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Title

The Refinement Store Model: A New Insight into Speech Perception Impacts on Foreign Language Production

Case study: First year under graduate Students at Department of Letters and English Language at KMUO

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Dedication

I dedicate this dissertation to my mom and dad whom I am very grateful for their unconditional support and endless love.

I dedicate this dissertation to my brothers, sisters and nephews; I take this opportunity to express my sincere thankfulness to them.

I also dedicate this dissertation to the souls of my passed away beloved ABDO-M and ROX.

I dedicate this work and give special thanks to my friends and colleagues ZEGHTI and MEDJOURE whom I would not reach this level of academic achievement without their support and help.

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Abstract

Due to previous models of speech perception shortcomings together with Phonemic Restoration examination findings, a model named The Refinement Store is proposed. The Refinement Store is a model of speech perception, but not limited to, it is also suggested to play a role in foreign language production. In an attempt to crystallize the model mechanisms, an experimental design was followed. The underlying mechanisms found to be a direct result of a systematic integration and adjustment of the following items mechanisms: working memory, short term memory and semantic memory. First Year Undergraduate students at department of Letters and English Language at Kasdi Merbah University whom native speakers of Arabic were first examined to reveal the model mechanisms, and later their phonological production errors of English were analyzed in light of the model mechanisms. The results of this study demonstrate besides The Refinement Store mechanisms that phonological errors of production of English language trigger perception then production. The findings of this study are held to play an important role in reconsideration of teaching English.

Key terms: The Refinement Store model, speech perception, semantic memory, working memory, phonological production errors.

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General introduction

1. Background of the Study

In ordinary circumstances, speech holds in noisy background causing to the addresses physically, scanty speech signals reception. Surprisingly, speech perception does not affect, and it continuous. In multifaceted requirement, the brain hallucinates the missing/scanty phonemes in phenomenon known as Phonemic Restoration (warren, 1970). Suspected to play a role in the phenomenon, number of factors were examined: the nature of the extraneous sound in laboratory investigations of the restoration, the phonetic properties of the restored phoneme, the length of the words, the word classes, and words lexical context. Together with the structural perspective of language, the restoration happens within a sequence of phonemes, and hence the most suspected levels of investigations are Phonetics, Phonotactics, and inevitably semantics. Referred to as a phonological system, Phonetics and Phonotactics interaction with semantics is what raises the conundrum about the brain mechanisms required in the restoration, and in a broader sense unveil the way speech is perceived (Scharinger, 2016). Which one does precede the other within speech perception; the phonological system or semantics was not, and need to be addressed

Deduced from the basic notion of semantic and phonology interaction within speech perception, so many models were proposed. The widely recognized ones are many like The **Motor** model, **TRACE** model, **Cohort** model and the **Examplar** theory, yet not without pitfalls. Some was criticized for their inadequacy of accounting for some phonological effects like Cohort model with Phonemic restoration, or Examplar theory with McGurk effect. TRACE model, for instance, fails to have a compatibility with memory in term of capacity and categorization. Speech perception models did not failed with only first language perception, but also in addressing the role of other aspects of language skills impacts. In addition, the role that first language perception plays on second language was fully neglected. Concerning the last claim, some researchers proposed models of cross-languages speech perception, but they remain a shy tries like Best's model (Best, 1995).

Based on the previous models shortcomings together with phonemic restoration suggested investigations, a new model of speech perception named **The Refinement Store** is proposed. To

concretize the investigation, Arabic as a first language and English as foreign language are used. Phonemic Restoration of English language was intensely examined, but up to this research never with Arabic language. Arabic phonological system is quite different from English in both Phonetic and Phonotactics which affects learning of English . Algerian native speakers of Arabic and learners of English's case is more complex, for the impact of other previously learned phonological systems like Berber and French. In light of the proposed model of The Refinement Store, the errors of Algerian native speakers of Arabic and learners of English's production phonological errors are analyzed .

2. Research problem

The problem this research arises is concerning the validity of a proposed model named The Refinement Store as a model of speech perception, and also with a suggested role in foreign language production.

3. Research purpose

The overall aim of the undertaken study is to investigate the validity of the refinement as a model of speech perception with a suggested role in foreign language production. In more elucidated sense, the aim of this study in the first place is to unveil the underlying mechanisms of The Refinement Store model, and second is to address the interaction of first and foreign languages within the model mechanisms by analyzing foreign language errors.

4. Research questions

The present research aims to provide answers to the following questions:

The main question:

To what extent the proposed model of the refinement store is valid as a model of speech perception with a suggested role in foreign language production

Sub-questions:

1. Do Phonetics, Phonotactics & Semantics share the same impact on Arabic Phonemic Restoration?
2. Is word perception is a purely cognitive process with no impact of the phonological system?
3. Do errors trigger only English production, or perception then production?

5. Research hypotheses

The Refinement Store model depends on number of mechanisms manifest the following hypothesis:

1. Arabic phonemic restoration shows the impact of semantics on phonological system perception; phonetics and phonotactics

2. Word perception happens in a predictive manner based on general cognitive aspects with no impact of the phonological system

3. The Refinement Store mechanisms are able to explain Arab Algerian's production phonological errors of English as a foreign language indicating the interaction between perception and production.

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7. Structure of the dissertation

This research paper is structured into four parts named Introduction, literature review part, methodology part, and conclusion. Within introduction part, the nest issues related the Refinement store model are presented. The issues sum the phonemic restoration as a phonological effect suggested to play a role in Speech perception, the shortcomings of the previous models, The interaction between speech perception and production, the role of memory and cognition, and last but not least, the implication of the model on Algerian, native Arab learners of English. In the second part of literature review, the presented issues in introduction are discussed extensively on the light of previous research findings. The literature review part is constructed mainly into two ideas: language and cognition one side, and speech perception and production, from the other side. The third part which is methodology is upholding an experimental design to investigate the mechanisms of the model then the implication of these mechanisms to check the model validity, and to provide a further explanation to Algerian learners of English' production phonological errors. The last part of conclusion sums the main findings and implications of the research in addition to the limitations that emerged during the conduction.

7. Key terms

Dependent event: A mathematic principle in which the probability of one event occurrence affects the event that comes after it

Logatome: It is a one non-meaning syllable type of pseudo-words

Phonemic Paraphasia: The substitution of a word with non-word that preserves at least half of segments of the intended word. Phonemic Paraphasia can take a number of types

Primary effect: The tendency of the first presented items to be remembered better than the later in a given auditory or visual list.

Recency effect: The tendency of the later presented items to be remembered better than the first in a given auditory or visual list.

The Refinement Store model: the proposed model of speech perception with a suggested role in foreign language production.

Verbal Transformation effect: It refers to "The occurrence of illusory changes of distinct speech upon repetition" Warren (1971)

White noise: It is random signal having equal intensity at different frequencies.

Chapter one: Literature Review

1. Introduction

Speech perception is the cognitive process of deciphering phonological items been heard to get meaning that is associated with, yet the notion is not as simple as an interaction of phonology and semantic. There are numbers of phonological and semantic aspects that make their interaction a complex process. One of these essential interaction aspects is the level of phonological structure that semanticity emerges within. Whether it is on the level of phonemes or words, crystallizing the exact structural level or the used mechanisms provide explanations to how ordinary speech perception circumstances are coped with like in Phonemic Restoration. Phonemic restoration phenomenon provides evidences to speech perception in scanty physical speech items reception. On the other hand, semantic aspects of speech perception trapped majorly into two factors: semantic categorization and the necessity of auditory cues in semantic items selection for interaction. The former fact denotes speech perception multimodality.

Language in general and speech perception specifically comprise an ability of systematic remembrance of both sequences of phonological items as physical properties, and the meaning is associated with these sequences. The systematic remembrance or recall as it is known, on its turn, comprises storage of items in memory. Memory studies indicate the existence of different types of memories with different rules to play. Recall and memory make speech perception mechanisms a more complex process then the already exist ones based on phonology and sematic interaction mentioned above. Rely on these grounds, different assumptions of how speech is perceived were generated to unveil speech perception phenomenon mechanisms.

2. Speech perception definition

It is almost impossible to arrive to consensus agreement about speech perception definition without trapping in the various angles researchers have triggered speech perception from. As a matter of fact, each researcher is given the right to be correct in his/her own definition based on his/her investigations. Nonetheless to large extent of researchers, the term is used to

describe the process of associating meaning to auditory cues. Within this sense, it is a gradual process of hearing then interpreting (Pisoni, & Remez, 2005).

There are two insightful questions about the former claims. The first one is about the necessity of auditory cues existence in meaning retrieval then association. To exemplify, listeners found no difficulties in filling different lengths of gaps of speech. The phenomenon is known as phonemic restoration, and the first investigated gap was the phoneme (Warren, 1970). MucGurk effect is another phenomenon that puts the necessity of auditory cues in suspicion (MucGurk, 1976). It resembles listeners' perception of another phoneme when two different phonemes, visual and auditory, interact. Phonemic restoration and MucGurk effect prove that meaning retrieval and association in speech perception is a multimodal process that does not solely rely on auditory cues interpretation. The second question is related to the nature of segment of speech. As there exist white spaces between words in sheets, independently perceived words and phonemes found to be hardly identified within acoustic segments (Fant, 1962). Speech non-segmented perception or as it is known as Linearity of speech perception provides an evidence for the existence of other cues that meaning is associated with, and the auditory cues, speech, are cued with these meaning cues. However the length of the auditory cue that meaning cue is associated with remain unresolved, speech perception is a multimodal process of associating meaning to auditory cued input is the appropriate definition.

2.1. Models of speech perception

2.1.1 Motor model

Proposed by Lieberman and colleagues in 1967, the motor model of speech perception is rubricated on the claim of vocal tract ability of detecting articulatory gestures. That is when speech sounds are heard relies on innate similar vocal tracts, the intended movements of the sender vocal tract are identified by the receiver vocal tract (Liberman; & whalen, 2000). To achieve a speech perception, the Motor model compromises mainly two pathways. The first path of ***motor commands*** deals with the representations of speech signals to articulation gestures through innate linguistic configurations. The second path explains the phenomenon of two simultaneously articulated gestures that stands for two different phonemes which may overlap in

time within the same segment. The latter path is known as ***Coarticolation***, and it has gained an interest even more than the motor model itself (Pisoni, & Luce 1987).

After the discovery of ***Mirror neuron*** phenomenon which explains the impact of observing an act on producing the same act under a neurological umbrella, the motor model has gained an interest again (Rizzolatti, Giacomo, Craighero, & Laila, 2004). Nonetheless, despite the previous fact, the model has attracted scientific claims about its implausibility. Lieberman and colleagues' curtailment of addressing the mechanisms that allow consonants and vowels perception was one of the very first claims. Speech perception encompassing of production was also a suspected idea (Ohala, 1994). The lion share of claims goes to damaged vocal tract patients. In a study investigated their speech perception, their vocal tracts found to have no impacts on their production. A fact that falsify the whole idea of motor model (Stasenko, Garcea, & Mahon, 2013)

2.1.2. Cohort model

In 1980 Wilson and Tyler have suggested a model of word recognition relies mainly on lexical retrieval. Since then, the model is known as Cohort (Wilson, & Tyler). It follows a basic process of mapping heard speech signals with previously exist items that share the same entries which have been stored in the lexical dictionary. The claim was generated after an examination of word detection task within sentences. The result reveals participants rapidity in recognizing the words before they are perceived aurally. Regardless of the concern about its validity as a speech perception model, it was widely used in computational positioning. Google research bar predicting process and digital dictionaries are some of the examples.

On the basis of the available evidence, it seems fair to question the model validity of resembling speech perception. To begin with, Phonemic Restoration effect which explains the brain ability of hallucinating physically messing or scanty phonemes within segments processing provides a confirmatory evidence about the model falsified ways of mapping. The model has not also portrayed the issue of memory and how signals are decoded in. above all, a closer look to what speech perception may stand for contradicts with the orientation of this model. Visual aurally cued cues that resemble the process of reading are not addressed.

2.1.3. TRACE model

According to McClelland and Elman (1986), this model was called TRACE because "The network of units forms a dynamic processing structure called "the Trace" which serves at once as the perceptual processing mechanism and as the system's working memory". To simplify, the model' substantial function is the integration of different features of speech, for words identification. Trace model requires two components deal with the integration, and three levels of integrated components. The first level is signal features. It describes the phonetic features that have specific identifiers. This level integration of features is managed by TRACE I. The second and third levels contain phonemes on words identifiers, respectively. The levels are managed by TRACE II into which lexical information is also included.

From McClelland's viewpoint, TRACE model demonstrates an ability of accounting for Cohort's shortcoming. Accompanied with lexical information integration, it handles the scanty or the mispronounced word's beginning. Along similar lines, McClelland himself admitted that the model has some limitations. The idea of keep analyzing of the features of every single phoneme within every single word over and over hinders the activation rapidity. A fact that puts the process of learning words in question (McClelland, & Elman, 1986).

2.1.4. Examplar/Episodic theory

Quite similar to Cohort model, Exemplar theory relies on copping the acoustic input to already exist lexical items. The slight difference between the two is that the lexical items in the exemplar theory are previously stored acoustic episodics represent very specific senders/speakers whilst in Cohort model, the lexical items are conceptualized. The theory was proposed first by Johnson in 1996 as a model of sound perception within the field of phonology later it gained psychologists interest as a theory of perception. The theory also stands on the notion of information trace; each stimulant leads to its episodic cues tracing whether it is the sender or the episodics (Johnson, 1996).

The theory was exceedingly recognized, for it demonstrates a correlative relationship cognition-phonology. It was associated with Prototype claim of categories perception based on the idea of the same sender activates all the stored episodics (Medin, Altom, Edelson, & Freko,

1982). In this study, notwithstanding to its soundness, it is hard to neglect the growing support for the claim about the ability of memory to hold all the perceptual categories since they represent all the experienced aspects of the category (Johnson, 1997). It is, more, harder when Speaker Normalization is not addressed. These two claims do not appear to validate Exemplar Theory as a model of speech perception.

2.2. Phonological effects and speech perception

2.2.1. Categorical perception

Standing on what is now know as the principle of membership in ***Cognitive Category*** which prerequisites all or none belonging aspects (Stevan, 2005), Liberman and colleagues have introduced a phonological category that relies on voicing continuum (i.e. speech sound belongs to /kip/ or /gip/)(Liberman, Hariss, Hoffman, & Griffith 1957). The continuum is widely known as Voice-onset-time (Lisker, & Abramson, 1964), and it is used as a phonetic parameter. According to Liberman, Voice-onset-time provides an evidence of the role of phonology production on speech perception in his Motor model of speech perception. The claim was that people perceive only/pa/ or /ba/ continuum because they are unable to produce in between due to the biological nature of their vocal apparatus.

2.2.2. Ganong effect

To address the interaction of auditory information with lexical knowledge in speech perception, Ganong has proposed a constructed synthesis of voice-onset-time continuum (Ganong, 1980). The continuum investigated word and non-words perception (i.e. /kat/ and /gat/. The results demonstrate that participants hear words even when the Voice-onset-time denotes non-word. The phenomenon explains participants' lexical bias. The Ganong effect explains the memory ability of tracing words more facilely than non-words; in clear evidence of non direct relationship between Short Term phonological Memory and Semantic Memory

2.2.3. McGurk effect

By accident, in a study investigated infants' language perception, McGurk have found that when a visual cue is presented simultaneously with a different acoustic one, a third cue is declared to be perceived (McGurk, & MacDonald, 1976). The effect goes against Ganong's claims of the role of language production impacts on speech perception. Demonstrating that from one hand, it falsify the motor model, and from another it emphasizes on the multimodal aspect of speech perception (Magnotti, & Beauchamp, 2017). McGurk effect also validate Baddelley's model of Working memory as an essential component of language acquisition especially the phonological loop and Visuo-spatial sketch pad.

2.2.4. Phonemic Restoration

Phonemic Restoration is the process that allows the brain to hallucinate the scanty or non-exist phonemes. The phenomenon was proposed first by Warren (1970) where twenty (20) undergraduate students of psychology were asked to circle the phoneme that a "cough" did replace in the written form of the sentence :"The state governors met with their respective legislatures convening in the capital city" after they had heard it. However the cough replaced the first "S" in the word "legislatures", nineteen subjects (19) found the sentence "intact" and only one (1) did not, but he mislocalized the target phoneme. Another twenty subjects were tested, but the cough was replaced with a tone of 1 kHz, and results remain the same.

2.2.4. 1.Phonetic dimension of restoration investigations

Phonemic Restoration Effect was investigated on numerous facets, and the effectiveness of the replacement sound was one of these. Addressing the issue, several experiments were done by Warren and others. Warren and Obusek (1970) investigated the differences between "coughs", "tones", "buzzes" and "silence". They found that their effect was equal, and only silence restricts the restoration. Warren and Obusek (1973) had also discovered that when subjects heard different replaced segments of sounds, they recognize the variance due to "*The verbal transformation effect*" which was predicted that it shares the same perceptual process with phonemic Restoration. Layton (1975) in response to Warren and Obusek (1970) has found that

the investigated replaced sounds are not the same, and "tones" are the less effectiveness.

Although the previous conducted researches were proposed to address the role of the nature of the replaced sound effectiveness of restoration, the procedures were disguised. The results of Warren's first experiment oscillated among a number of factors. The most important ones were the written form of the sentence, and subjects' **bias**. Warren and Obusek (1973) and Layton (1975) investigations focused on the effect of the replaced sound properties more than the phoneme been replaced. Words semanticity and the role of the cognitive categorizations are other entirely neglected issues. The procedures were more artificial then what could happened in real situation

Based on these researches shortcomings, another stimuli was proposed by Samuel (1981, a), (1981, b). He found that word's frequency, word length and phone classes are crucial factors in restoration effectiveness. The last paradigm was a turning point in Phonemic Restoration, for it emphasizes on phonetic knowledge. Samuel in an attempt to investigate the relationship between phonetic and the replacement/ extraneous sound, he changed the used *pure tone* in the first experiment with a *white noise*. The results were not surprising; Fricatives and Stops were restored easily in comparison to Nasal and Liquid, for they match the white noise properties. Bashford (1996) believes that a *modulated noise* is better in restoration. The modified Amplitude- envelope adds a strong bottom-up cue, for its enhancement, yet is more artificial.

2.2.4.2. Phonotactic dimension of restoration investigations

Aforementioned, phonemic restoration was investigated on different levels. After Phonetics, Phonotactics was the headed level. Samuel's aim in the second experiments (Samuel, 1981, a) was to examine the impact of phonological knowledge on restoration by replicating the first experiment, but with pseudo-words. To limit subjects misperceive, he used priming. The results reflect his assumption of restoration. The perception of words is stronger than pseudo-words based on subjects' familiarity with words and their frequencies. In other words, subjects already knew what to expect, and his investigation of lexical uniqueness (Samuel, 1987) in words and non-words priming remains inadequate to address only phonotactic impact on restoration. The yielded results surpass to the semantic level, and the intervention is much of stimuli inevitability.

2.2.4.3. Semantic dimention of restoration investigation

Relying on the logical ground of the examination of phonotactic restoration, and based on hesitation of Phonotactic rules perception (Brown, & Hildum, 1956. Cited in Moreton), words and pseudo-words perception seem to be due on the same path. Using Priming, and based on the arbitrary relation between words as symbols and meaning, the fact of words and pseudo-words similarity of perception was experimentally proved (Dorffner., & Harris, 1998). Brain imaging studies are another evidence of the rule semantics in perceiving words and pseudo-words, for they show an equal activation in Superior Temporal Gyrus (Baars, & Gage, 2013). These last facts show that Semantics has a crucial role in phonemic restoration and speech perception in a broader sense however how symbols are encoded with the semantic items is undeniable dilemma of interaction that need to be reinvestigated cunningly.

3. Language and Cognition

One of the most arguable linguistic issues is the conundrum of which one influences the other; language shapes cognition, or cognition is wider, and hence it shapes language. According one of the recent studies that investigated the prelinguistic relational concepts, language has no impact on learning abstract relations, and hence "meaning is skill of its own" as Hispos mentioned (Ferry, & Hespos, 2015). Another study dealt with color perception indicates that infant have the ability to categorize colors independently from language (Yang, & et al, 2015). By contrast, a study proposed by Hispos, Ferry, and Waxman (2010) showed the ability of three 3 month infants in associating words to objects categories in comparison to beeps. The findings clearly indicate that language influences cognition. In a more complex cognition aspect, a research examined the role of language in doing math. The research has been applied on the Piraha people of Amazon; a tribe, one out of few in the world, where their language has no words for numbers. The results show that these people are unable to accomplish a simple numeric task greater than three quantities (Everett, & Madora, 2012). A consensus agreement about cognition- language sort of influence remains unsettled; the key yet to come with researches.

3.1. Language and cognitive categorization

Overstepping the dilemma of which one precedes the other, cognition or language, the next central interest question is driven to one's cognitive classifications and categorizations. The notion of categorization backs far to Plato and Aristotle, or the classical view as it is known. Aristotle did believe that perceived items fall into ten common categories in which can be either subject or predicate (Ackrill, 2002). The other crucial claim about categorization is Pototype. The emphasis of this view is on the natural features items consist of, and on the more central one item of the one category than other items (Rosch, 1973), (lackoff, 1987). Categorization in words is more problematic since it is not addressed whether their perception trapped in one specific item from the category or in more general features of the one category. According to Locke, numbers of shades form the category depends on one's very experience with the categories. A fact that has proved lately in a new stimuli proposed by Edminston(2015)

3.2. First language and cognition

Understanding the complex cognitive process of both perception and production of language needs to de-composed language into its structural component parts, along with cognitive strategies used within the perception and the production of these language parts. To begin with words, a child development study found that word ***edges*** are more important than middle syllables in word recognition (Benavides-Varela, & Mehler, 2014). Word class, also, was an interest item. Findings suggested nouns tend to be acquired faster than verbs, for they present easy categorization storage for infants (Waxman, 2016). The study investigated number of languages, and the results are cross-linguistic. Infants when interact with their mothers found to acquire isolated words better than within sequences. The research examined infants aged less than 15 months, and the results cannot be generalized beyond this age (Washington University in ST Louis, 2001). In another study dealt with toddlers, verbs found to be acquired out and in impoverished context despite the general view of language as a social aspect (Arunachalam, 2013). In another layer of language construct, namely grammar, researchers rest mostly on the existence of grammar in the processing of language cognitively (Ding, Melloni, Zhang, Tian, & Poeppel, 2015). Some researchers go far and examined the cognitive existence of grammar within sign languages speakers. The results remain the same; Grammar is general cognitive aspect of all languages (University of Rochester, 2006). Grammar errors were also tested. In very

recent stimuli, errors found to be detected implicitly even without one's awareness. "A result which suspects some teaching strategies especially that is related to second language teaching" as Neville, a co-researcher, has mentioned (Batterink, & Neville, 2016).

3.3. Foreign language and cognition

Within cognitive language processing, the terms foreign language and second language are used intelligibly. The slice difference between the two is the amount of language exposure based on the learner's surrounding context, and hence for a learner's cognition; a second or a foreign language is just another type of system processing. Based on, so many researchers have an attempt to investigate how second language is processed, yet so many have rested on the interference between first and second language (Natalico, & Natalico, 1971). Other researchers went to the extreme and investigated the effect of learning a second language on other cognitive functions. The belief was that bilinguals have a cognitive advantage, for they access different languages labeling (Krizman, Skoe, & Kraus, 2014). A counterparty view upholds the belief that bilinguals access their languages simultaneously without appraising one system over the other. The interpretation varies among researches based on researchers used stimuli. To exemplify, one of the recent researches focused in the flexible cognitive control of using two languages (Kleinman, Gollan, 2016), and another on the melting of both languages words in the same ***mental lexicon*** (Vitevitch, 2011). A unified, clear view about second language cognitive process is still scuba diving in Research Sea that is fluctuated in term of publication (Bruin, Treccani, & Della Salla, 2014).

4. Language and memory

Whether it is a psychological, a linguistic or a computational orientation, memory is conceived as a system of information processing that has three main functions. They are namely, ***encoding***, ***storage*** and ***retrieval***.

4.1. The Multi-Store model

Before Atkinson and Shiffrin's contribution (1986), memory was one entity system with one function, but with their Multi-Store Model, it becomes three stores of Sensory, Sort- Term Memory and Long- Term Memory. The notion of Short Term Memory is no longer a store of temporary storage rather it is a multifunctional processor store. The very exclusive functions of Short term memory were information rehearsal along with transfer to and retrieval from Long Term Memory. The model has trapped in number of pitfalls led by the notion of Recency Effect (Murdock, & Bennet, 1962) in which some information are retrieved from LTM without STM rehearsal. Another factual claim is that not every stored information piece in LTM is reachable, yet its capacity is limitless. According to Eysenck(2012), it is due to scanty, imperfect, corrupted processing of memory functions. Despite the over simplicity of the explained functions of memory by the Multi-Store Model, the STM was a milestone notion that many future researches had started from.

4.2. Short Term Memory

According to Atkinson and Shiffrin, Short Term Memory is the store that is responsible on both information storage and processing (Atkinson and Shiffrin, 1971). Its capacity is limited, and it has a direct access to Long Term Memory. The information processing of Short Term Memory takes two forms of integration; auditory and visual ones. The store main function is information rehearsal. From researchers' perspective, the rehearsal mechanism is due to Recency Recall effect coupled with information retrieval from Long Term Memory. However it was widely recognized, the sort of information nature still needs to be addressed. The model seems unable to clarify a complex piece of information like one word which consists of numbers of phonemes, each phoneme with specific nature.

4.3. Working memory

As a response to Short-Term Memory shortcomings together with neuropsychological evidence from the famous amnesia patient Henry Custav Molaison (Beecker, & Milner, 1957), Baddelly and Hitch have proposed their model of Working Memory (1974). The model emphasis mainly on the patient normal language and intelligence however his Long Term Memory is damaged. The case that proves information needs not to rest in Short Term memory, so it can be

stored in Long Term Memory, and that they are two separate entities. By inverse, another patient P. K; due to brain damage has failed in digit span test while he could easily remember his past. P. K's case proved, again, that Long Term and Short Term Memories are two separate stores, according to Shalice and Warrington (1969).

For so many researchers, Baddelly & Hitch's model of working memory is a model of Short Term Memory however it hard to be accepted as a solid claim for many reasons. The first reason concerns the existence of another store that moderates between Short Term memory and Long Term memory since evidences proved that they are only separated and never denied an additional, no-direct path between the two, as Baddelley himself has admitted it (Baddelly, 2010) . The second reason questions the previous manipulated information storage since the Central Executive can control only one task at each time. The model consists of three components: Phonological loop, Visuo-spatial Sketch pad, and later on Episodic Buffer (2000). The three parts are controlled by other one central component, named Central executive that is" limited in capacity and runs the show" in Baddelly's words, as it was mentioned before. The next Figure indicates Baddely's model components.

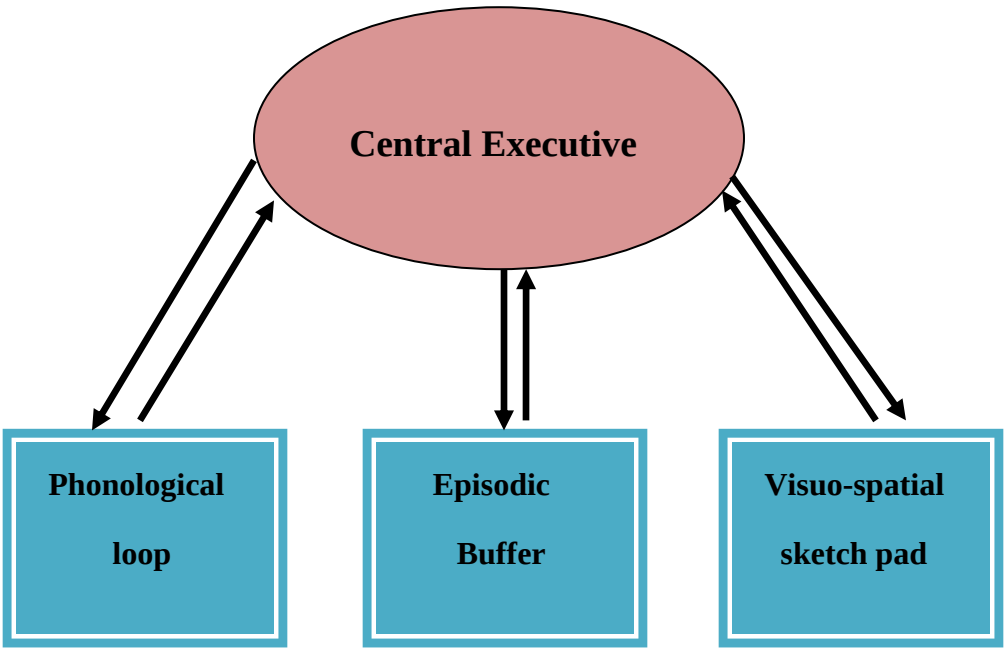


Figure1. Baddelly's Working Memory(2000)

4.3.1. Phonological Loop

Phonological or Articulatory loop, according to Baddelly, is the responsible component about auditory, verbal information. It traces the verbal information, and it rehearses them. Its existence is supported by number of evidences such ***Phonological similarity effect.*** Based on confusion acoustic information and memory span researches, people found it easier to remember similar semantic words sound different than similar phonology ones (Conrad, & Hull, 1964), (Baddelley, 1966). Conrad, Hull and Baddelley's researches support the idea of phonological encoding of information, and therefore the existence of phonological loop. ***Phonological Suppression effect*** is another proof of its existence. In a study investigated the structure of phonological loop store, subjects were suppressed to rehears irrelevant sounds while presented with visual items indicating that it is a separate entity (Baddeley, Thomson, & Buchanan, 1975). However it is clear that information short storage and rehearsment happen through an auditory process in the phonological loop store with the control of Central Executive, the nature of information is ambiguous whether it is phonemic or wordy.

4.3.1.1. Phonological loop and language acquisition

Based on the proposed nature structure of the phonological loop together with the investigated associated functions with its structure, it is suggested to play a role in language acquisition; mainly word acquisition (Baddely, & Gathercole, 1998). In many studies examined and measured both adults and early school years children's vocabulary, phonological memory, reading, and nonverbal intelligence, and word repetition, phonological loop has found to have a **causal effect** on word acquisition (Gathercole, & et al, 1992), (Gathercole, Hitch, Service, & Martin, 1997), (Gathercole, Service, Hitch, Adams, & Martin, 1999). Some other researchers attempted to investigate the nature of the used process of phonological loop in word acquisition via Serial Recall (Gupta, 2003), but the exact lineated process of how are words stored and rehearsed within Short Term Memory and it relation to Long Term Memory remains unaddressed.

4.3.1. 2.Phonological loop and second language acquisition

Very similar to the role that phonological loop plays in first language acquisition; researchers have demonstrated that it is the same in second language. The investigation upholds different dimensions, but again the structural process was not addressed, and examinations contented the causal relations. Service has found Finnish children aged 9-12 years results in performing of English as foreign language non-word repetition task exactly the same as non-word repetition of Finnish (Service, 1992). Papgno and Vallar with Baddeley's collaboration have found that an Italian deficit Short-Term Memory patient unable to recall a sequence of Russian words was represented in cued manner with Italian words. The results clearly indicate that phonological loop has to do with foreign language acquisition (Baddeley, Papagno, & Vallar, 1988). An interesting study attempted to unveil the process of phonological loop in both first and foreign languages acquisition indicated that there is no interference in each process. They are separate but the same (Gathercole, Willis, Emslie, & Baddeley, 1992). On these grounds, two claims would be generated. The first one is based on phonological errors foreign languages tend to make (i.e. Arabic speakers of English adding Schwa sound between consonant clusters). The second claim questions how first and foreign language words are related in working memory, or if they are related in semantic memory type of long term memory, how working memory accesses to.

4.3.2. Visuo-spatial Sketch pad

In Baddely's model of Working Memory, Visuo-spatial Sketch pad represents the second component (Baddeley, 1974). This store was first responsible on the permanent storage of visualized information before it goes to Long Term Memory or it disappears. Its function may interact with Phonological loop, but they are two separate components. Later, provided with neurological evidences (Denis, & et al, 2012), Baddeley has rectified its nature. Form any visual information pathway, the nature of the sketch pad has changed to two pathways; a visual one responsible about visual items, and a spatial one responsible about catching spatial information within visual items (Baddely, & et al, 2009).

4.3.2.1. Visuo-spatial Sketch pad and language

According to Baddeley, the Visuo-Sketch pad, also, plays a role in language perception and recognition. His evidences were centered on reading sentences eye-tracing and turning pages of books. When the nature of the pad is examined in relation to McGurk effect, the role that it may play in language, in a broader sense, and in speech perception specifically, it is suggested to be an aspect of speech perception multimodality.

4.3.3. Episodic Buffer

Another component of Working Memory was lastly introduced by Baddely called Episodic Buffer (Baddely, 2000). The function of this component is to integrate a chronological order to phonological loop and visuo-spatial sketch pad digits rather than two separate ones. Later, a proposed study examined amnesia patients while practicing prose recall, explained the existence of the Buffer. The interpretation was that recall was longer than what the phonological loop can handle, yet it cannot be stored in Long Term Memory (Baddely, & Wilson, 2002).

4.3.4. Central Executive

Rely upon Alzheimer patients whom suffer from disability of combining two concurrent tasks, it was suggested that it exists another component controls both tasks (Baddeley, Della Sala, 1996). The main function of central executive was to supervise phonological loop and visuo-spatial sketch pad, and later Episodic Buffer too. However Baddely has indicated it is the head of working memory, later researchers have found that it is another component of working memory, and "running the show" it is another component's function. The claim was interpreted in term of dual tasks requiring dual different executive functions (Akira, & et al, 2000). The Central Executive exact processes and function rises the most claim about the validity of Working Memory. From one hand, it was too simplified to explain the complex processes of its ***Slave System*** since it controls only one task by one. On the other hand, it is almost impossible to test the Central Executive without affecting its slave system (Richardson, 1984).

4.4. Semantic memory

One of the essential components of Long Term Memory is Semantic Memory. Proposed by Tulving in 1972, Semantic is assumed to hold information related to peoples' general knowledge of the world like concepts, objects, colors and words. Semantic Memory can be either Declarative related to conscious facts, or Procedural related to general skills like driving. On how does Semantic Memory process information, numbers of models were proposed; Semantic Network model and The Adaptive Control of Thoughts are one of these (Sowa, 1987), (Anderson, 1973). Regardless of models soundness, they all focus on the items categorizations and the associative relationship among them. In relation to words sematicity, a recent research has set neurological evidence to words categorization. The study has indicated that all the cerebral cortex areas are involved in selected narrative language text meaning representation. The research also has demonstrated that the same cortex areas are activated for the same words among different participants in clear evidence to semantic fixed categorization of items meaning, and possibly the same processing leading to less emphasizing on peoples' knowledge experiences diversity (Huth, Heer, Griffiths, Theunissen, & Gallant, 2016).

5. Memory and recall

One of the essential elements in memory studies is Recall notion. Recall is defined as the mental process of previously encoded and stored information retrieval or remembrance. Recall can be categorized into three types; Free Recall, Cued Recall and Serial Recall.

5.1. Free recall

This type of recall is marked by ***recaller*** used free process of digit span remembrance (Kooufman, 1957), (Brown, & Gordan, 2000). Free Recall is often associated with Primary effect and Recency effect, or as it is known Serial Position Effect (Murdock 1960). While primary effect titles recalling information stored first in list span, Recency effect describes information stored lastly but recalled firstly. Contradicted with the structural feature of language, free recall plays an essential role in language processing whether mother tongue or a foreign language however most researches were conducted to test foreign and first languages comparatively (Glanzer, & Duarte, 1971),(Yoo, & Kauchanskaya, 2015).

5.2. Cued recall

Cued Recall is information retrieval with the help of encoding cues. In other words, when a recaller is asked to remember one of the two, usually, previously items by presenting the other, this paradigm is called Cued Recall. Within psycholinguistics, the items may take both auditory and visual forms. To test a recaller's semantic association, so many methods are used, and hence so many interpretations are generated (Tulving, & Pearlstone, 1966). As free recall, researches about language and cued recall examined, often, two languages semantic association recall. On the other hand, within one language, cued recall was mostly used as a methodology paradigm to test other language features than in language processing (Marian, & Kauchanskaya, 2004), (Cao, 2012).

5.3. Serial recall

The ability of recalling information with the same order as it was presented is known as Serial Recall Effect. This type of recall differs in Long Term Memory than in Short Term Memory. Within the last, it has been found to be different between related words and unrelated words providing a further evidence for the impact of semantic memory (Poirier, & Saint-Aubin, 1995). Regardless of this fact, it is not addressed whether semantic memory affects the relation between words recall, or after words are associated recall. Slightly different from Free and Cued Recalls, Serial Recall is highly associated with language processing. Allen and Hulme(2006) investigated phonological neighborhoodness and the role of serial effect in words production mechanisms. Avons, Wright, and Pammer(1994) studied word-length. The impact of serial recall on syntax was also an interest item, and results indicate that it is more than a storage/retrieval process at least on the level of words (Perham, Marsh, & Jones, 2008).

6. Memory and digit span

The term memory span refers to the number of items can be hold and retrieved from one's memory. It is essentially associated with Short-Term memory since the measurement of its function requires only one representation of items before retrieval or declination. Its function

also goes hand in hand with Recall process, and hence recalls types. So many tests are used the measure the memory span, but the most commonly used test is ***Digit Span*** into which participant have to recall following a certain given instructions of recall after a sequence of digits is presented.

6.1. Miller's Magical Number Seven, Plus or Minus Two

In 1956, Miller has introduced his famous title "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information". He argued that the items that can be hold in one's working memory are seven plus or minus two. He emphasizes on two main claims. The first one was ***the one dimension discriminator***. That is, to typify a span of minimal pairs, they have to vary, for instance, in only second phonemes. The second phoneme is the discriminator. Miller's second claim was the notion of ***chunk***. According to him, it is the longest list of items that can be recognized. For example, words in one language may be considered as list of gibberish sequence of phonemes to another language speaker. Concerning the suspected validity of The Magical Number, so many researchers have raised claims using different paradigms to test the memory capacity. Not limited to, Baddeley has argued that the Phonolological Loop can hold approximately two seconds of sound (Baddeley, 2000) whilst Cowan has proposed ***The Magical Number four***. His examination was about Subitizing memory capacity. The consensus view about memory capacity seems to be that there is no constant number of items shared between people, and also no constant number of items shared within the same person in different tasks.

7. Arabic language

7.1. Arabic language phonology

Derived from West Semitic languages, Arabic with its siblings have a whole system of phonology that is different from Germanic languages like English. The Arabic phonological system is scrutinized with a limited set of vowels, but variably a wide number of consonants. Arabic Phonetics is most described with the set of consonants that are special for only Semitic language like the voiceless fricative /k̲/, and specific consonants for only Arabic like the voiced

alveo-dental plosive /d̪/ and the voiceless dental plosive/t̪/. Arabic vowels are only six (6); three are short and three are long. The Arabic language has also a different system of Phonotactic rules. When compared with English, the syllable structure of English allows a combination of consonant clusters while in Arabic is not allowed, and a schwa is integrated between consonants. This feature makes CV, CVV, CVC, CVVC the only possible syllables structure (Watson, 2002). In addition, all Arabic consonants have an equal possibility to be an initial consonant within a syllable (Al-Farahidi, 1985). These described phonetic and phonotactic features are valid only within Standard Arabic, and may vary within dialects.

7.2. Algerian native speakers of Arabic's phonological errors of English

English for Algerian native speakers of Arabic is considered as the fourth or the fifth phonological system after Algerian dialect, Berber, Standard Arabic and French with variance in precedence and existence of one phonological system over the other/s . All the previous acquired phonological systems trigger the produced English phonology in a way or another. Some of the errors marked the Arab learners like the difficulty of producing non-exist phonemes in Arabic as /p/ and /v/. This phenomenon is explained on the light of the deficit of the Arabs' vocal tract based on the unfamiliarity with this type of sounds (Scott, 1962). Some errors emerge within the written form produced phonology like mistaking homophones. Algerians learn French before the critical age makes the French phonology system more automatic and hence more fossilized. The French influenced errors are more vocalic like misuse of 'i' instead of 'ea'. Regardless of the gathered evidences used to explain data, it hard to be accepted due to the shortcomings of the models of speech perception or production that were used, in addition to researchers' failure in addressing the interaction between the two.

8. Conclusion

The purpose of this research review was to help in understanding speech perception related issues in more contemporary findings. It is clear that speech perception is affected by memory

and cognition, and hence the contributions of working memory to language are undeniable. Along with this, it is also clear that phonemic restoration examinations provide a window to look through to Speech perception mechanisms. On the light of these reviewed researches, proposing new model of speech perception is a matter of necessity. It is not an exigency just to address the speech perception related issues, but also to provide a valid answer to speech production interaction.

Chapter two: Methodology and results

1. Introduction

This research is proposed to provide an answer to the main question concerning the validity of The Refinement Store as a model of speech perception with a suggested role in foreign language production. The investigation, in a concrete sense, upholds Arabic speech perception impacts on learners of English as a foreign language. The learners' production errors are analyzed on the light of The Refinement Store.

2. Research design

To investigate the validity of the proposed model of The Refinement Store as a model of speech perception with a suggested role in foreign language production, both qualitative and quantitative methods are used. To examine mechanisms that delineate the model processing, two experiments were proposed: Phonemic Restoration and An Apple Eats Me. To investigate the validity of the model, both casual observation and case study were selected upholding the qualitative method. Algerian Arab Student of English as a foreign language were not selected as just a case study but also participated in the experimental investigations and set for observation.

3. Data collection and techniques

3.1. Participants

To investigate the validity of the Refinement Store within Algerian Arabs of English as a foreign language, students of English at Ouargla Univesity did participate. Participants are two types; one graduated student (H, F) and randomly selected two groups (1 & 8) first year undergraduate students. **H, F** took a part in casual observation while groups (1&8) set for two tests and observation then group one (1) alone set for two experiments. Participants' phonological background was questioned, but their age and gender were neglected.

3.1.1. Observation and tests sampling

Group eight after the observation was changed to become group six. Both groups one and six resemble 33,98 % (87students) of the first year students population , but only 57students out of 87 did participate made the percentage 7,95 less to become 26,027%. In addition to H,F second year master student participation.

3.1.2. Experiments sampling

Only group one students participated in Phonemic Restoration and An Apple Eats Me experiments. Group one stands for 16, 66% (43 students) out of the whole first year undergraduate students population (258 students), but actually only 9,30 % students participated in An Apple Eats Me experiment. Some participations were neglected, for they were Berbers or submitted a white answers made the percentage 7,751%. In Phonemic Restoration experiment, the participation reached 10,07% from whole first year students; stand for 26 students out of 43 students of group one.

3.2. Setting

This research was conducted at Ouargla University, Faculty of Letters and Languages, Department of Letters and English Language. It took a place in between December and March, academic year 2016/2017. Apart observations, all experiments were conducted in classrooms before midday, (11:00 am).

3.3. Instruments

Participants within this research went through observations, two tests and two experiments named Phonemic Restoration and An Apple Eats Me. The used instruments were papers, record device, earphones, computers, Power Point and Praat softwares.

3.4. Procedures

3.4.1. Observations

3.4.1.1. Natural observation

To categorize and classify the oral production phonological errors Algerian Arab beginner learners of English as a foreign language tend to make, Groups one and eight (1&8) were observed for two phonetics sessions. The participating students were not informed so they had no idea about the observation.

3.4.1.2. Casual observation

H, F, second year master student was noticed for making a remarkable phonological Error transpires in mistakenly pronouncing perspective instead of prescriptive. The student even he/she demonstrates a good English language skills, the mentioned error was fossilized.

3.4.2. Oral test

Groups, one and eight (1&8) were given a check list of oral phonological errors falls into six (6) categories. The students were asked to note each other's errors for eight (8) sessions they attend together.

3.4.3. Written test

Students of groups one and eight (1&8) were asked to select one of the three topics and write a short passage of less than eight (8) lines in fifteen(15) minutes.

3.4.4. An Apple Eats Me experiment

3.4.4.1. Beneath the name

Based on the objective this experiment was designed to investigate which has to do words as a cognitive items perception regardless of the phonological systems were associated with or the syntactic rules that govern, the name was selected. The word "apple" for instance stands for that specific shape, taste, color and smell of an **X** apple that people are costumed with. It also stands for that notion which submits the bite even when syntactically it has been displaced

as a subject which supposes to reflect cognitively an action doer. What makes the sentence " An Apple Eats Me" structurally odd is its cognitive perception intactness. It is intact in the first place, for it is understood, and second because the general understanding shows the syntactical oddness.

3.4.4.2. The procedure

Within this experiment, participants were presented with a written form of sentences in which some words were removed. The words stand for different classes; verbs, nouns, adjective, articles. Participants were asked to fill the gaps from a given list of pseudo-words that fit the gaps in number. Next, they were presented with the same sentences, with the same gaps, and they were asked to fill the gaps, again, with same previously selected pseudo-words then to tick from a given list of categories what each pseudo-word denotes in each sentence. The categories take the form of shape, size, gender, taste smell abstract/concrete, and other categories; participants had the choice to add them. Finally, they were presented with same sentences, and they were asked to fill the gaps with words of their own then were asked to tick the categories that suit the words meaning. The experiment was presented in English then in Arabic. The number of sentences was ten and the removed words were twelve.

3.4.5. Phonemic Restoration

3.4.5.1. Masking phonemes

Within this experiment, participants went through three stages named Phonetic, Phonotactic and Semantic. The basic idea in this experiment was centered on phonemes masking. From a psychoacoustic orientation, so many methods are used to cover human sound like using filters of lower frequencies or higher frequencies to pass. This method can be used with English since phonemes frequencies are already investigated and have fixed frequencies however it is more complicated, for different phonemes frequencies exist within one word and differ in another. The fact that makes it less reliable for Arabic implication with its specific set of phonemes that is different from English. To best mask Arabic phonemes without changing sound physical properties, Gelfland's Threshold masking method was used. According to Gelfland, when sound **α** is higher than another sound **β** in term of intensity, sound **β** is no longer audible

(Gefland, 2004). 10db is the lowest intensity change between **α** and **β** that can achieve the masking.

3.4.5.2. Masking with white noise

In Phonemic Restoration experiment, the used masker of phonemes was white noise. The white noise property of broadband makes it suitable for Threshold method of masking. It has equal peaks at different frequencies which makes the intensity fixed at different frequencies at any given period of time as it is shown below in Praat generated white noise.

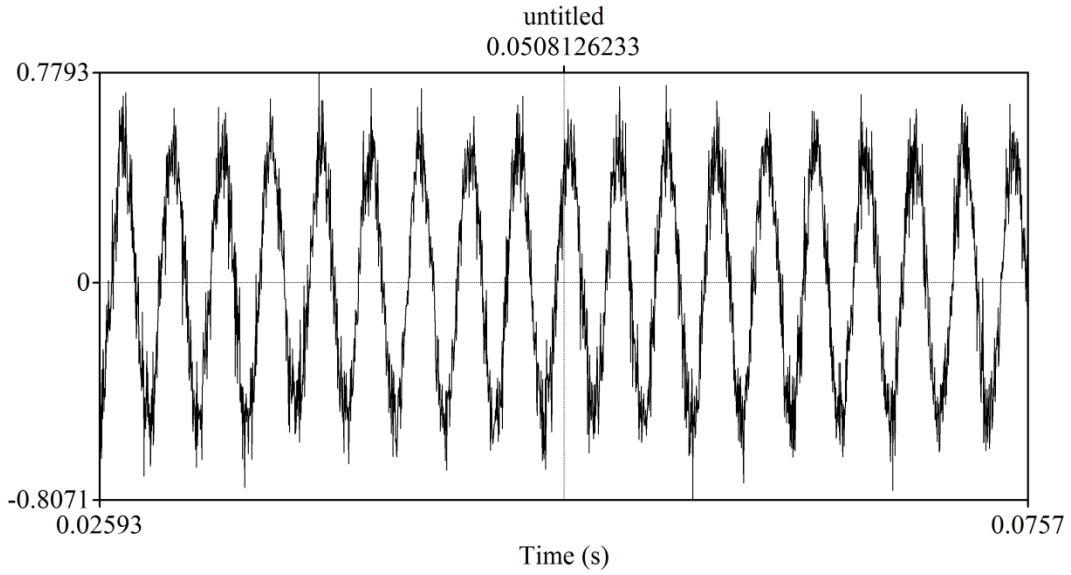


Figure2: 0. 0508126233 Second white noise with 44100 Hz frequency, generated with Praat software.

To avoid the Verbal Transformational Effect, it has been used both masking and embedding phonemes with white noise. The process was made by Praat software, and masking was higher 30db than the investigated phoneme intensity while embedding was less than 10db.

3.4.5.3. Praat words modulation

Since phonemic restoration happens within sequence of phonemes, the basic unit of investigation was word. In Phonetic and Phonotactic stages of the experiment, words and pseudo -words were modulated with Praat software using white noise as a masker and the method of masking was Threshold. To concretize, an Arab, adult, male voice was recorder using Praat

SoundRecorder. The words were recorded in term of Mono channels, and with 44100Hz sampling frequency.

After the words are recorded, a spectra analysis is shown in Praat Objects. To be able to modulate word's middle phoneme in this experiment, the next successive tips were followed:

1. All word's phonemes were selected and extracted in a linear order based on their spectra.

2. Using Rename section, the extracted phonemes names were modified from sound waves to a selected given name.

3. After the selected phoneme for modulation is picked and showed in Praat Object, Query section was used to get phoneme's duration and intensity.

4. In Praat Object, New Sound section, create a new sound formula option was selected to generate a white noise with same properties of the phoneme used for modulation.

5. In Praat Object, Modify section, the white noise scale intensity was changed based on the need of covering or embedding.

- Covered with white noise, 30 db was add

- Embedded white noise, less than 10 db was reduced

6. The white noise and the selected phoneme for modulation was combined using Concatenate option.

7. The generated sound chain after tip (6) was copied.

8. Using Modify section, the copy was reversed.

9. Using combine section, the raw chain and the reversed one were combined to stereo.

10. Using Convert section. The stereo chain was converted to mono.

11. After the mono chain of phoneme covered/embedded with a white noise was generated, only one phoneme duration was extracted since the chain have two phonemes duration after the concatenation in tip (6).

12. Back to tip (1), all the phonemes before the selected phoneme for modulation were copied in order then the modulated phoneme of tip (11) was copied next then, again, the phonemes that come after the selected phoneme for modulation were copied last.

13. The sequence of all the copied phonemes were combined in chain using Concatenate option, and the modulated word was generated.

Following this tips, all used words and pseudo-words in the phonetic and phonotactic stages were modulated.

3.4.5.4. Phonetic stage

In this stage participants heard three(3) lists of minimal pairs, in each list some words 'middle phonemes where covered with a white noise, and the rest were modulated by embedding the white noise to avoid The Verbal Transformation Effect. This stage was experimented using PowerPoint software into which each layer presented the written form of the word accompanied with the oral form. To avoid participants' bias, only the modulated phoneme for testing was omitted. They were asked to write the missing phonemes of the presented words based on what they heard, but in paper submitted the same words with same order. The first list of minimal pairs was Arabic lengthy nouns, but the second and the third lists were Three Letter Arabic verbs.

3.4.5.5. Phonotactic stage

Participants in this stage went in the same process as phonetic stage of writing the missing phoneme based on what they heard. The difference in this stage was that words were two types; words and Logatomes, and all selected phonemes for modulation had an embedded white noise. The words were three letters verbs, and Logatomes were extracted from.

3.4.5.6. Semantic stage

3.4.5.6.1. Logatomes automatic meaning generation

Students to be able to participate in the semantic stage, they were given meaning to logatomes. They were presented with a list of eleven words and eleven Logatomes; each word

and logatome meaning was explained facing a picture that denotes the meaning. The students were given two weeks to memorize the list. Next they were given a homework of matching a list of logatames with the pictures they were associated with based on the previously given list.

3.4.5.6.2. Cued recall

Just before participating in the semantic stage, students' knowledge of the logatomes was tested through a Visual Cued Recall. They were presented with pictures of logatomes facing words. The phoneme that makes the distinction between logatome and its derived from word, was removed. Participants had the fill the gaps of the logatomes based on the pictures alone.

3.4.5.6.3. Semantic Stage procedure

In this final stage, participants were presented with a pictures associated with an oral forms of words/logatomes through a PowerPoint layers. In some layers, the picture and the oral form were matching, and in others the oral form was associated with another picture that match the word/logatome derived from. Participants were asked to fill the gaps in a given list of words/logatomes based on the presented layers that share the same order and number with. The words were already given, and only the selected phonemes of distinction between logatomes and derived from words were removed, to avoid participants' bias.

4. Data Analysis and results

4.1. Phonemic Restoration

4.1.1 Phonemic Restoration data analysis

4.1.1.1. Phonetic stage data analysis

With 26 students participated in the Phonetic Stage, the data was collected and analyzed as it is shown in the following table which sums the results of a randomly selected participant **X**.

	Embedded white noise									Covered with white noise								
	correct			word			Pseudo-word			correct			word			Pseudo-word		
list 1	1	1		0	0		0	0		1	0		1	0		0	0	
list 2	1	1	1	0	0	0	0	0	0	0	1		1	0		0	0	
list 3	1	1	0	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0

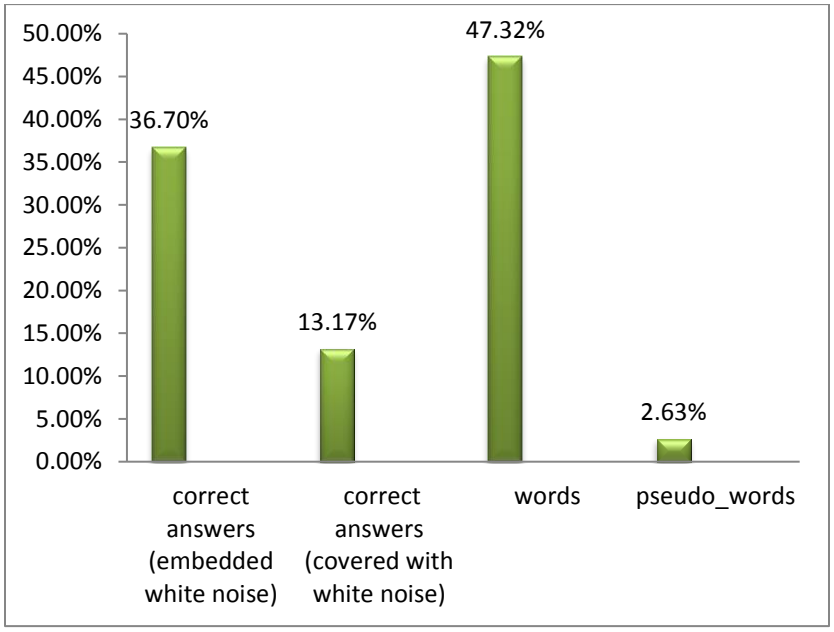
Table1: The Phonetic stage results of (X) a randomly selected participant.

In this stage, two types of minimal pairs were presented in list one (1). Each type contains two minimal pairs: one with a middle phoneme covered with a white noise, and in the other, the white noise was embedded. The possible answers would be either participant fills the gaps with **the exact phoneme**, or he fills it with another phoneme, so the answer would be either another **word** or **pseudo-word**. To illustrate, the word / استعمار / had the /ع/ sound covered with a white noise. When this participant were asked to fill the gap, he picked up /ث/ sound, so his answer was **not correct**, but it was a meaningful word. If he filled it with /ل/ sound for instance, the word becomes/استلمار/ which stands **for pseudo-word** in Arabic. Each number one (**1**) stands for an answer type, the fact that prerequisites a naught (**0**) in the rest of the categories. The second list contains five, three letter verb, minimal pairs. Three verbs' middle phonemes had an

embedded white noise while the rest, two, were covered with the white noise. The third list contains six minimal pair verbs: three verbs' middle phonemes covered with the white noise, and three had an embed white noise.

Since list number one (1) contains only four words, each number (1) in the table stands for 25% of the possible answers while number one (1) of second list stands for 20% out of five words, and the one (1) of the third list stands of 16.666666667 % out of six words. With regard to these percentages, list number one for (**X**) indicates: 50% correct embedded white noise answers, 25% correct covered with white noise answers and 25% non-correct but meaningful words. list number two(2): 60% of correct embedded white noise answers, 25% of correct covered with white noise answers and 25% non-correct but words answers. The third list shows 33.33% of correct embedded answers, 50.001% correct covered words and 16.66666667% of words but non-correct. After summing up, the final result of (X) indicates 47% of correct embedded white noise answers, 31.66% of correct covered answers, 20.55% of non-correct words and 0% of pseudo-word answers.

Following the same analysis, all the participants' answers were summed up in the next diagraph



Graph1: participants 'Phonetic stage answers

4.1.1.1.2. Phonetic stage results discussion

Based on the gathered results, it is clear that phonetic knowledge affects phonemic restoration. Phonemes recognition enhances the restoration, and this fact expressed in the percentage of participants' restorations of phonemes with embedded white noise. Despite the mentioned fact, it is hard to deny the percentage of phonemic restoration of phonemes covered with white noise indicating that restoration is a supra-segmental phenomenon. The high percentage of non-correct but meaningful words results of non-phonemic restoration advocates the role of either phonotactics from a physical orientation of sounds or semantics from a cognitive orientation.

4.1.1.2.1. Phonotactic stage data analysis

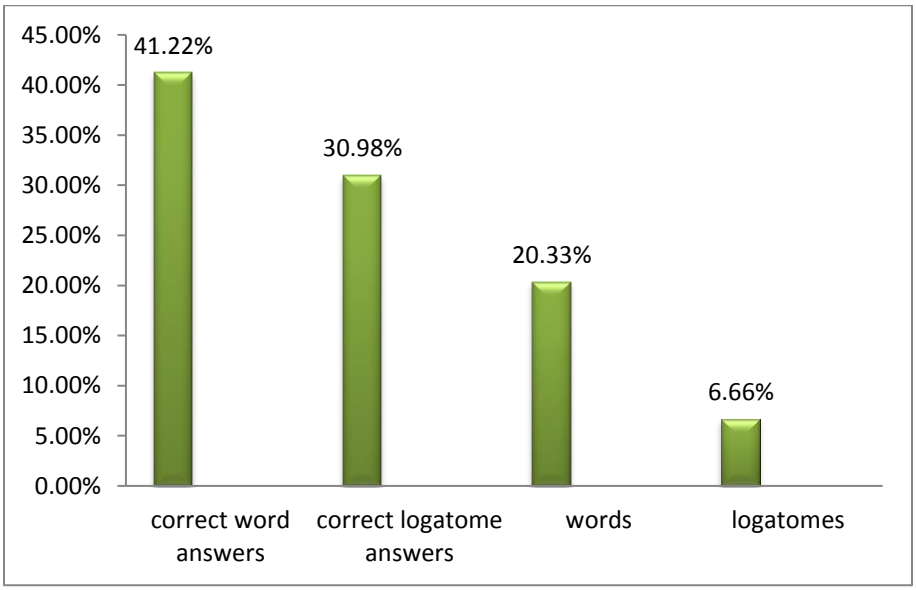
Within this stage, the data was collected and analyze as the table below indicates. The following table shows the results of randomly selected participant(**Y**).

	WORDS									**LOGATOMES**								
	CORRECT			**LOGATOME**			**WORD**			**CORRECT**			**WORD**			**LOGATOME**		
List 1	1	1	1	**0**	**0**	**0**	**0**	**0**	**0**	**1**		**1**		**0**	**0**		**0**	**0**
List 2	1	1	0	**0**	**0**	**0**	**0**	**0**	**1**	**1**		**0**		**1**		**0**		**0**	**0**
List 3	1			**0**			**0**			**1**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**

Table 2: The Phonotactic stage results of(Y) a randomly selected participant.

In this stage, participants were presented with three lists of minimal pairs. List one (1) and two(2) contain three words and two logatomes while list three(3) contains three logatomes and one word. To exemplify, the table (2) indicates the result of (Y) participant. Each number one (1)in list one (1) and two(2) of the table stands for 20% of occurrence out of five words. In list number three, each one (1) stands for 25% of occurrence out of four words. The table (2) indicates all the possible answers participants may provide. To concretize, when participants are presented with the logatome /رشع/, their answers would be either the correct answer/رشع /; another word/ركع /, or another logatome/رخع / , for instance. The same possible answers categories were provided when they are presented with words.

After summing participant(Y) table results, his final percentage of answers is as the following: 41.66% of correct **words** answers, 30% of correct **logatomes** answers, 20.33% of non-correct but **words** answers, and 6.66% of other **logatomes** answers. Following the same analysis with the rest participants, the results indicates some answers without non-correct but words answers, and without other logatomes. The final percentage of all participations is presented in the next diagraph



Graph2: Participants' Phonotactic stage answers

4.1.1.2.2. Phonotactic stage results discussion

Based on the high percentage of correct answers of both words and logatomes, the Arabic language restoration prove to be a phonetic phenomenon on the first class however when the percentage of non-correct but word answers is compared to the percentage of correct logatomes, it is hard to deny the percentage of word answers which stands for less than just 10% of correct logatomes, and higher 14% than other logatomes answers. The result indicates the Lexical Bias impact on restoration. The percentage of non-correct logatomes, on the other hand, explains the Phonetic bias of participants; the fact that put phonotactic rules in regard to words semanticity in question.

4.1.1.3.1. Semantic stage data analysis

For students to be able to participate in the semantic stage of phonemic restoration experiment, they were taught meaning to logatomes. The process of teaching the meaning was through explaining the logatomes via written words accompanied with a visual meaning then they were practicing these logatomes through matching with the picture exercise. Despite the previous process of teaching meaning, out of 26 participants only two students have succeeded in the Visual Cued Recall test. The attempt of the semantic stage was to investigate the impact of semantic knowledge regardless of the phonological system is accompanied with. The results of the two students who had an automatic knowledge of logatomes indicates that phonemic restoration is phonetic, phonotactic, and then lastly semantic phenomenon. Regardless of this result, it is hard to arrive at sound judgment since the participants are only two students standing for less than 7.69% of whole experiment participation, and the automaticity of logatomes knowledge is in doubt.

4.1.2. Phonemic Restoration results

Gathered from the three investigated stages of phonemic restoration, it has been found to be massively a phonetic phenomenon based on phonemes recognition and even a suggested role of supra-segmental features. Phonemes recognition based on the phonotactic stage results found to be due to not just a physical recognition of sounds, but also due lexical features identifications.

Where exactly the identification appear remains unaddressed since the semantic stage investigations failed because of participants' results in the Cued Recall test.

4.2. An Apple Eats Me

4.2.1. An Apple Eats Me experiment data analysis

To investigate words perception as cognitive items regardless of the phonological systems were associated with, or the syntactic rules that govern, twenty (20) students participated in An Apple Eats Me experiment. With a three related questions of filling the gaps in a given sentences with a given pseudo-words, ticking the cognitive categories that suit each pseudo-word then filling the gaps with words, and ticking the cognitive categories that match the words; the results were gathered. By comparing the ticked categories in questions number two and three, the attempt was to check to what extent phonological words and non-correct phonological words are identical. The results show that words and pseudo-words are cognitively diverted with 75% participation in English and 35% in Arabic sentences. When the categories were analyzed, 90% out of 15 students whom participated in ticking the categories picked the category of shape in both questions two and three, and 73.33% ticked the category of color in English sentences. In Arabic sentences, participants' most ticked categories found to be abstract/concrete and animate/inanimate with six (6) students out of seven (7) participation. To examine how words are related to each other cognitively within sentences despite the syntactic rules that govern, sentence number three in the English sentences were designed. The sentence contains subject and object with no possible cognitive relation. The results shows that participants picked a verb that refer to either the subject or the verb indicating a cognitive Serial Recall, both Recency and Primary.

The last finding of cognitive Serial Recall emerged a need of reinvestigating the selected pseudo-words in both English and Arabic. The results were surprising, 75% of participants selected the same word **kandible** in the same sentence " Neighbors are……mostly". When their selections of their own words were analyzed, 70% of the used words found to be synonyms to the word **kind**. The same situation was found within Arabic sentences. One specific word **زمت** was used in the same sentence " مكعبات الثلج.....بسرعة" with 65% of students participation. When their selection of their own words were analyzed, 90% found to use the past simple of the

verb ذاب with the plural feminine pronoun ت the thing that affects the selection of the pseudo-word

4.2.2. An Apple Eats Me results discussion

Depends on the collected data from An Apple Eats Me experiment, words as a cognitive items found to be recognized based on the phonological system properties following a Serial Recall effect. In ordinary sequence of language the recall is Recency for both phonemes selection within words and words selection within sentences. When the Recency Recall failed to provide a phonological association, words are selected predicatively based on the cognitive categories of the previous words. Within English as a foreign language the shape and the color are the second important categories after the phonological structure of words selection. And finally, the more language users are familiar with the phonological system, the less they pay attention to the cognitive categories, and the more the syntactical rules.

4.3. The Refinement Store mechanisms

On the light of the Phonemic Restoration and An Apple Eats Me examination findings, the Refinement Store as model of speech perception institutes the next mechanisms.

1. The operation of all stored words in semantic memory by matching the auditory cues with the sequence of phonemes that built the word. The process of matching happens in Dependent Event manner

2. The semantic memory consists of numbers of cues for one word: an auditory externally cues been stored or internally stored acoustic cues by sounding them out from the reading process. It also contains visual cues, visual cues stored in parallel with the acoustic cues, somatic cues, olfactory cues, gustatory cues and the syntactic form which is encoded in the acoustic cues in addition to other languages cues of the same word as a cognitive item.

3. When speech is trapped by scanty physical auditory cues reception, perception is happened in a predictive manner. When the scantiness is within phonemes, the selection of the intact phoneme depends on the mechanism number (1). If mechanism number one failed, the selection of word depends then on the cognitive categories perception where the visual cues play the biggest role unless the received cues are gustatory or olfactory.

4. The needed time of words selection adjustment depends on the strength of the Active Working memory, and Short Term memory of Serial Recall with both types Recency and Primary.

The next page figure indicates The Refinement Store Model

Note: The model mechanisms are also valid in explaining number of phonological effects beside Phonemic Restoration like Ganong effect, McGurk Effect and Categorical Perception. This study was set to explain the impact of Arabic speech perception on English as foreign language production, and these effects investigation on the light of the model are recommended for future research.

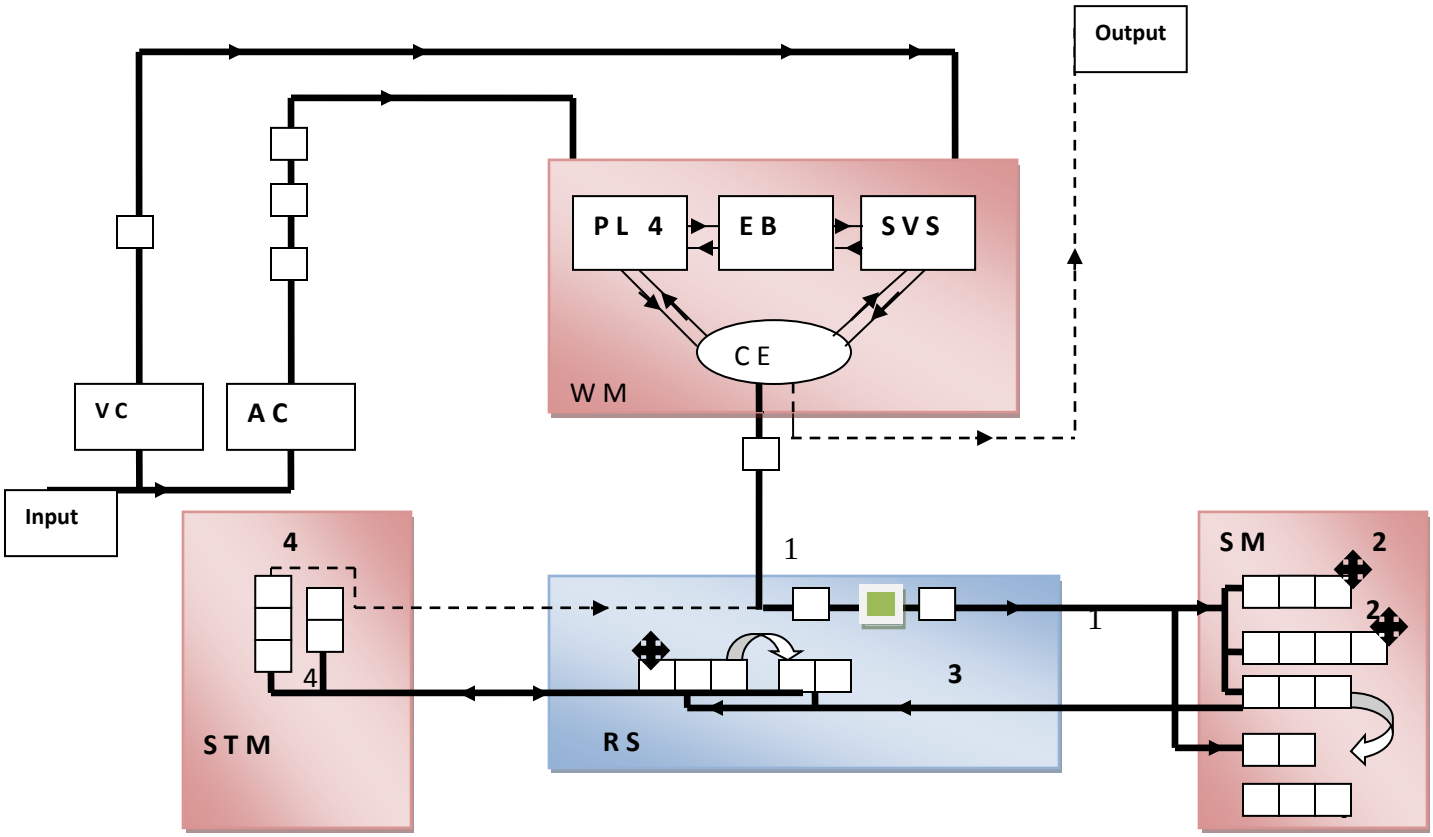


Figure 3: The Refinement Store Model

A C: Auditory cues

C E: Central Executive

E B: Episodic Buffer

P L: Phonological Loop

R S: Refinement Store

SM: Semantic Memory

S T M: Short Term Memory

S V S: Spatial Visual Sketchpad

V C: Visual Cues

W M: Working Memory

1: Mechanism (N1) **2: Mechanism (N2)** **3: Mechanism (N3)** **4: Mechanism (N4)**

: phoneme **: Scanty/Missing phoneme**

Word **: Lemma**

: cognitive association

: Perception pathway **: Production pathway**

4.4. Phonological errors

4.4.1. Phonological errors results analysis

4.4.1.1. Oral test results analysis

Due to participants' failure of submitting the given check list of English oral phonological errors, the analysis on the light of the refinement store mechanisms is omitted however hints based on more general error category that were generated after the natural observation is explained as the following

Non-exist phonemes in Arabic like /v/ &/p/ sounds: However the claim was that this type of errors is due to Arabs' vocal tracts of non familiarity with this two sounds makes it a production phenomenon, it is on the light of the Refinement store a perception aspect. The Arabic language syllabus structure consists of no consonant cluster, and a schwa is always integrated in between. Following the same structure of Arabic language, when a /p/ sound is about to be perceived, a schwa is integrated; operating mechanism number one of the Refinement Store, so a /b/ sound is perceived instead. The analysis of /pa/ and /ba/ categorical perception shows that /pa/ 's Voice-onset-time has a delay of 65ms in comparison to /ba/' V-O-T. The exact delay time stands for the time of schwa perception according to Flemming & Johnson (2007). A so close evidence was indicated by Binturki(2008) explained that the hardness of pronouncing this type of sounds appears in the middle of words higher than in the beginnings.

The rest of the errors occur within other mechanisms like Phonemic Paraphasia which appears based on weak Serial Recall, and pronouncing every written letter error which emerges as an aspect of semantic memory components fusion.

4.4.1.2. Casual observation result analysis

H, F 's oral phonological error of mistakenly pronouncing perspective instead of prescriptive prove that errors could be also compound. Since H, F has admitted that the first interaction with these two words was through reading and within the same field, the first typical error is integrating schwa between /r/ and /s/ sounds in perspective, and another schwa in

between /p/ and /r/ sounds in prescriptive then stored in the semantic memory based on mechanism number **one**. This inverted schwa makes the entries of the two words similar surpassing mechanism **one** to mechanism **two**. Since the two words experienced within the same field, the hesitation appears also in mechanism **three** for the similarity of cognitive categories, and also in mechanism number **four** with a suspected Phonemic Serial Recall deficiency; in working memory.

4.4.1.3. Written test results analysis

With 57 students participated in the written test, the English written phonological errors was categorized and analyzed as the following

Homophones: it has been found two types of homophone errors within students' participations. A phonemic homophone like /f/ in **phase** and in **fails**. This type of errors surpasses the mechanism number one, but it fails in mechanism number two which has to do with the visual cues storage. The same claim concerns wordy homophones like **eigh**t and **ate.** This type of errors surpasses both mechanism number one and three, but it is trapped in mechanism number two, for the fail is in associating visual cues with the auditory ones.

Mixing vowels: however there exist many vowel mixing errors, because the Arabic vowels visual structure is different from that of English, the errors could be due to the impact of French language like writing **prair** or **inglish** instead of prayer and English, respectively. Whether it is the impact of French or other languages, the errors emerge in mechanism number one of the Refinement store.

5. Conclusion

Based on the gathered results from the selected research design, the Refinement Store as a model of speech perception mechanisms were unveiled. When Algerian, Arab, undergraduate students of English at Department of Letters and English Language's production phonological errors were analyzed; they proved to be due Arabic mechanisms of speech perception impacts on English speech perception. The errors emerge in production as a direct result of perception. The refinement Store model proved to be valid as a model of speech perception with a suggested role

in foreign language production, at least to the level of fulfilling the set objectives of analyzing phonological production errors.

General conclusion

1. Summary of the major findings

With an attempt to investigate The Refinement Store model validity as a model of speech perception with a suggested role in foreign language production based on both the limitations of previous models of speech perception and Phonemic restoration investigations, a number of hypothesis were generated. After the experimental design that was followed, it has been found that Phonetic, Phonotactic and Semantic constrains have the same impacts on Arabic Phonemic Restoration. Is has also found that word perception is on the first place a phonological process then a cognitive one. When Algerian Arab Learners of English as foreign language production phonological errors were analyzed on the light of the Refinement Store, it has been revealed that these errors triggered perception then production.

2. Implications for practice

In this research, the aim was to give to the proposed model of The Refinement store the credibility as a model of speech perception that also plays a role in foreign language production. The applicability of the model investigation was on Arab Algerian learners of English whom after the model mechanisms were unveiled based on experimenting them, their English production phonological errors were explained on the light of the model. The finding refutes most of the previous models of speech perceptions validity, and hence refutes their significant.

Accordingly, the major practical contributions of the model are related to the learn ability of foreign languages in general and of English as specific case. The next contributions are recommended to effectively learn English as a foreign language:

- Teaching words pronunciation via transcription is not a sound option, for it complicates phonetics symbols retrieval since it shares the same auditory/oral signals with written form words.
- Beginners are recommended not to read silently, for they may store a oral signals based on sounding out every single letters.
- Code switching in classroom is highly recommended, for it automates the accessibility to foreign language items.
- Students with more phonological errors are recommended to have sessions in more calm circumstances.

The Refinement Store model can be also used significantly as Robots model of speech perception and language processing in general since it has fixed set of mechanism. With its similar access labeling to both first and foreign languages, the model can be used as a program of automatic translation.

3. Limitations

A veracious judgment concerning the model validity needs a further investigation due to the limitations been generated during the conduction. This study only sheds the light for future investigation regardless of the proposed methods that were set to achieve the objectives of the research however it is hard to deny the limitations that have emerged during the process of examination. The following are some account for limitations:

- Due to pedagogical decision, groups one and eight were separated, so students failed in checking each other's oral phonological errors, and hence they failed in submitting the list.
- Due to time boundaries, some questions were not answered in An Apple Eats me experiment.
- Due to the fact that students were participating voluntarily, it was impossible to force them in memorizing the meaning of logatomes, and hence they failed in the Cued Recal and the Semantic stage of Phonemic Restoration experiment.

- The phonemic Restoration experiment was conducted in a classroom, but Anechoic Chamber suits the nature of the procedures much more.

4. Ethics

Concerning ethics, one claim could be generated against this research investigation which is teaching participants pseudo-words without their knowledge of that fact. The participants were told that the pseudo-words are new agreed about generated Arabic words. a fact that may affects their future perception of Arabic words.

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Appendix

Oral check list

Thank you

Name:……

Non-exist phonemes in Arabic Eg: /v/, /p/	Sound out another vowel Eg: /bæd/; /bɛd/	Add another vowel Eg: /splɪt/ ⇨ / spɪlɪt/	Pronouncing every written letter Eg: / no/ ⇨ /kno/ (know)	Phonemic Paraphasia Eg: /dɛks/ ⇨ /dɛsk/	Non-check words Eg:/spik/ ⇨ /skɪp/

Written Test

Full name (You can add a fake one, but keep your gender):…… 

Pick one of the following topics, and write a short passage; you can do it.

1. A conversation with your first grandson; just imagine!

   ……
   ……
   ……
   ……
   ……
   ……
   ……
   ……

2. You favorite book, car, artist, TV show, or animal.

   ……
   ……
   ……
   ……
   ……
   ……
   ……
   ……

3. A letter to ISIS(Islamic State in Iraq and Syria; داعش, yes داعش!)

   ……
   ……
   ……
   ……
   ……
   ……
   ……
   ……

An Apple Eats Me Experiment

Name :……. **Mother tongue:……**

Q1. Use the following words to fill the gap in the sentences below

List of words: pantle, spranckle, fint, colinction, kandible, spearle, cander, tindelation, ziffer, retial, sustin, worfill, steap.

Sentences

1.…….needs more cares to be happy.

2. He ……in the…….of the house.

3. Neighbors are…….mostly.

4. The dog runs……

5. Women ……..their hair in the ……..

6. Football players……in the mall.

7. Horses……..cats and dogs.

8. They destroy the wall……pieces.

9. Flowers……..in stadiums

1. Animals……..clothes and colors in …….

Q2. Rewrite the previous sentences with the same words you have selected then tick/fill the boxes you think they describe your selected word; you can add your own description boxes.

1……needs more cares to be happy.

Gender	Age	Color	Taste	Smell	Shape
Female ☐					
Male ☐					

Neuter ☐

Abstract/Concrete		**Animate/Inanimate**		.....	.....
Abstract	☐	animate	☐	☐	☐
Concrete	☐	inanimate	☐	☐	☐

2. He…….in the ……..of the hose.

1st word

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**
Female ☐					
Male ☐					
Neuter ☐					

Abstract/Concrete		**Animate/Inanimate**		.....	.....
Abstract	☐	animate	☐	☐	☐
Concrete	☐	inanimate	☐	☐	☐

2nd word

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**
Female ☐					
Male ☐					
Neuter ☐					

Abstract/Concrete		**Animate/Inanimate**		.....	.....
Abstract	☐	animate	☐	☐	☐
Concrete	☐	inanimate	☐	☐	☐

3. Neighbors are……..mostly.

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**

Female ☐ ☐ ☐ ☐ ☐ ☐

Male ☐

Neuter ☐

Abstract/Concrete	**Animate/Inanimate**	……	…….
Abstract ☐	animate ☐	☐	☐
Concrete ☐	inanimate ☐	☐	☐

4. The dog runs……..

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**
Female ☐	☐	☐	☐	☐	☐
Male ☐					
Neuter ☐					

Abstract/Concrete	**Animate/Inanimate**	……	…….
Abstract ☐	animate ☐	☐	☐
Concrete ☐	inanimate ☐	☐	☐

5. Women…….. their hair in the…….

1st word

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**
Female ☐	☐	☐	☐	☐	☐
Male ☐					
Neuter ☐					

Abstract/Concrete	**Animate/Inanimate**	……	…….
Abstract ☐	animate ☐	☐	☐
Concrete ☐	inanimate ☐	☐	☐

2nd word

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**

Female ☐ ☐ ☐ ☐ ☐ ☐

Male ☐

Neuter ☐

Abstract/Concrete	**Animate/Inanimate**	……	…….
Abstract ☐	animate ☐	☐	☐
Concrete ☐	inanimate ☐	☐	☐

6. Football players ……in the mall

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**
Female ☐	☐	☐	☐	☐	☐
Male ☐					
Neuter ☐					

Abstract/Concrete	**Animate/Inanimate**	……	…….
Abstract ☐	animate ☐	☐	☐
Concrete ☐	inanimate ☐	☐	☐

7. Horses……cats and dogs.

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**
Female ☐	☐	☐	☐	☐	☐
Male ☐					
Neuter ☐					

Abstract/Concrete	**Animate/Inanimate**	……	…….
Abstract ☐	animate ☐	☐	☐
Concrete ☐	inanimate ☐	☐	☐

8. They destroy the wall…….pieces.

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**
Female ☐	☐	☐	☐	☐	☐
Male ☐					

Neuter ☐

Abstract/Concrete		**Animate/Inanimate**		…….	…….
Abstract	☐	animate	☐	☐	☐
Concrete	☐	inanimate	☐	☐	☐

9. Flowers in ……..stadiums

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**
Female ☐					
Male ☐					
Neuter ☐					

Abstract/Concrete		**Animate/Inanimate**		…….	…….
Abstract	☐	animate	☐	☐	☐
Concrete	☐	inanimate	☐	☐	☐

10. Animals……..clothes and colors in……

1st word

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**
Female ☐					
Male ☐					
Neuter ☐					

Abstract/Concrete		**Animate/Inanimate**		…….	…….
Abstract	☐	animate	☐	☐	☐
Concrete	☐	inanimate	☐	☐	☐

2nd word

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**
Female ☐					
Male ☐					

Neuter ☐

Abstract/Concrete		**Animate/Inanimate**		.....	.....
Abstract	☐	animate	☐	☐	☐
Concrete	☐	inanimate	☐	☐	☐

Q3. Rewrite the same sentences, fill the gaps with your own words then tick/fill the boxes you think they describe your words.

1……needs more cares to be happy.

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**
Female ☐					
Male ☐					
Neuter ☐					

Abstract/Concrete		**Animate/Inanimate**		.....	.....
Abstract	☐	animate	☐	☐	☐
Concrete	☐	inanimate	☐	☐	☐

2. He…….in the ……..of the hose.

1st word

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**
Female ☐					
Male ☐					
Neuter ☐					

Abstract/Concrete		**Animate/Inanimate**		.....	.....
Abstract	☐	animate	☐	☐	☐
Concrete	☐	inanimate	☐	☐	☐

2nd word

Gender	Age	Color	Taste	Smell	Shape
Female ☐	☐	☐	☐	☐	☐
Male ☐					
Neuter ☐					

Abstract/Concrete	Animate/Inanimate	……	…….
Abstract ☐	animate ☐	☐	☐
Concrete ☐	inanimate ☐	☐	☐

3. Neighbors are……..mostly.

Gender	Age	Color	Taste	Smell	Shape
Female ☐	☐	☐	☐	☐	☐
Male ☐					
Neuter ☐					

Abstract/Concrete	Animate/Inanimate	……	…….
Abstract ☐	animate ☐	☐	☐
Concrete ☐	inanimate ☐	☐	☐

4. The dog runs……..

Gender	Age	Color	Taste	Smell	Shape
Female ☐	☐	☐	☐	☐	☐
Male ☐					
Neuter ☐					

Abstract/Concrete	Animate/Inanimate	……	…….

Abstract	☐	animate	☐	☐	☐
Concrete	☐	inanimate	☐	☐	☐

5. Women…….. their hair in the…….

1st word

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**
Female ☐					
Male ☐					
Neuter ☐					

Abstract/Concrete		**Animate/Inanimate**		**……**	**……**
Abstract	☐	animate	☐	☐	☐
Concrete	☐	inanimate	☐	☐	☐

2nd word

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**
Female ☐					
Male ☐					
Neuter ☐					

Abstract/Concrete		**Animate/Inanimate**		**……**	**……**
Abstract	☐	animate	☐	☐	☐
Concrete	☐	inanimate	☐	☐	☐

6. Football players ……in the mall

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**

Female ☐ ☐ ☐ ☐ ☐ ☐

Male ☐

Neuter ☐

Abstract/Concrete		**Animate/Inanimate**		**……**	**……**
Abstract	☐	animate	☐	☐	☐
Concrete	☐	inanimate	☐	☐	☐

7. Horses……cats and dogs.

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**
Female ☐	☐	☐	☐	☐	☐
Male ☐					
Neuter ☐					

Abstract/Concrete		**Animate/Inanimate**		**……**	**……**
Abstract	☐	animate	☐	☐	☐
Concrete	☐	inanimate	☐	☐	☐

8. They destroy the wall…….pieces.

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**
Female ☐	☐	☐	☐	☐	☐
Male ☐					
Neuter ☐					

Abstract/Concrete		**Animate/Inanimate**		**……**	**……**
Abstract	☐	animate	☐	☐	☐
Concrete	☐	inanimate	☐	☐	☐

9. Flowers in ……..stadiums

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**
Female ☐	☐	☐	☐	☐	☐
Male ☐					
Neuter ☐					

Abstract/Concrete	**Animate/Inanimate**	**……**	**……**
Abstract ☐	animate ☐	☐	☐
Concrete ☐	inanimate ☐	☐	☐

10. Animals……..clothes and colors in……

1st word

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**
Female ☐	☐	☐	☐	☐	☐
Male ☐					
Neuter ☐					

Abstract/Concrete	**Animate/Inanimate**	**……**	**……**
Abstract ☐	animate ☐	☐	☐
Concrete ☐	inanimate ☐	☐	☐

2nd word

Gender	**Age**	**Color**	**Taste**	**Smell**	**Shape**
Female ☐	☐	☐	☐	☐	☐
Male ☐					
Neuter ☐					

Abstract/Concrete	**Animate/Inanimate**	**……**	**……**
Abstract ☐	animate ☐	☐	☐
Concrete ☐	inanimate ☐	☐	☐

1. **استخدم الكلمات التالية لملء الفراغ في الجمل.**

الكلمات: ارتمع, كردابة, الحلتيات, رليع, دنك, فاغل, سداعة, لعم , مليد, زمت, سمال, قلتاف.

الجمل

1. مكعبات الثلج.....بسرعة.
2. يده.....في الفرن.
3. .....وكأنها حيوان.
4. لا داعي لان تكون ملم ب.....اسمع وستدرك مدى.....
5. .....النو .....النشاط.
6. اكلتني.....
7. سيارة.....لا تناسبك
8. .....قديمة و نوافذها مهلهلة.
9. صندوق.....ثلاثة الاف كيلومتر
10. كاد يقتله بغبائه .....

2. **اعد كتابة الجمل التي سبق وملأت فراغاتها مع تحديد ماذا يمكن ان تصف الكلمات المختارة في كل جملة وذلك عبر شطب/ملء الفراغات المناسبة اسفله.يمكنك اضافة صفات اخرى**

1. مكعبات الثلج.....بسرعة.

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
مذكر ☐	☐	☐	☐	☐	☐
مؤنث ☐					
محايد ☐					

مجرد/حسي	جماد/حي	...../.....	...../.....
مجرد ☐	جماد ☐		
☐	☐		

حسي حي

2. يده.....في الفرن

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
مذكر ☐					
مؤنث ☐					
محايد ☐					

مجرد/حسي جماد/حي ...../..... ...../.....

مجرد ☐ جماد ☐

حسي ☐ حي ☐

3. .....وكانها حيوان

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
مذكر ☐					
مؤنث ☐					
محايد ☐					

مجرد/حسي جماد/حي ...../..... ...../.....

مجرد ☐ جماد ☐

حسي ☐ حي ☐

4. لا داعي لان تكون ملم ب.....اسمع وستدرك مدى.....

الكلمة1

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
☐ مذكر					
☐ مؤنث					
☐ محايد					

مجرد/حسي **جماد/حي** **...../.....** **...../.....**

☐ مجرد ☐ جماد

☐ حسي ☐ حي

الكلمة2

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
☐ مذكر					
☐ مؤنث					
☐ محايد					

مجرد/حسي **جماد/حي** **...../.....** **...../.....**

☐ مجرد ☐ جماد

☐ حسي ☐ حي

5. .....النو .....النشاط

الكلمة 1

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
☐ مذكر					
☐ مؤنث					
☐ محايد					

مجرد/حسي جماد/حي ...../..... ...../.....

مجرد ☐ جماد ☐

حسي ☐ حي ☐

الجنس	العمر	الكلمة2 اللون	الطعم	الرائحة	الشكل
مذكر ☐					
مؤنث ☐					
محايد ☐					

مجرد/حسي جماد/حي ...../..... ...../.....

مجرد ☐ جماد ☐

حسي ☐ حي ☐

6. اكلتني.....

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
مذكر ☐					
مؤنث ☐					
محايد ☐					

مجرد/حسي جماد/حي ...../..... ...../.....

مجرد ☐ جماد ☐

حسي ☐ حي ☐

7. سيارة.....لا تناسبك

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
مذكر ☐					
مؤنث ☐					
محايد ☐					

مجرد/حسي جماد/حي ...../..... ...../.....

مجرد ☐ جماد ☐

حسي ☐ حي ☐

8. .....قديمة ونوافذها مهلهلة

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
مذكر ☐					
مؤنث ☐					
محايد ☐					

مجرد/حسي جماد/حي ...../..... ...../.....

مجرد ☐ جماد ☐

حسي ☐ حي ☐

9. صندوق.....ثلاثة الاف كيلومتر

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
مذكر ☐					
مؤنث ☐					
محايد ☐					

مجرد/حسي جماد/حي ...../...../.....

مجرد ☐ جماد ☐

حسي ☐ حي ☐

10. كاد يقتله بغبائه.....

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
مذكر ☐					
مؤنث ☐					
محايد ☐					

مجرد/حسي جماد/حي ...../...../.....

مجرد ☐ جماد ☐

حسي ☐ حي ☐

3. اعد كتابة الجمل السابقة مستخدما كلماتك الخاصة لملء الفراغات ثم قم بشطب/ملء الفراغات بما يمكن ان يصف كلماتك .

1. مكعبات الثلج.....بسرعة.

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
مذكر ☐					
مؤنث ☐					
محايد ☐					

مجرد/حسي جماد/حي ...../...../.....

مجرد ☐ جماد ☐

☐ ☐

حسي حي

2. يده.....في الفرن

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
مذكر ☐					
مؤنث ☐					
محايد ☐					

مجرد/حسي جماد/حي ...../..... ...../.....

مجرد ☐ جماد ☐

حسي ☐ حي ☐

3. .....وكانها حيوان

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
مذكر ☐					
مؤنث ☐					
محايد ☐					

مجرد/حسي جماد/حي ...../..... ...../.....

مجرد ☐ جماد ☐

حسي ☐ حي ☐

4. لا داعي لان تكون ملم ب.....اسمع وستدرك مدى.....

الكلمة1

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
☐ مذكر					
☐ مؤنث					
☐ محايد					

مجرد/حسي **جماد/حي** **...../.....** **...../.....**

☐ مجرد ☐ جماد

☐ حسي ☐ حي

الكلمة2

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
☐ مذكر					
☐ مؤنث					
☐ محايد					

مجرد/حسي **جماد/حي** **...../.....** **...../.....**

☐ مجرد ☐ جماد

☐ حسي ☐ حي

5. .....النو .....النشاط

الكلمة 1

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
☐ مذكر					
☐ مؤنث					
☐ محايد					

مجرد/حسي جماد/حي ...../..... ...../.....

مجرد ☐ جماد ☐

حسي ☐ حي ☐

الجنس	العمر	الكلمة2 اللون	الطعم	الرائحة	الشكل
مذكر ☐					
مؤنث ☐					
محايد ☐					

مجرد/حسي جماد/حي ...../..... ...../.....

مجرد ☐ جماد ☐

حسي ☐ حي ☐

6. اكلتني.....

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
مذكر ☐					
مؤنث ☐					
محايد ☐					

مجرد/حسي جماد/حي ...../..... ...../.....

مجرد ☐ جماد ☐

حسي ☐ حي ☐

7. سيارة.....لا تناسبك

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
مذكر ☐					
مؤنث ☐					
محايد ☐					

مجرد/حسي جماد/حي ...../..... ...../.....

مجرد ☐ جماد ☐

حسي ☐ حي ☐

8. .....قديمة ونوافذها مهلهلة

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
مذكر ☐					
مؤنث ☐					
محايد ☐					

مجرد/حسي جماد/حي ...../..... ...../.....

مجرد ☐ جماد ☐

حسي ☐ حي ☐

9. صندوق.....ثلاثة الاف كيلومتر

الجنس	العمر	اللون	الطعم	الرائحة	الشكل
مذكر ☐					
مؤنث ☐					
محايد ☐					

مجرد/حسي جماد/حي ...../..... ...../.....

مجرد ☐ جماد ☐

حسي ☐ حي ☐

10. كاد يقتله بغبائه.....

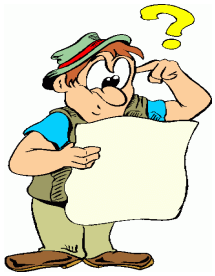
الجنس	العمر	اللون	الطعم	الرائحة	الشكل
مذكر ☐					
مؤنث ☐					
محايد ☐					

مجرد/حسي جماد/حي ...../..... ...../.....

مجرد ☐ جماد ☐

حسي ☐ حي ☐

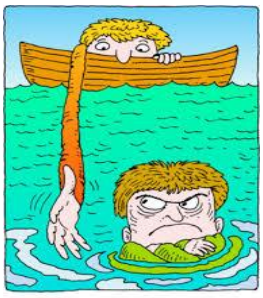
فرد:(فعل)عن الجماعة اي انفصل عنها



فقد:(فعل) الشيء أي ضاع منه وغاب عنه

فسد:(فعل) الشيء أي عطب وتلف

فطد:(فعل) الشيء أي اهلكه بنفسه

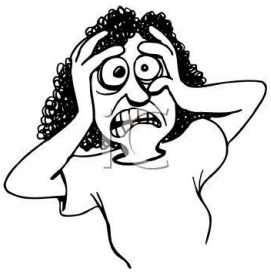


فعد:(فعل) رفض المساعدة رغم الحاجة اليها

فند:(فعل)في فعله أي أخطأ فيه

فلد:(فعل)اشياءه أي تبرع بقسم كبير منها

هزع:(فعل) عدا عدوا سريعا



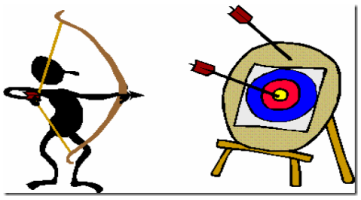
هلع:(فعل) خاف خوفا شديدا

هرع:(فعل) مشى مشيا سريعا فيه اضطراب

هصع:(فعل)الرجل أي اكثر البحث والتحليل

هكع:(فعل) سكن واطمأن

هشع:(فعل)اعجب على غير العادة



هنع:(فعل) بحث عن الهدف مهما كلفه الامر

ولد:(فعل) فهو والد

وعد:(فعل) فلان اي مناه بأمر

وأد:(فعل)بمعنى هدر اي صوت الجمل

ورد:(فعل)في الصحف اي كما جاء فيها

انتفاع:(اسم) حصول على فائدة او خير من الشيء

انطفاع:(اسم) الاحكام على الشيء ومنع ظهوره

انكفاع:(اسم) الاخذ عنوة

اندفاع:(اسم) ميل تلقائي الى التحرك

هزع

انكفاع

وأد

هنع

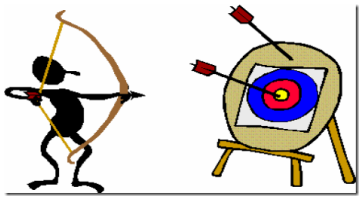
انتفاع

هشع

ولد

هكع

فطد



انطفاع

فعد

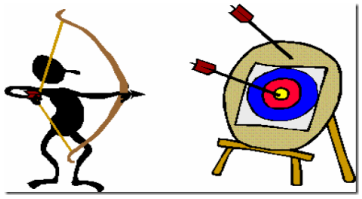
فلد

هصع

ف...د

ف...د

ان...فاع



ه...ع

ه...ع

Name : **Mother tongue :**

Restoration 1(phonetic)

1) ا...تياح 2) ا...تياح

3) است...مار 4) است...مار

5) خ...ل 6) خ... ل 7) خ...ل 8) خ...ل 9) خ...ل

10) س...ر 11) س...ر 12) س...ر 13)س...ر 14) س...ر

15) س...ر

Restoration 2(phonotactic)

1) ر..ع 2) ر...ع 3) ر...ع 4) ر...ع 5) ر...ع

6) ن...ل 7) ن...ل 8) ن...ل 9) ن...ل 10) ن...ل

11) ك...ب 12) ك...ب 13) ك...ب 14) ك...ب

Restoration 3 (semantic)

1) ف...د 2) ف...د 3) ف...د 4) ف...د

5) ...لد 6) ... لد

7) ان...فاع 8) ان...فاع

9) ه...ع 10) ه...ع 11) ه...ع 12) ه...ع

Abstract

Due to previous models of speech perception shortcomings together with Phonemic Restoration examination findings, a model named The Refinement Store is proposed. The Refinement Store is a model of speech perception, but not limited to, it is also suggested to play a role in foreign language production. In an attempt to crystallize the model mechanisms, an experimental design was followed. The underlying mechanisms found to be a direct result of a systematic integration and adjustment of the following items mechanisms: working memory, short term memory and semantic memory. First Year Undergraduate students at department of Letters and English Language at Kasdi Merbah University whom native speakers of Arabic were first examined to reveal the model mechanisms, and later their phonological production errors of English were analyzed in light of the model mechanisms. The results of this study demonstrate besides The Refinement Store mechanisms that phonological errors of production of English language trigger perception then production. The findings of this study are held to play an important role in reconsideration of teaching English.

Key terms: The Refinement Store model, speech perception, semantic memory, working memory, phonological production errors.

Résumé

En raison de déficiences des modèles précédents de la perception de parole et les résultats de l'examen de restauration phonémique ; un modèle nommé The Refinement Store est proposé. The Refinement Store est un modèle de perception de la parole, mais sans se limiter, il est également suggéré de jouer un rôle dans la production de langue étrangère. Dans une tentative de cristalliser les mécanismes de ce modèle, des méthodes expérimentales ont été suivi. Les mécanismes sous-jacents résultent directement d'une intégration et d'un ajustement systématiques des mécanismes des éléments suivants: mémoire de travail, mémoire à court terme et mémoire sémantique. Les étudiants de première année de premier cycle au département des Lettres de la langue anglaise à l'Université de Kasdi Merbah auxquels les locuteurs d'arabe ont été examinés pour révéler les mécanismes de la modèle, et plus tard, leurs erreurs de production phonologique de l'anglais ont été analysées à la lumière des mécanismes modèles. Les résultats de cette étude démontrent à côté des mécanismes de The Refinement Store que les erreurs phonologiques de production de la langue anglaise déclenchent la perception ainsi que la production. Les résultats de cette étude ont pour rôle de jouer une importance dans le réexamen de l'enseignement de l'anglais.

Mots-clés: The Refinement Store modèle, la perception de la parole, la mémoire sémantique, la mémoire de travail, les erreurs de production phonologique.

ملخص الدراسة

استنادا إلى كل من نتائج البحث حول ظاهرة ما يعرف باسترداد الصوتيم و اوجه القصور في النماذج السابقة لإدراك الكلام تم اقتراح نموذج جديد يدعى بمخزن الصقل. لا يعد مخزن الصقل نموذج لإدراك الكلام وحسب بل يقترح ايضا ان يلعب دورا في انتاج الكلام. لبلورة أليات النموذج تم اتباع منهج تجريبي حيث وجد ان هذه الاخيرة هي نتيجة مباشرة لإدماج منتظم لآليات العناصر التالية وتنقيحها على مستوى مخزن الصقل الذاكرة العاملة والذاكرة قصيرة المدى والذاكرة الدلالية. للكشف عن اليات النموذج كمرحلة اولى من الدراسة شارك طلاب السنة الاولى من متحدثين اللغة العربية كلغة ام من قسم اللغة الانجليزية في كلية اللغات من جامعة قاصدي مرباح كعينة الدراسة. كمرحلة ثانية من الدراسة تم تحليل اخطاء الانتاج الصوتي في اللغة الانجليزية للطلبة المشاركين على ضوء اليات مخزن الصقل. نتائج هذه الدراسة تثبت ان اخطاء الانتاج الصوتي للغة الانجليزية بالنسبة لمتحدثين اللغة العربية كلغة ام هي اخطاء توسم الادراك قبل الانتاج الامر اللذي يعتقد انه سيلعب دورا هاما في اعادة النظر حول اليات تدريس اللغة الانجليزية.

كلمات مفتاحية: نموذج محزن الصقل. ادراك الكلام . الذاكرة العاملة. الذاكرة قصيرة المدى. الذاكرة الدلالية. اخطاء الانتاج الصوتي اللغوي.