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## LITERATURE, LINGUISTICS & CRITICISM | REVIEW ARTICLE

# Revisiting the competition model: From formation to pedagogical implications

Hassan Banaruee<sup>1</sup>, Omid Khatin-Zadeh<sup>2</sup> and Danyal Farsani<sup>3\*</sup>

**Abstract:** Language is a unique phenomenon and special enough to be treated meticulously in its analysis. Several models describe the underlying mechanisms for language acquisition and its processing. One of the most salient ones is the Competition Model suggested by Bates and MacWhinney (1982). We reviewed the CM from its initial principles proposed by Bates and MacWhinney, its adequacy and development, to its recent language learning version. This review discusses challenges regarding CM's accountability for Persian and Bandari (a language variety of Persian) and its potential pedagogical implications. Conclusions are drawn on whether the CM can be implemented in first-language acquisition studies and second-language learning.

**Subjects:** Cognitive Linguistics; Applied Linguistics

**Keywords:** language processing; competition model; learning; cognitive processing; acquisition

### 1. Introduction

Basically, language acquisition and understanding its psychological processes are very tough jobs. Language is a unique phenomenon and special enough to be treated differently in its analysis. Scholars unanimously agree that its acquisition is a highly cognitive issue involving sensory and motor channels in our brain (sensorimotor) (for a recent review of psychological processes, see Banaruee et al., 2023). There is still a question of whether these mental activities differ from other cognitive processes in tasks unrelated to language. To investigate these psychological processes, we must produce models that enable us to provide strategies that, both in general and particular, explain cognitive activities involved with language. Several models describe the underlying mechanisms for language acquisition and its processing. One of the most salient ones is the Competition Model (CM) suggested by Bates and MacWhinney (1982). This model is formed based on representational, processing, and learning principles. The model introduces a theory of the acquisition of grammar. It is called competition due to its assumption that lexical items compete with one another in the process of production and comprehension. Shortly, the

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representational principles highlight the lexicon's role in organizing different knowledge forms. The processing principles indicate how lexical items compete with one another in production and comprehension processes, and the learning principles contribute to isolating these lexical items and shaping the connections between them and their properties. In this study, the Competition Model (henceforth CM) proposed by MacWhinney and Bates has been reviewed thoroughly. The paper reviews CM's initial principles, components and structures, adequacy, and development to its recent language learning version.

The paper is formulated in eight sections. In the following sections, at first, a sound theoretical background provides information regarding the evolution of the model, its underpinning tenets, and the role of lexical items in its formation and application. Secondly, in section three, CM's structures are discussed. Then, some main features of the model, including mapping, cue and its construction (cue is considered the backbone of the CM predictive mechanisms), and monitoring, are reviewed. In section five, the challenges regarding the strains of the model, besides the criticism against it, are discussed. Next, its unified version, which also encompasses the acquisition of any language after the first language, and parallel distributed processing are reviewed. Section seven discusses the CM, its unified version, and all concepts related to learning and pedagogy. Eventually, conclusions are drawn in section eight on whether CM can be implemented in both first-language acquisition studies and second-language learning.

## **2. Theoretical background**

### **2.1. Evolution of a model**

In the early days of acquisition, learning a language in the first place might involve several forms of mental representations so that a human child feels competent enough to put a large number of language components together and not only comprehend but even produce them. Both comprehension and production of the language have a long root in literature with different terms and implications, such as *Lange and Parole* by Ferdinand de Saussure and *Competence and Performance* by Noam Chomsky. It is challenging to produce a model considering children's comprehension and language production since every stage of learning involves complex grammatical relations and sequential orders or phases for linguistic components that a child experiences. Previous research (see Alcock & Krawczyk, 2010; Darrah et al., 2003; Iverson, 2010; Wang et al., 2014; Webster et al., 2005) show that it is not simply viable to distinguish the changes in the developmental skills of children at different ages, however; these studies suggest that there is not a robust predictive power for the motor skills as the prerequisite for the development of language. This indicates that other factors may play a role in this process. For instance, motor resonance plays a big part in increasing the comprehension of language according to embodied cognition arguments (e.g., see Fischer & Zwaan, 2008; Glenberg & Kaschak, 2002). In how they encode functions in the surface structure (Farsani et al., 2022), languages differ in many conceivable syntactic-morphological and semantic-phonological aspects. These differences can be traced for articles, verb conjugations, pronominalization, relative clauses, word order, adverbials, word formation, elliptical phrases, and verb agreement. The idea becomes more challenging and more complicated considering explanations of how children pair functions and forms, meanings and forms, sounds and forms, and forms and meanings or map them onto one another. This mapping or/and pairing is based on rationality and regularity so that children not only stick to the rules and laws they are exposed to but also overgeneralize and transcend the laws sometimes (Bates & MacWhinney, 1982). For instance, they overgeneralize “-ed” as a past participle to many irregular verbs in English (goed, spended, maked) or add plural “-s” to some irregular nouns (mouses, foots, tooths). This imposition challenges linguists, psychologists, and psycholinguists to investigate the psychological processes involved in forming the proper form of language. Abstract and concrete conceptual processing are considered to involve varying factors, while they contrast in carrying modalities and amodalities. In other words, our thoughts are formed by symbolic language which is internal, while embodied theories rely on the triangular relationship of body, experience, and the environment (Khatin-Zadeh et al., 2023a, 2023b; Mahon & Caramazza, 2008).

A primary and presumably acceptable justification is frequency and conventionality's role in shaping the language a child overgeneralizes or overextends, but this is not as accepted as suggested. In this assumption, the role of nature is ignored, which is a debatable issue. The nature-nurture has been a heated controversy from the very first discussions over language by Aristotle to date by modern psychologists. Chomsky (1965) viewed language as a genetically coded mental organ among linguists. Languages can be investigated to a limited scope and area diachronically. The most available data to study linguistic phenomena are synchronic, as we do not have data from how children produced language centuries ago. The synchronic information is available for researchers, but deciding which components and elements are the underlying factors to include in a model is still challenging. We cannot insert every observable information in adults and children's linguistic systems into our models because, besides the information, the way they are processed, stored, and received is important.

Nevertheless, scientists have no other way to prioritize form and function (or meaning) relationships to investigate acquisition processes. As Bates and MacWhinney (1982) suggest, researchers need to consider the precedence of function to form and the multiplicity of forms to function. In other words, a repertoire of functions must be available in a child's mind before acquiring a form. Several surface forms must be accessible mentally to be tested when predicting a function. Several scholars (e.g., Bates & MacWhinney, 1982, p. 186; Brown, 1994; Rosa & Farsani, 2021; Sinclair & Coulthard, 1975) believed that function is mapped onto a set of heterogeneous grammatical forms that "can only be described with an abstract set of symbols like "+subject"- symbols or categories that in some way transcend semantic or pragmatic meanings." It is challenging to decide whether the construction of an internal mental symbol such as +subject is synthetic or an innate property. "Surface grammatical conventions cannot be isomorphic with functions, but relations among arbitrary surface devices should be predictable from processing constraints." (p. 188). These surface patterns should map onto a set of biological categories.

## **2.2. Underpinning tenets and features of the CM**

Bates and MacWhinney (1982) argued that even though "a unified model in which competence and performance facts are described with the same elements, categories, and relational symbols" might be inelegant, it can manage the description and prediction of an extensive range of facts. They introduced six tenets in a competition grammar model to fully represent relations between form and function: channel limitations, informational pressures on the channel, two classes of solutions, conventionalization, disequilibrium, and vestigial solutions. Channel limitations mean that we are bound to limited resources of acoustic-articulatory channels to map meanings onto these entities. Still, interactions among them can establish determining constraints as the base for a more extensive set of meanings and communicative functions (p. 192). There are informational pressures on the channel because every language user has to deal with an infinite number of meaning packages to communicate; for instance, one referent, such as "dog" can play different roles.

To solve the competition problem, we have two choices; one to spoils, which is "a one-function-one-signal approach," and the other choice is peaceful coexistence, which is "a form of many-to-one mapping." (p. 192). Conventionalization refers to the promise that humans and animals are willing to repeat a confirmed behavior meeting novel phenomena. Based on conventional norms, individualistic changes within a language are usually apprehended even though changes in the community by groups are feasible. As it is not simply possible to accept changes from every group to map forms and functions, it is rational that languages experience a stage of "disequilibrium and adjustment." Moreover, finally, vestigial solutions indicate that there is always a gradual change during the transition. In other words, children use intermediate strategies to acquire the conventionalized forms even without experiencing them in previous communications. Still, these vestigial components are among the early disappearing entities at every level of change in the child's language, probably because they are environmentally sensitive.

Bates and MacWhinney (1982) argue that competition within the system describe the relationship between the topic and comment and other systems. Even though it is complicated to investigate and explain the mental states and internal psychological processes involved in mapping grammatical forms onto their discursal functions, Bates and MacWhinney begin with five features that structurally describe the topic-comment system. 1) there is only one function; there is always something (topic) we are talking about and a point (comment) we make about that thing. 2) several competing motives are involved in selecting topics and comments. 3) topics and comments are specified with a wide range of degrees, which can form a continuum from zero specification to an entirely long passage. 4) there is an indefinite and recursive point-making function within a sentence's topic-comment relationship, which can have different layers. 5) as point-making functions are highly complex, languages must be equipped with an artillery of communicative devices. Furthermore, topic and comment relations compete with other systems. Take animacy and agency as an example. Sometimes, an animate object is selected as the agent while the inanimate object is assigned to the topic role (Bates & MacWhinney, 1982). A modified typology of Li and Thompson (1976) by Bates and MacWhinney (1982, p. 204) suggests "that 1) topics are processed more easily, quickly, and so on as subjects or initial-position elements, and 2) that agents also make 'better' subjects in a variety of psycholinguistic tests." The primary goal of the CM was to investigate and test relative causal control of forms and functions within a network that deals with a variety of language use and development without considering a one-to-one mapping of functions and forms. It is widely accepted that internal structures of grammatical categories have salient effects on the mapping. Take subjectivalization, for example; many grammatical devices such as subject-verb agreement, nominative case, and initialization (e.g., in English) help map the subject. The subject is considered an abstract symbol, which is axiomatic according to Bates and MacWhinney (1982). Even though it contradicts their argument regarding the internal structures of grammatical categories that affect form-function mappings using a set of grammatical devices, they are not independent.

However, if we consider them free of internal structures, unitary and axiomatic, the subjects can be regarded as unbounded abstract symbols. Here is a question: How do we form constructions with +subject, +verb, and +noun? The answer may be that we humans use semantic components to map meanings onto words; in other words, we primarily interpret the symbols and then link them to a semantic category or relation. Bates and MacWhinney (1982) proposed that a prototype theory allows us to assign some surface forms to prototypes representing grammatical categories. This approach forms its basis relying on essential tenets such as central tendency, family resemblance, the goodness of membership, heterogeneous membership, fuzziness, and weighting.

### **2.3. Competition**

The CM argues that there is a dynamic control over the form-function mapping in comprehension and function-form in production. Identification of this mapping takes place through a parallel activation system. Why shall not be a mapping of function onto the form in production? How do we coin a word or use an existing word for a novel purpose? It can be the subject of further investigations, apparently. According to Glushko (1979), there is an analogical process at work to decide whether an unknown word such as "mave" rhymes "have" or "cave." In this hypothesis, the role and part of psychological rules are neglected and considered abstract. MacWhinney (1987) made a list of words that rhyme with "have" and "cave" and claimed that the solution for the nonsense words such as "mave" is the frequency of the similar words which the hearer may have previously been overwhelmed with. Therefore, if the candidate is overwhelmed with words such as pave, cave, made, mare, and mane, they would choose "long a sound" because this sound is more competitive than "short a sound" on this occasion. In their justification, the candidate pays heed to all four letters of the words. What if the candidate considers "ma" and "ve" discretely or highlights the combination of "mav" (a CVC combination) as a prime? This consideration sounds to produce a different result. In the case of word order, the previous data revealed that the Italians were more flexible to benefit from semantic relations and the agreement between the verb and subject, while

the English comprehenders relied on word order. Hence, it is likely that language users across the globe benefit from diverse strategies.

Nevertheless, every examined language has word order biases that cannot be attributed to the model (Bates & MacWhinney, 1987). Take clefting or pseudo-clefting as a concrete example. The model cannot rely on clefting as a syntactic pattern to compete with SVO in English, even though the identical pattern might be prototypical in some languages. In their view, there is a progressive updating of information as the comprehender approaches the end of a sentence to fully assign roles to the subject based on the cue strength they provide. This detection is considered a mapping of functions onto forms determined by the organism (Gibson, 1992).

#### **2.4. Role of lexical items in the CM**

In the CM, a lexical item bridges units of function and form. Obviously, every lexical item carries a load of semantic properties. This infinite bulk of properties means that a human child does not have natural access to them at birth, and it acquires them to passing stages in childhood. Looking at the phenomenon from a cross-linguistic perspective, the child will only know the lexical semantics of the language or languages they have acquired. Still, the majority of properties are known to them. Evidently, it is extraordinarily complicated to model how a child processes these semantic-related entities. MacWhinney (1997) suggests that semantic concepts differ from semantic properties even though his differentiation does not influence the development of psychological models and sounds fuzzy. Moreover, he argues that the solution relates to how children shape semantic concepts using grammatical regularities. One of the challenges of the model sticks out here because the core of the CM is a lexicon, and the solution to universal language learning is searched in grammatical regularities. How does a child comprehend the word different tokens of a lexeme? In English, a word can be both a noun and a verb, in some cases, such as “lead, design, water, milk, and look.” Adding the present participle “ing” to a verb can change it into a gerund, a continuous verb, or a subject adjective. How does a child process the input information without a mistake? The role of context and its importance is clear, but how do children process them outside the context? This complexity is absent in some languages, such as Persian, in a way that not only does one word have one part of speech but also a particular form. Thus, recognizing a verb or a noun in Persian is not a challenge for a child. Persian verb construction is different from English in several ways. One of the most significant dissimilarities is its combination with the subject and object participles so that the subject and object are coded in the verb.

Moreover, in a large number of verbs, a noun or an adjective is combined with a verb to produce a compound verb. This combination is known as light verb construction (LVC). Does this huge difference in the forms of languages require different models of psychological processes, or is there a possibility of a universal model regardless of forms? Our current view is negative and finds the psychological processes of the human child partly universal, particularly at its conceptual level. It seems that children, like adults, are genetically coded to map concepts, but they face problems encountering a new language because they do not know its forms. With previous examples from English and Persian, the differences in the forms of verbs and the psychological processes involved in different languages seem specific. The German sentence “Ich gehe ins Kino mit meinem roten Auto” highlights the presence of some marking systems in Indo-European languages such as German. 1) the sentence in its first look does not confirm the tense, whether it is simple-present or present-continuous (particularly for English and Persian speakers). 2) the preposition “ins” meaning “to” is marked because of its position before “das Kino.” 3) the possessive adjective “meinem” meaning “my” is marked dative affected by a dative preposition “mit.” 4) the adjective “roten” meaning “red” which is a conjugated version of “rot,” are marked by the dative structure and the neutral noun ‘da Kino’. Hence, we assume that psychological processes that a German child goes through to acquire noun phrases might be at least to some extent different from Indo-Iranian languages or English. MacWhinney (1997) argues that a complete command of such gender or animacy marking is formed late and with a slow rate in German, and adult-like performance may need six years in such cases. This delay in development of language is also

observable in pronouns. Based on one of the researchers' personal observations of his son (Amir Ali), who is nine years old, delay in temporal pronouns is longer than locative pronominals in his first language, Persian. He still asks questions for the definition of words such as "soon" in Persian and Bandari "zood." He has developed the system to comprehend and use sentences such as 'see you soon in English, "ich komme sofort" in German, "zood atam" in Bandari, and "alan miam" in Persian. Still he cannot fully comprehend 'I will do that soon. He faces more difficulty when facing metaphoric expressions such as "in a flash." He can understand short metaphoric expressions related to vehicles and speed, such as "shooti" meaning "so fast" (the expression in Persian and Bandari is related to some cars that drive so fast). Thus, it is presumable that children might be able to describe more tangible and physically-related pronominals faster and more confidently than abstract ones. In the case of proximal and distal pronouns, he acquired the pronoun "here" in his third year in Persian, Bandari, and English. But the child has not used the pronoun "dort" in German and "there" in English, even though he has been exposed to them at home and in classes. This suggests that phoric references have their unique psychological process. As noted, the core concept in the CM is the lexicon and its representation. Form and Function are characterized by the auditory and semantic properties, respectively. One of this model's first items to revisit is the auditory properties. According to the CM, "word recognition works directly off of auditory properties" (p. 252). While these properties co-occur in time and sometimes it is necessary to pay heed to this co-occurrence. Particular auditory properties get recognized as being attributed to segments with temporal positions. Every segment is characterized based on four types of positions; tone unit's groups, tone unit, syllable, and cluster, which are formed hierarchically, starting with groups containing syllables consisting of clusters formed with segments. The positions are coded as "center", "post", and "pre". To provide a concrete example, the tonic, onset/p/, is represented in pound, pool, and pitch, and the tonic, coda/p/, is found in loop, chip, and deep. It is argued (MacWhinney, 2017) that such structures are mappings off of auditory properties, and consequently, the articulatory structure is a mapping off of this system that relies heavily on the representations acquisition.

### 3. Structures in the CM

To tie meanings to each other in a sentence or an argument, there must be a structure rather than only lexical relations, something that functionalists (e.g., Givon, 1979) introduced as role-relational structure, MacWhinney (1987) used to express relational functions that represented what fits next to what. In the CM, every relational structure starts with verbals (predicates) and is complemented/ accompanied by nominal (arguments). The independent clause "birds fly" is shown in the following diagram:

Fly—S->birds

Predicate—role—>argument

In a longer clause such as 'a young man often dislikes schools'.

< — H —/S/

Dislike—S —> (A—H—> (young—H > man))

O— > (plural—H— > school)

< — H— >often

S = subject, O = object, H = head

'A' and 'young' are bound as operators to their head 'man'. 'often' is bound as an adjunct with the verb as its head. "a young man" is bound to the subject role, and "school" is bound to the object

role. There is always one argument to a predicate. The arguments in a sentence exceeding one argument can be subject, object, and result or indirect.

Gibson (1992) stated that in the CM, a listener relies on the cues they receive through input, and the cue strength is continuously updated within a connectionist network. Therefore, successful cues get reinforced positively, whereas failure results in negative activation of cues. Negatively activated unsuccessful cues are reactions to the absence of positive evidence of a form or function in a language's environment. In other words, this is not a universal constraint-based grammar that confirms the failure of a cue but the negative evidence it faces in usage. This negative evidence is frequently observed in language classes or second-language communities but is unavailable for first-language learners.

Crain and Mckee (1986) contended that the existence of a preordained curb on learning is an inherent constraint. Several scholars (e.g., Crain, 1991; Pinker, 1990; Wexler, 1990) argue that input information only partly feeds a human child's generalizations, so how can partial generalization lead to full language acquisition if there is no universally constraint-based grammar? Advocates of the CM believe that their approach can solve this mystery. It is widely accepted that no model can explain all aspects and effects related to sentence processing or language acquisition. The CM emphasizes the presence of a learning mechanism based on connectionism. Accordingly, the CM tends to match cue strengths to available cue validities. Gibson (1992) argues that this matching may produce a positive outcome in early FLA, but the mechanism is not practical for every language, particularly in later stages.

The CM uses experiments to provide supporting shreds of evidence. The participants are administered sets of words in sequential orders of noun-noun-verb (NNV), noun-verb-noun (NVN), and verb-noun-noun (VNN). The nouns are concrete, and the verbs are transitive actions so that they take objects (patient, recipient). The tests differ in the type of cues they investigate according to the availability or existence of the items in their languages. The participants are adults and children. The adults provide the stimuli for the children by recognizing which noun is the subject or actor of the verb. Subsequently, the children using some toys perform the represented stimuli (we can give more explanations of how they are rated here). The problem with this system is in complex sentences!

### **3.1. Syntactic frame competition**

MacWhinney (2004) argues that the CM applies to all language levels. Hence it can describe the syntactic overgeneralized language. Sometimes group membership may result in the emergence of novel lexical structures (MacWhinney, 1993). When a word has shared features with a set of words semantically, it is syntactically a group member. There is a potential overgeneralization in syntactic components "when a valency pattern common to a large group of verbs is incorrectly overextended to a new verb" (MacWhinney, 2004, p. 5). In some languages like German, dative, accusative, and genitive marking systems are strong and distributed to several components within a sentence, such as articles, pronouns, adjectives, nouns, and verbs. Thus, the roles are more predictable for learners.

Nevertheless, the case in English is different, and it is mostly unclear whether a verb is a dative, but it can be shown by replacing an indirect object (the recipient) with a direct object. Take the verbs "tell and say" for example. One can utter "I told a story to Jack" or "I told Jack a story," but they cannot produce 'I said Jack my problem.' It should be 'I said my problem to Jack,' or I said to Jack my problem.' In all cases, the child already has access to analogic support, episodic auditory representation, and competition.

Further, when a child encounters a new verb in the same category, for instance, "utter," how can he recognize its structure? Taking into account that the episodic encoding does not support "utter" here. There is no clear support for how the child blocks overgeneralization in such cases in the absence of



the background representation, even though it is suggested to be similar to benign “goed.” This lack of support is a challenge that has not been solved in acquisition models such as the CM.

#### 4. Main features of the CM

##### 4.1. Direct mapping

The CM assumes a direct mapping between form and meaning (function). In other words, it suggests that language processing in its performance (rooted in the de Saussurian domain of parole) consists of two levels; formal and functional. This directness signifies a single level of cues where languages can refer to various kinds of data. It means that, in sentence production, the language user can take configurations of cues into account; cues such as animacy, agency, agreement markers, pre or post-verbal positions, acoustic, and phonetic cues.

##### 4.2. Cue

It is the backbone of the CM predictive mechanisms. The idea is rendered from Brunswik (1956), where psychological mechanisms are modulators of the human mind and the information value of every cue in its environment (ecology). It has two components; availability and reliability. As the CM considers every cue a place of information value, it is logical to assume the organism's knowledge regarding the validity of this information. In this vein, the model employs a connectionist notion, cue strength, to define the likeliness of pairing an organism to the given information in its ecology. Hence, there is a weight or cue strength between the form and function (between the surface form and meaning). Consequently, the probability of preordained and deterministic language rule is discouraged, but a connectionist approach towards a unified network is supported.

Both the task frequency and its cue validity constitute the cue strength. One of the problematic areas of the CM arises regarding the frequency of a task. How possible is calculating the frequency of a task or a cue? Is it possible to calculate the cue strength when its frequency is unavailable? The question remains unsolved to date. One question is whether a human child maps forms onto meanings in a unidirectional fashion. Or are there more correlations between them? It is suggested that children map form and function using two principles; semantic connectedness and positional patterning (see Bates & MacWhinney, 1987; Braine, 1976; MacWhinney, 1978, 1984). Thus children examine form-form, form-function, and function-function correlations (Bates & MacWhinney, 1987; Maratsos, 1982). We already know that it is almost impossible to look at the language and its connections as an all-for-one, a one-for-all, or a one-for-one relationship. In other words, lexemes are mostly polysemous; this means that in most cases, some forms are mapped onto a function, or several functions can be mapped onto a single form.

According to Bates and MacWhinney (1982), “subject” is a coalition of multidirectional mappings. They view the network of connections related to a coalition of subjects as internally prototypic. In other words, horizontal (form-form or function-function) and vertical (form-function) correlations produce a schematized system where the grammatical categories are viewed as subject prototypes. Every grammatical prototype suits family resemblance, heterogeneous membership, and maximum distance from other categories (MacWhinney, 1987). One of the criticisms to pose here fits against the coalitions. It is argued that “languages have evolved to exploit natural coalitions” (Bates & MacWhinney, 1987, p. 167). There are pieces of evidence when functions that are identical prototypes or go together are assigned to distinct components for the sake of adequacy. To solve the problem, Bates and MacWhinney suggest two kinds of compromise (to make an item explicitly a member of a category) and divide the spoils (to assign the devices which compromise the subject to separate elements, for instance, topicalization).

##### 4.3. Cue construction

A connectionist model can be implemented to represent overgeneralized language cue construction. “Analogic pressure from one group of words leads to the establishment of a case frame that

is incorrect for a particular verb” (MacWhinney, 2004, p. 6). Evidence from English causative cases shows that weak competition between words can lead to causative overgeneralizations. Take a gardener profession as an example, they can hammer something flat or rake the sands flat, but they cannot water the flowers flat. This sort of overgeneralization is also observable in source-goal structures. Heed “I poured the cup with tea” instead of “I poured tea into the cup” in this situation, the analogic pressure to pick the source or the goal in the post position may result in an incorrect frame.

#### **4.4. Monitoring**

Time rectifies wrong forms by providing the learner with the chance of more positive instantiations to support correct forms and spurn the incorrect versions. Language learners can correct themselves proactively. MacWhinney (1978) argued that children compare the overgeneralization form with the correct rote, listening to their own utterances and trying to inhibit the production of wrong forms. By doing this, they fade away the analogic form and highlight or consolidate the weak rote form. Receptive monitoring suggested by MacWhinney (ibid) that a child can track the differences in his production and received information by closely following the input structures. Two kinds of variation should be considered for creating universal accounts of language acquisition; one across languages and the other across every individual (Bates & MacWhinney, 1987). The CM is focused on variation across natural languages, in principle. It contends parameter settings of nativists (not to be universal) and hypothesizes that children perceive language differently. The human child acquires language through a gradual progressive procedure to reach an adult-like steady state. A critical question is whether every child’s language aptitude or mental ability is the same or if every child has unique psychological processing or capability.

### **5. Problems with the CM**

#### **5.1. Critics proposed by Gibson (1992)**

One criticism leveled at the competition model of language development is that it does not consider language’s social and psychological context. The functional approach tends to ignore language’s structure in favor of speech’s utility in attaining social goals. Gibson (1992) criticized the CM for its 1) lack of a comparative discussion with other existing models in its production, ignoring nativists’ accounts, over-reliance on syntactic level of language and ignoring sentence interpretation. 2) Lack of a clear definition of cues and their validity. 3) Lack of control over the number of cues. 4) Lack of identification of cues in longer sentences. 5) Lack of associated meaning in the definition of cue validity. 6) lack of explanations regarding how less reliable cues may be more valued than more reliable ones. 7) lack of support for how a connectionist model can produce correct patterns. 8) The preliminary experiments propose no concrete results for cue validities. 9) lack of explanations for the coding methods. 10) lack of falsifiable and replicable data. 11) lack of experimental evidence for how people process non-sentences in contrast to grammatical sentences 12) lack of online experiments. Language appears to be un-learnable in the absence of formal constraints (MacWhinney, 2004). Language appears to be un-learnable in the absence of formal constraints (MacWhinney, 2004).

#### **5.2. Overextension of nonce words**

One of these formal constraints available input is corrective feedback assumed as negative evidence (c.f. Pinker, 1984). According to Gold’s (1967) text presentation problem, when an informant is exposed to a large list of regular verbs to acquire the “ed” rule, they presumably overextend the rule to irregular verbs such as “go” to produce ‘goed.’ In such occasions, the language user may only rectify the overgeneralized rule through the reception of feedback on the ungrammaticality of the form. Gold (ibid) suggested two contrasting language learning situations as informant and test presentation, where language learners receive grammatical feedback from an error-free informant throughout the learning process in the former situation. However, they are only exposed to positive feedback for the accepted language, while the ungrammatical sentences are ignored in the latter situation. There is a higher possibility of parents treating their children’s

ungrammatical language with oral recast (MacWhinney, 2004) as a complex type of feedback compared to over-correction, which is usually unsuccessful. When children make a morphological error using 'goed' instead of 'went', indeed, it is not just a mere morphological overgeneralization, as I believe overgeneralization should potentially occur when a language user risks uttering a low-frequency expression, while 'went' is a highly accessible term in English. According to MacWhinney (2004), the child needs positive evidence, such as corrective feedback, to compete with an overgeneralized form to block the production of 'goed.' This is considered a benign overgeneralization (Baker, 1979). This competition, supported by parents' corrective feedback, contradicts the CM principles. Formerly, MacWhinney (1978) described this competition as a challenge between rote and combination. Why should a child produce an erroneous verb "goed" while being a user of "went" before?

Even though MacWhinney (2004) argues that CM differs from Gold's blocking accounts due to the comprehensive approach the CM takes. The CM distinguishes between comprehensive and production and observes the phenomenon from three angles: analogic pressure, episodic auditory support, and completion of the confirmed and new forms. The human child overcomes the overgeneralized form as soon as analogic supports consolidate the correct form. The question is that why should a nonce form such as "went" be ignored? A tentative guess could be that the human child uses "goed" as a second alternative to "went." If they receive positive feedback, the form will be consolidated. The blocking occurs if they receive a spurn, and the overgeneralized form is inhibited. The stronger the competition between the meanings of two forms, the higher the chance of blocking an overgeneralized form (MacWhinney, 1997). How does the CM treat two similar words with different morphological forms? Consider two words, such as "road and route," "breathe and inhale," "bag and sack," and "pot and bucket." These words have very similar meanings and can occasionally be employed as alternatives. Is there a competition between these pairs? Does a child overextend one form and inhibits the other? If yes, how do they receive the feedback? Indeed, how do they cognize the overgeneralized form? According to the CM, where all three forces of episodic, analogic, and competition are at work, the child does not need correction but more exposure to the input information. Massaro argued that competition does not impose a fixed constraint on the information but a probabilistic fuzzy logic.

### **5.3. Word order before morphology**

Relatively, semantic development occurs earlier than syntactic categories, and syntactic systems appear to be prior to morphological developments. However, language processing is not restricted to these three developments, and more constraints exist, such as functional readiness and cue cost. Piaget (1952) argued that language is subservient to and relies upon developments in the child's cognitive ability. For example, children should not use nouns prior to attaining object permanence. Cue cost springs from Carroll (1979), stating that cues might be employed less frequently than expected due to their usage's unusually high processing costs. In Bates and MacWhinney (1987), the cue cost was described in two sections: permeability and assignability. The former refers to the level of difficulty a hearer encounters detecting the cues to use in processing a sentence (this level deals with perceptual factors and perception). In contrast, the latter refers to the extent to which the cues can be easily assigned to the roles (this level deals with memory). Two significant advantages of these principles are their testability and non-circularity of them. According to Bates and MacWhinney (1987, p. 176), "functional readiness means that children will not acquire a complex form until they can assimilate it, directly or indirectly, to an underlying function." If a child encounters a novel form in a language before acquiring its function, the function is considered unready or not ready. Children mostly rely on intonational factors and pick the loudest part of a sentence without using them in the right place (with the right function). This suggests that the underlying function is available but not accessible to them.

## 6. Unified competition model

A drawback of the CM was the short scope that did not include the processes in second and multilingual acquisition. MacWhinney (2005) suggested the Unified Model of language acquisition that encompassed the acquisition of any language after the first language. This model replaced parallel distributed processing (PDP) with self-organizing maps (for a detailed discussion about PDP, refer to Rumelhart & McClelland, 1986) and added cue cost and resonance ideas. The neurobiological fact that the higher the level of exposure and number of practices a learner receives, the more active and stronger the resonant neural connections will be between cortical areas (MacWhinney, 2008) gave weight to this unified model. Within the maps, some self-organizations establish learning. It also contains subprocesses that are formed parallel to the representations within the maps. This model suggests three self-organizational mapping levels: syllable, lexicon, and construction. As is aforementioned, the higher order mapping is not supported. Even though unified models and the CM have been criticized (cf. Dörnyei, 2009; Eubank & Gregg, 2002; Gibson, 1992) for being a patchwork of dissimilar doctrines (principles) and sound more fragmented than unified, we assume that integrating discrete principles into one and merging them beyond a grouping or superficial amalgamation would result in a multifaceted model. Indeed, the more trespassing and encroaching it is, the more dynamic the model will be. MacWhinney (2005) developed the CM into its unified version by suggesting that mechanisms involved in processing the second language can provide subsumptions to the mechanisms present in acquiring the first language. Therefore, he assumes parallel mechanisms at work. The CM was primarily modeled to discuss syntactic structures, but through its unified version, more aspects of the acquisition and processing of language would be encompassed. Based on the UCM, associative maps are employed for storing syllables, constructs, and lexical and mental items. Still, syntactic processing plays a big part as cue strength fulfills its role in a syntactic processor that determines the most competitive form as the right one (MacWhinney, 2008). MacWhinney (1997) argues that L2 learners must learn the significance of such cues in the target language. The UCM highlights the role of buffering, chunking, resonance, and codes and inserts them into the model. These more recent components propel the model to assume that acquisition has a storage for the primary adjustment of information of short-term retention as a buffer. It uses codes; thus, it enables the model to discuss coding, code-switching, code competition, code activation, and dual-coding issues.

Accordingly, resonance conveys the coactivation of codes and their related factors. Finally, chunking supports learners with the processing of information in chunks rather than discrete units. Based on the UCM (MacWhinney, 2005, 2017), learning takes place when these components interact within a competitive and resonating process. In a way that, the representation of coactivated reciprocal connections leads to resonance. As the resonance increases, the coactivation rises higher. As a result, it generates a coherent coactivation set of neural circuits. MacWhinney (2005, 2017) argues that resonance involves associative mapping or relations that use imagery to record or learn an image of words prior to the complete consolidation of relations.

MacWhinney (2005) assumed a great transfer potential for all language users regarding bilingual or second language learners. In his own words, “whatever can transfer will” (p. 17). There exist several types of bilinguals regarding the age they have started acquiring any of the languages, level of current exposure to the languages, equality in the amount of input, and dominance, which makes it a challenge for the model to be all-encroaching. In this regard, the UCM admits the difference and provides a solution. The UCM suggests that there is no secondary access to any information for equal bilinguals. Thus, there is no extra transfer than the primary message as there is unity in the internal language system, which we disagree with (it is argued in the following lines). However, unbalanced bilinguals have a weaker and stronger language repertory relatively. In such cases, learners’ first language is the dominant one, and the comprehension and production in the second language are filtered through the L1 (Tokowics & MacWhinney, 2005). Language transfer plays a big part in such situations and may have different levels. Brown (1987) suggested a hierarchy of six difficulty levels for language learners. The hierarchy can be applied to

phonological and grammatical levels. These levels are; transfer, coalescence, underdifferentiation, reinterpretation, overdifferentiation, and split. Due to the limit in space, we only provide examples for the transfer or the zero level in this paper. In zero level (as the name implies), there is no trace of contrast between the acquired and the learning languages. The reason may lie in the sameness of the information in both languages. Take the vowels/ae, i, o, u, a, and e/; for example, they are the same in Persian, English, and German. Hence, a language learner may not need a different resonance to produce or comprehend them.

On the other hand, when there are the slightest differences in any language component, more serious difficulties will arise. These difficulties are even observable with learners of a standard language in one society living as an equal bilingual. For instance, Bandari is a language variety of Persian spoken in the south of Iran. There are great subtle differences between the standard and the regional varieties. In Persian, “moshk” (meaning musk) is used in perfumery and medicine, but in Bandari, “moshk” is a small rodent that has never been welcomed in houses, a rat, a mouse.

Regarding the negation and syntactical differences, Persian and Bandari appear to be two different languages than a family. Take, for example, “xaeste naebashid,” a highly common Persian compliment (which is absent in German and English). The imperative expression is translated word for word as “do not be tired,” and its gloss is “tired not be 2fpl”. In Bandari, the equivalent phrase is “nakhasta” which utterly conveys the identical concept. Its gloss is “no tired.” There are four salient differences in this short expression. 1) there is no verb in the Bandari version. 2) the negation is used before the adjective in Bandari. 3) the adjective “xaeste” is pronounced with phatic/e/in Persian but/ae/in Bandari. 4) “id” at the end of the Persian verb indicates the second person plural form of the subject person, which is merely absent in the Bandari counterpart. Nevertheless, the concept is the same, and the message is transferred easily from Persian to Bandari but not equally from Bandari to Persian, so Persian natives may not fully comprehend the expression interacting with a Bandari speaker in the first place. Moreover, this concept is absent in English and German, apparently, when English and German speakers meet the end of a service provided for them, they thank them with thanks and thank you, but do not represent the concept of tiredness in that situation. In this respect, a Persian speaker may not be able to deal with the situation in the first place easily. MacWhinney (2005) argues that such a learning process takes place gradually, and time is the solution to the right adjustment to the new language. We agree that the time, frequency, and exposure level are game changers. But, how can the Competition Model provide supports to such tremendous differences not only between languages but even within language varieties? How many conceptual and linguistic layers need to be represented in a model to reach a unified model with equal weight across languages?

## 7. Discussion

We expect children to map meanings onto what they hear and process. It does not sound very convincing to consider an infant’s perception limited to the prosodic aspects of language, but when does it occur, apparently, after feeling saturated and overwhelmed with the sounds? In this vein, Estes and her colleagues (Estes et al., 2007) investigated whether infants can map meanings onto novel segmented words. They found out that children in their seventeenth month of exposure to language can map meanings only onto objects that could be linked to a referent but not to the novel objects. These children had to attend to the segments and prosodic properties of the non-words or the unfamiliar words. It is suggested that by age two, a human child is able to pay attention to the words which fit at the end of the expressions, even if they are new to the hearers (cf. Fernald & Mazze, 1991; Grassmann & Tomasello, 2007).

Furthermore, children perceive sounds differently to demonstrate their auditory system’s strength and to signify that they conceive the differences between what they hear differently. Hence, this is the change in the meaning that makes children highlight the changes in the sounds (Shvachkin, 1973). This can be another support for how children holistically process the language representation they receive. However, how is this representation comprehended? Do

the children keep every segment of sounds they hear stored somewhere in their brain, and any time they hear a sound, they try to judge whether this sound is novel or previously available in the treasury? Alternatively, whether these sounds and their orders are innately, biologically, or inherently coded in the child's brain, all that happens is the activation or encoding of these phonotactics. Nevertheless, how do children map the meanings to the sounds and keep the information robustly? Beyond the perception of sounds, which, as previously discussed, were limited in number and order, the perception of our language involves thousands of roots and affixes, borrowed vocabulary, and in the case of bilinguals and polyglots, every entity and component relevant to language and linguistic will be duplicated or multiplied. Then, is it rational to assume that this huge amount of information is innate? I prefer not to challenge the number of codes that human DNA can carry and the number of messages that neurons can transfer at once since neuroscientists may not have come to concordance in such aspects. However, the brain must be an enormous mega information processing monster to analyze all the input and try to match them with the previously available information (imagine listening to the news or a presidential debate in a foreign language). The problem can be figured out, to some extent, if we look at the processing matter from a holistic view and consider that all the information we receive is attached to a unified dynamic network. All the perceiving steps would be one at a time (refer to the later sections under dynamic theories and unified models). As explained, language and the phenomena related to it are one of the most intriguing subjects in science. As formerly stated, cue validity plays a great part in the CM predictive power. It looks at the role of cues from a minimalist viewpoint. Suggesting that children are sensitive to the primary input and add weight to the first information as the perceptual pattern. For instance, they pick semantic information of agent and object before their order and their order prior to their grammatical morphology (Bates & MacWhinney, 1987).

The supremacy of semantics among young children has been supported in several studies (c.f. Bever, 1970; Farsani & Villa-Ochoa, 2022; Strohner & Nelson, 1974). MacWhinney (1997) argues that psycholinguistic models and their data support second language learning theories in theory and practice, which is feasible to a great extent. According to the reviewed literature, the CM and its UCM have implications for SLA and can be incorporated into its pedagogy in several ways. First, experiential grounding of information facilitates learning. Thus a learning context with optimal experiential elements might be highly effective. Second, the order of information plays a crucial role in learning, so phones and phonemes can be the building block of instructing classroom vocabulary lessons. Third, simpler linguistic items are acquired earlier. Hence, in providing language learners with accessible linguistic input, simplicity must be considered in the material development and syllabus design. Fourth, syntactic frames show that words must be represented in context, not in discrete vocabulary tasks and drills. Fifth, the UCM highlights the feasibility of transfer from L1 to L2, observed in various languages. Hence, the curriculum designers can benefit from the identical language components in the source and target languages to include in the teaching materials (see Banaruee et al., 2023; Zare-Behtash & Banaruee, 2017). Sixth, MacWhinney contends that errors need to be systematically tracked and tackled. Therefore, a systematic error detection and feedback production plan may propel every learning system. As there are a variety of errors that the learners encounter throughout learning, they need appropriate forms of feedback that suit the type of error (for detailed discussion, refer to Banaruee, Khoshshima, & Askari, 2017; Khoshshima & Banaruee, 2017). Seventh, cue construction suggests that there is a possibility of overgeneralization in every stage of learning. Thus teachers must be aware of the processes and treat them as interlingual errors to be corrected in later stages. Last, the UCM highlights the role of chunking and resonance. Learning phrases in chunks may help EFL and ESL learners produce language in a chain to produce larger pieces of language faster and more accurately than trying to build phrases with discrete units. Eventually, buffering and the idea of having short-term storage is quite persuasive for book writers and course instructors to provide the teaching materials in a spiral way so that the old and new materials meet each other more frequently. The result will be a higher level of consolidation in mapping available information onto the new linguistic content, whether in form or meaning. However, relating facts in FLA to SLA is not easily acceptable. Dörnyei

(2009) argues that both L1 and L2 acquisition differ in qualitative and quantitative aspects. He outlines the first difference as “differential success” (p. 21). It is an attribute that highlights the satisfaction that first language learners have with the quality of their proficiency. Yet, second language learners may never attain the same quality. The second salient difference is that the automaticity of FLA sounds more homogeneous, while SLA involves diverse factors and processes (Juffs & DeKeyser, 2003). L1 is considered to simultaneously blend knowledge of the world and language (Ellis, 2002). While L2 is built on a huge pre-existing knowledge of the world. Above all, it can be logical to think that the intense and deep differences should not push scholars to ignore the underlying similarities.

## 8. Conclusion

This in-depth review of the competition model suggests that it can be implemented in first-language acquisition studies and second-language learning, even though there are unsolved questions and criticisms to answer in future research. Second language learning or acquisition can share similarities with FLA or dissimilate it in process and components. However, the discrepancies may not hinder the generation of potential assumptions to render from SLA to FLA and vice versa. Implementing the psycholinguistic data from FLA in English language teaching is rational and may have practical and positive consequences. The psychological processes and mental conceptualizations and the transfer of language concepts from L1 to L2 cannot be overlooked or underestimated today (Banaruee et al., 2023; MacWhinney, 2004), even though there are assumptions that the underlying mechanisms may differ in strength or accessibility (ibid). Above all, we cannot forget the role of the brain, per se, as the unique omnipresent element in learning. In other words, this is the same brain that acquires and learns whether on or an infinite number of languages. Hence, it is logical to predict that our brain and its fellow neurons and subsets use particular techniques and strategies for specific actions, which can be represented through cognitive models or even created one any time necessary. The failure of a model depends on the number of disconfirmations it receives and the addition of novel constraints to it only to survive without providing independent justifications, which is not true about the CM. Previous research reveals that individual styles exist in language acquisition and language learning (for detailed learning styles differences, see Banaruee et al., 2022; Yarahmadzahi & Banaruee, 2017). Nelson (1976) suggests the most salient styles as referential and expressive styles and Bloom et al. (1975) as nominal and pronominal styles. It is suggested that these styles are partially and in a shared fashion employed by children (Bates & MacWhinney, 1987). This diversity among individuals is the source of a huge challenge for every psycholinguistic model. Various stages are involved in the constitution of a language, and these stages sound to be successive. According to the CM, these stages are constructed employing information value of mappings of forms onto functions, having the information input modulated by two constraints of cue cost and functional readiness. No mechanism has ever been suggested to ensure the prediction of individual styles’ patterns. The question of how a model may encompass each individual variation remains open for future research. Indeed, that is not what models do (their epistemological function)—they are meant to abstract away and generalize from anecdotal details. We do not quest for a predictive model that can predict any possible case with 100% accuracy, which seems unreasonable to request. We suggest a model would need perfect information on all relevant parameters as an input to achieve its best form, which is probably not possible by principle, but future research can help.

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