (1998: 30). It follows that the storage system, which is meant to underlie the processing system, can be as small as possible. However, as he points out, there is no convincing evidence why the human memory system would avoid duplication of storage of lexical items in the brain.

Early models of how meaning is stored and organized in memory were thought of in two ways: as a network or a set of features stored with each word (Quillian 1967, and Smith, Shoben & Rips 1974, respectively). Caron explains that these two models only differ in their formulation and both postulate the principle of economy of storage i.e. "each piece of information appears only once in the network" (1992: 73). This was later rejected by Collins and Loftus (1975) who argued for a direct connection between a concept and all the information acquired related to it. Based on corpus evidence referring to connotations, Stubbs (2001) has shown that the meanings of words are often not captured by their dictionary definitions, but defined in terms of logical relations. Earlier Sinclair (1991) expressed similar views and claimed that most combinatory possibilities of grammatical rules are ignored in real-life language production and lexical items occur again and again in different locations in the brain based on these logical relations. He proposes the open-choice principle and the idiom principle to account for multiple storage. The open-choice principle, he explains, is the capacity to use and understand unconstrained numbers of combinations of words. The idiom principle claims that the co-occurrences of words are limited, many frequent words become delexicalized as they enter into frequent collocations and phrases, and that the idiom principle takes precedence.

Tannen (1989) extended the analysis and focused on the area of conversation, emphasizing the preference of language users of formulaic language and repetition to create a frame to new information. Bolinger (cited in Skehan 1998: 34) coined the term 'item-bundles' to refer to multiple representations of lexical items, supporting the view that the same word is stored more than once in the brain, adding that these multiple representations are likely to be the combinations of a base word to form ready-made expressions. This way, he proposes, the memory system is "organised not for efficient compactness, but for ease of use" (Skehan 1998: 34).

8.2 Wray's Heteromorphic Distributed Lexicon

As a proposed solution to the vastly debated questions of multiple representation and the storage of words that break the rules in one sense or another, Allison Wray (2002) proposed a single rule-based system for language processing, where regularities in language are more easily explained than irregularities. Within her dual-systems model language is seen to be processed both holistically and analytically, which is more liable to explain problems raised by formulaic sequences and idiomaticity in language.

Her combined model, the Heteromorphic Distributed Lexicon, proposes the existence of five lexicons she named grammatical, referential, interactional, memorized and reflective, each consisting of three holistic units of various distributions and sizes: the morpheme, the formulaic word, and the formulaic word string units (Wray 2002: 262–265). She emphasizes that the unit types are not discrete; units can hover between the levels, and claims that "even if a string is segmented and one or more of its component parts are separately stored, it may also continue to be stored holistically" (Wray 2002: 262). Therefore, an idiom such as *Look out!* may be stored as *look* in the morphemic unit of Lexicon II (referential) and as *out* in the morphemic unit of Lexicon I (grammatical), while it also permits *Look out!* as a string to be stored as one unit holistically in the formulaic word strings unit of Lexicon III (interactional), meaning be careful. This is referred to as 'compositional' versus 'noncompositional' processing in research literature.

This three-layered representation of each lexicon as units of morpheme, formulaic word and formulaic word string is exceptional, Wray (2002) explains, for it displays all the linguistic units that are not subject to further segmentation, thus it should be handled as one holistic unit. Therefore, this model is able to account for those lexical patterns that previous models struggle with. Her model also rejects the theory of economy of storage outlined earlier and proposes that units gain entry to the lexicon "not by virtue, but as a result of pure expediency" (Wray 2002: 267), i.e. we only store things we have a use for, be it morphemes, words, phrases or whole texts. This assumption implies that the nature of the lexicon is determined "not by structural principles which decide whether an item is simple enough to be stored" (Wray 2002: 268), but by what priorities an individual assigns to certain linguistic input, making every lexicon personal and different.

9 Conclusion

Major models of the mental lexicon and lexical processing in the brain have been discussed in order to cast light on novel approaches to the field, by touching upon the logogen, the cohort, and the serial search models, as well as some models of higher cognitive processes, such as the blueprint for the speaker, the modularity of the mind and some relevant aspects of connectionism. An outline of studies on how words may be stored in the brain has been provided, where the uncertainty is justified by the scarcity of our present understanding of how the human brain works. Recent research has shown that language is more lexical than previously thought and noncompositional processing has important implications for language pedagogy. Knowledge of collocations and lexical chunks seem to play a crucial role in how well we know words, i.e. the depth of word knowledge, and consequently in how word knowledge is to be developed and assessed in and out of the language classroom.

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