# Overcoming the Native Language Magnet Theory for Second Language Adult Learners

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## Abstract

When learning a new language, most learners, if not all, desire to attain native-like fluency without noticeable foreign accentuation. However, despite being immersed in a native-speaking environment with daily social interaction with native speakers and exposure to mass media, some still speak with a recognizable accent that persists even after years. Does this make sense? The underlying root cause is believed to involve both the process of acquiring phonemes and the ability to reproduce them accurately. The Native Language Magnet Theory expanded (NLM-e) states that when adult listeners encounter an unfamiliar phoneme from a foreign language, they tend to perceive it as a sound similar to one of the phonemes from their own native language that is closest in pronunciation. Learners who are unable to accurately recognize a certain phoneme in a foreign language will struggle to correctly produce it. In addition, the more they practice, the more they reinforce their difficulties in perceiving it accurately. Consequently, their pronunciation may not improve or may even worsen over time. The detection of different phoneme pronunciations is subjective. It becomes more challenging for adult learners of French when taught by non-native French teachers, as their perception may be impaired. It was concluded that to overcome perception distortion from the Native Language Magnet effect that occurred at the brain neural network level, an adult learner needs to use alternate sensorial feedback other than an aurally distorted channel. The authors propose perception correction and training guidelines based on objective measurement and visualization of phoneme formants

compared to native formant reference positions. This information provides ideas for correcting articulatory organ movements according to the differences observed.

**Keywords**: Phoneme Acquisition, French /y/, Adult Learners, the Native Language Magnet Theory expanded

## Introduction

Each language originates from a complex historical continuum of human interactions and subsequently embodies the cultural identity of a nation. Rather than being a static relic of the past, a language exemplifies an evolving and dynamic treasure that continues to adapt and develop over time. Besides regional dialect variations, linguistic usage also displays temporal differences even within the same dialectic context. Currently, people's speech patterns differ considerably from those employed centuries ago, even leading to altered pronunciations of identical words. The advent of social media interactions expedites language evolution, compelling rapid transformations in language usage that influence the spoken language of the present generation. As a consequence, linguistic research necessitates periodic reexamination of prior studies to ascertain and compare significant changes that have transpired over time, employing contemporary subject samples.

When learning a new language, most, if not all, desire to attain native-like fluency, without noticeable foreign accentuation. However, despite being immersed in a native-speaking environment with daily social interaction with native speakers and exposure to mass media, some still speak with a recognizable accent that persists even after years. Perfors and Dunbar (2010) confirmed that wrong pronunciations impair communication understanding.

The underlying root cause is believed to involve both the process of acquiring phonemes and the ability to reproduce them accurately. The Native Language Magnet Theory expanded (NLM-e) (Kuhl et al. 2008) states that when adult listeners encounter an unfamiliar phoneme from a foreign language, they tend to perceive it as a sound similar to one of the phonemes from their own native language that is closest in pronunciation.

The Critical Period Hypothesis (CPH) postulates that language learning capabilities decrease progressively from birth to puberty, leading to a reduction in cerebral plasticity (Freiderici & Wartenburger, 2010). In other words, learning to pronounce phonemes at a later age is considerably more difficult (Kuhl, 2004).

The questions arise, "Are adult learners entirely powerless to overcome The Native Language Magnet effect that impairs their perception, and is it possible to improve cerebral plasticity?"

The main objectives of this study are to explore how to overcome the effects of The Native Language Magnet Theory and rediscover undistorted perception and training guideline that reopen the Critical Period and reinitiate the restructuring of the brain of adult learners.

## Language Learning: Training for Humans and Machines

Language learning demands paramount effort and extensive training, irrespective of the learner's nature, whether human or machine. The contemporary surge in machine–learning approaches for language learning within artificial intelligence, deep learning, and neural–network paradigms should be complemented by concurrent research endeavors focused on human language learning. The advancement of machine learning depends upon the sophistication of learning engine algorithms, which, in turn imitate the real functioning of human brain (Kuhl et al., 2001). However, the effectiveness of machine learning will perpetually necessitate extensive training with substantial quantities of real–world language data derived from human language usage – the fundamental essence of language learning (Goyal et al., 2018).

## Learning a language through the process of mimicking native speakers

When learning a foreign language, one often adopts an imitative approach, endeavoring to replicate the speech patterns of native speakers with utmost precision, seeking to minimize any perceptible deviations. Unfortunately, most foreign language learners typically cannot speak the language indistinguishably from a native speaker. However, some bilingual or multilingual individuals, who have been adequately exposed to multiple languages from a young age, might possess the ability to achieve a native–like level of fluency and pronunciation in those languages. Older individuals, especially adult learners, may encounter challenges when acquiring new foreign languages due to interference from their ingrained mother tongue. In other words, learning to pronounce phonemes at a later age is considerably more difficult (Kuhl, 2004).

## Determining the most effective method for language learning

The pursuit of the most effective language learning method remains a topic of ongoing scholarly investigation in the domain of applied linguistics. When endeavoring to learn a new

language, the primary objective typically centers around attaining fluency as quickly as possible, with a strong emphasis on speaking in a manner reminiscent of a native speaker, while endeavoring to reduce any discernible accent. Language mastery is a fundamental and crucial skill that humans must acquire. Babies require several years of social and familial interactions to learn their native language successfully (Kuhl et al., 2014). Acquiring a second language in an inauthentic environment is considered unnatural and less effective compared to the natural language acquisition process that occurs through immersion and authentic social interactions. Take Asian students who are learning European languages as a third foreign language as an example. The students' mother tongue has no linguistic connection or shared roots with the foreign language they are attempting to acquire. As a result, the students face challenges and difficulties in learning the third language due to the lack of linguistic similarities or familiar elements between their native language and the foreign languages they are studying. When choosing a method for teaching a foreign language, specifically English or French, a historical exploration of the evolution of language teaching methods will be undertaken.

## Evolution of language teaching

Throughout the extensive chronicles of language teaching and learning, noteworthy turning points have emerged as a result of scientific and linguistic discoveries. These milestones have significantly influenced the direction of teaching methods and approaches, guiding educators toward more effective and informed practices. English presently holds the distinction of being the most widely studied foreign language globally. However, in historical contexts, Latin reigned supreme for an extended period as the language of education, commerce, religion, and politics across European countries (Richards & Rodgers, 2014). The method of teaching Latin primarily relied on grammar and translation, a pedagogical approach that endured even into the post–World War II era in numerous developing countries due to missionary expedition (Kresge, 2008).

Even after falling out of common use as a spoken language, Latin retained its status as a noble knowledge reserved for higher education and intellectual communities. The language's sophisticated and structured system, with its essential rules and principles, continued to be valued as a foundation for intellectual development across various higher education disciplines (Richards & Rodgers, 2014).

### Reform movement: Phonetics and Phonology

By the end of the nineteenth century, the demand for spoken fluency in foreign language learning catalyzed a reform movement against the grammar and translation method. Linguistics emerged as a more scientific discipline, consisting of two primary foundations: phonetics, which involves the physical study of speech sound production and perception in a language, and phonology, which investigates sound patterns and their meanings within a language and across languages. This shift in linguistic focus directed language learning and teaching toward the oral aspect rather than solely the written form (Richards & Rodgers, 2014).

The aspiration to speak a foreign language as closely as a native speaker led to the concept of imitating the language learning process of infants acquiring their mother tongue. This approach, known as the "Direct Method," (Marcel, 2016; Prendergast, 2015; Gouin 1880) advocates for learning without relying on the learner's native language for explanation or translation (Simensen, 2007).

Although the Direct Method, exemplified by the Berlitz school of language, achieved commercial success, it faced criticism for lacking solid academic foundations or theoretical support. In a classroom setting, where the environment does not replicate real-life contexts, relying solely on verbal explanation for novice-level language learning often results in time-consuming and counterproductive efforts, leading to tedious detours in the learning process.

### Structural, Functional and Interactional Approaches

Three predominant language teaching and learning approaches were widely explored: the structural model, functional model, and interactional model (Richards & Rodgers, 2014). These approaches played a significant role in shaping language education and understanding how languages are acquired and used in various contexts. The structural model perceives language as a systematic arrangement of interconnected elements aimed at conveying communicative meaning. The primary goal is to achieve proficiency in these elements, including phonemes, words, phrases, and grammar rules. The teaching methodology known as the 'Audio-Lingual' approach aligns with this structural model: Unlike the Direct Method, which focuses on building language proficiency through natural vocabulary acquisition, the Audio-Lingual approach prioritizes the mastery of grammatically correct usage patterns. The functional approach centers on purposeful and action-oriented linguistic usage, where language is employed to fulfill specific functions, such as proposing, excusing, or suggesting. This approach emphasizes the practical

application of language in real-life contexts, enabling learners to use language effectively to accomplish various communicative tasks. The interactional model perceives language as communicative tools that facilitate the creation and maintenance of social relationships. In this approach, language is viewed as a means to interact, connect, and engage with others, emphasizing the importance of effective communication and social interaction in language learning and use.

**Cognitive processes versus learning environments**

Language teaching theories address two fundamental questions. Firstly, they explore the cognitive and psycholinguistic processes involved in language learning, aiming to understand how learners acquire, process, and internalize linguistic knowledge (Richards & Rodgers, 2014). Secondly, these theories seek to identify and establish appropriate learning conditions and methodologies that optimize language learning outcomes. Learning processes in language acquisition delve into understanding how the brain assimilates and internalizes new language information, encompassing cognitive processes such as perception, memory, and acquisition. On the other hand, learning conditions pertain to the examination of physical and human environments in which language learning occurs, encompassing aspects like classroom settings and authentic environments.

**Subconscious acquisition and conscious feedback control**

According to Krashen's (1981) Theory of Second Language Acquisition, language learners engage in subconscious acquisition during reception, where they intuitively absorb language patterns. Additionally, during the production of utterances, they utilize conscious feedback control or monitoring to correct perceived imperfections in their language usage. These two processes work together to facilitate language learning and refinement. The conscious monitoring, stemming from formal learning and persistent training efforts, contributes to speech refinement, thereby giving an utterance a more polished appearance.

**The persistence of the problem in adult learners**

A substantial number of adult language learners encounter challenges when attempting to acquire a second language, particularly in accurately pronouncing certain foreign phonemes that do not exist in their native language (Kuhl et al., 2008). Even after prolonged residence in

authentic language immersion environments with daily interactions with native speakers and exposure to various media channels, including cinema, radio, television broadcasting, internet streaming, and social media interaction, many immigrants still exhibit discernible differences in the pronunciation of numerous phonemes compared to native speakers.

### Examining the brain using magnetoencephalography

In earlier studies, subjective and indirect behavioral observations aimed at investigating brain activity during language acquisition and learning have been replaced by contemporary scientific and medical instrumentation enabling objective and replicable measurements such as electro–encephalography EEG that only detect electrical potential change time waveform, functional Magnetic Resonance Imagery fMRI offered snapshot images of the brain but very sensitive to movement (Friederici & Wartenburger, 2000). In modern neuroscience research, the utilization of Magnetoencephalography (MEG), a medical instrument capable of real–time visualization of active brain regions, enables the study of how the human brain acquires and processes phonemes during language learning (Kuhl & Rivera–Gaxiola, 2008).

### Innate flawless perception ability

A native French perceives and mentally characterizes ‘peau’ and ‘beau’ as two different words because they have different meaning in French. This observation has significant implications for language learning, prompting the development of a pedagogical approach focused on utilizing minimal pairs. Nonetheless, research conducted by Mayer and Gerken (2000) demonstrated that the ability to characterize phonemes is independent of whether these phonemes convey different meanings or lack meaning altogether. This finding sheds light on the complex nature of phoneme recognition and its relationship to language acquisition, suggesting that the distinction between phonemes can occur irrespective of their semantic associations. Every infant is inherently equipped with the innate capacity to distinguish and recognize various sounds present in human speech, whether from their native tongue or any foreign language spoken across the globe (Eimas et al., 1971). However, as individuals are predominantly exposed to their native language during early development, adults may encounter challenges in perceiving phonemes from foreign languages that do not exist in their mother tongue (Scovel, 1988; Kuhl, 2004).

### Event–Related Potential and Mismatch Negativity

To objectively assess an individual's ability to differentiate between two phonemes, researchers employ Magnetoencephalography (MEG) to visualize the magnetic field produced by neuronal electric currents in the specific brain region associated with the relevant activities. This visualization, known as Event–Related Potential (ERP), provides a near–real–time 3D representation of brain responses during the task of interest. When researchers measure the auditory ERP response by presenting a sequence of repeated stimuli with occasional insertions of different stimuli in between, any changes in the ERP indicate the presence of the Mismatch Negativity (MMN) response (Kuhl et al., 2008).

The MMN response occurs in six–month–old infants, regardless of whether they are exposed to native or foreign phonemes (Imada et al., 2006). However, by the age of twelve months, the MMN response is no longer evident for non–native phonemes, suggesting a shift in phonetic perception during early development (Kuhl et al., 2008). Around the tenth or eleventh month of age, infants undergo a progressive transition, focusing increasingly on their native tongue and gradually excluding other phonemes that are less encountered in their linguistic environment (Werker & Tees, 1984). This transition reflects the natural process of language development and specialization towards the sounds prevalent in their native language.

### Statistical reinforcement

Kuhl (2010) argue that a new born is neither a “tabula rasa” or an clean slate as Skinner believed nor a “Preprogrammed Linguist” as advocated Chomsky (Chomsky, 1959, 2000). The brain's perception ability for a phoneme improves as the frequency of its occurrence in the auditory input increases. In everyday human conversation, numerous speakers contribute to phoneme variation, forming a statistical distribution of that phoneme (Maye et al., 2008). The problem arises when an adult attempts to acquire a phoneme that does not exist in his/her native language. In such cases, the individual perceives the unfamiliar phoneme as resembling one sample of the nearest phoneme in his/ her mother tongue, often deviating somewhat from the standard representation found at the central region of the statistical distribution. This deviation towards the tail of the distribution can result in variations in pronunciation and difficulty in accurately producing the target phoneme. This fundamental cognitive activity involves a continuous process of comparing and categorizing every phoneme heard, associating it with a pre–existing memory database, and perceiving it as a member of a specific phonetic class. This cognitive

process allows individuals to make sense of and recognize various speech sounds based on their existing knowledge and language experience.

### Native Language Magnet Theory

Each new phoneme sample, regardless of its frequency of occurrence or position in the statistical distribution—be it at the center or the tail—will be categorized and perceived as the central representative, akin to a potent magnet attracting minuscule iron dust. The Native Language Magnet Theory expanded (NLM–e) has confirmed that individuals do not perceive sounds in their true form. Instead, the perception system consistently distorts these sounds in favor of the native language, as each sound heard is processed through the lens of the individual's linguistic background (Kuhl et al., 2008; Kuhl, 2010). The effect of this theory is reflected in the restructuring of the brain's neuronal network connections. As individuals are exposed to their native language and continuously process speech sounds, the brain's neural connections adapt and reorganize to prioritize and enhance the perception of phonemes present in the native language (Kuhl, 2010).

### Critical Period Hypothesis

The Critical Period Hypothesis (CPH) postulates that language learning capabilities decrease progressively from birth to puberty, leading to a reduction in cerebral plasticity (Freiderici & Wartenburger, 2010). While the magnet effect is powerful and influences early language development, it doesn't necessarily mean we are entirely powerless to overcome it. The closure of the critical period is not absolute and can potentially be reversed through intricate cognitive activities that involve focused attention and intensive learning. These efforts have the capacity to disrupt the background statistical distribution that contributes to the critical period closure in adult learners (Kuhl et al., 2008).

The closure of the critical period is not limited solely to speech perception but reflects the normal functioning of the brain. Between the ages of 8 to 12 months, babies begin to exhibit a decline in their visual face recognition capability (Pascalis et al., 2002). Indeed, European citizens often encounter difficulties in distinguishing between Asian or African faces.

**Curing perception problems through multi–sensorial training**

The MEG reveals that when individuals hear familiar native sounds, the brain activities are localized in small regions with remarkably short activation times, indicating high neural efficiency and minimal energy consumption (Kuhl, 2010). However, during the learning period, concentrated cerebral effort consumes substantial energy and triggers extensive neuronal activities across the brain, reflecting the restructuring of neural network connections and the potential reopening of the critical period for new discoveries and enhanced perception (Bosseler et al., 2011). A baby takes approximately eight months to establish the statistical distribution of its mother tongue. Nevertheless, by the ninth month of age, the baby can begin learning a new foreign language through just five hours of exposure to the language in a social context (Kuhl, 2010). In this social context, a multi–sensory environment provides the brain with redundant information to process, associate, and correlate, thereby facilitating acquisition and learning. Figure 1 shows causes and ways to overcome adult learner wrong pronunciation.

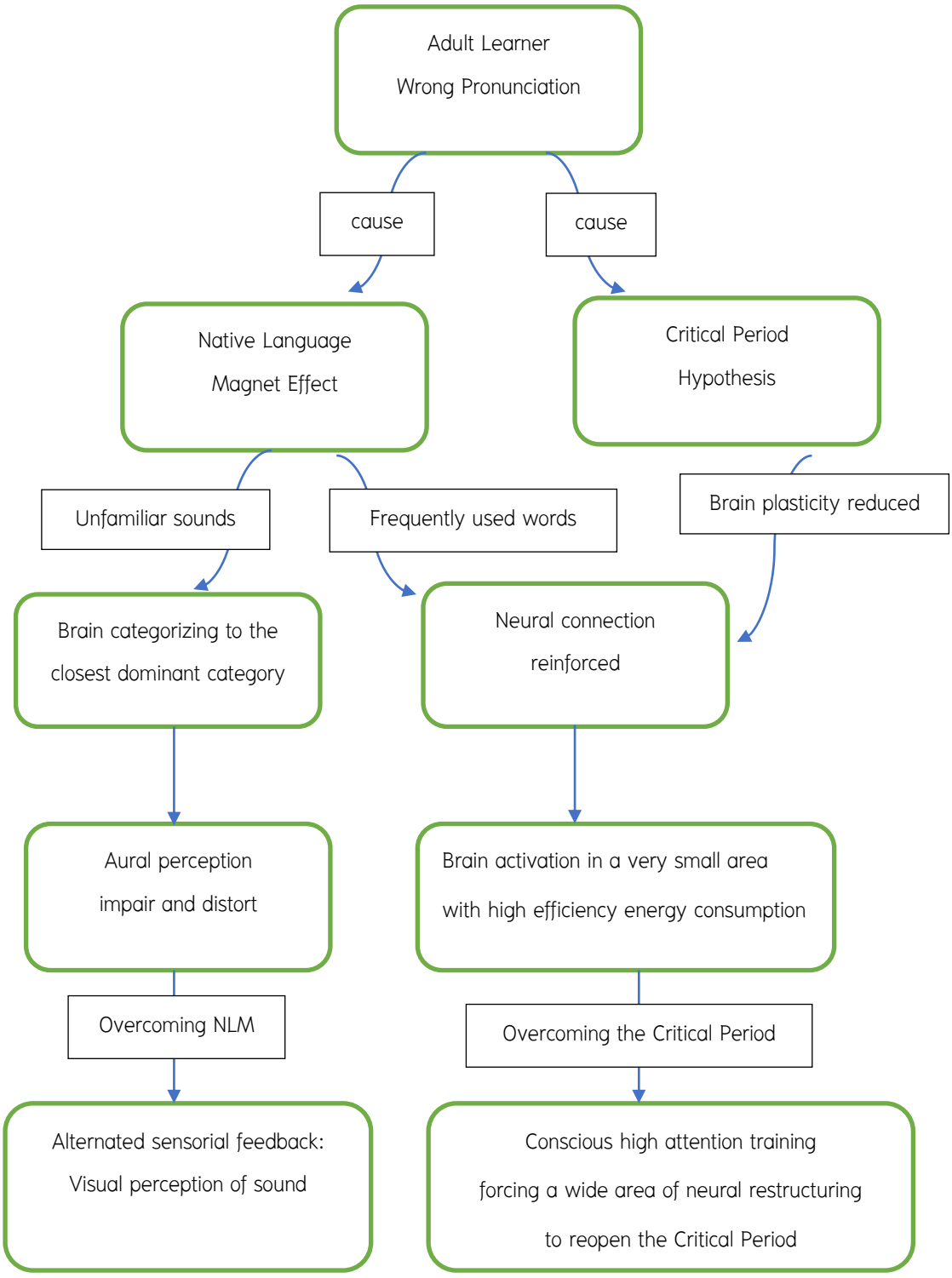


**Figure 1.** Causes and Ways to Overcome Pronunciation Problems

## Conclusion

The most severe case of perception problems can be observed in individuals who have fully functional vocal production organs but lack the ability to perceive sounds aurally, hindering their capacity to imitate and train for speech. Human beings can only imitate or reproduce sounds that they have perceived. For adult language learners, medical instruments have demonstrated that the brain perceives unfamiliar foreign phonemes as the closest native phonemes, which can pose challenges in accurately reproducing new sounds outside of one's native language. Thai adult learners tend to perceive the problematic and unfamiliar French /y/ phoneme as similar to their closest native Thai /u/ sound. Continuously listening and repeating the unfamiliar phoneme can lead to a deterioration in pronunciation. However, there is hope for improvement, as the critical period for new perception discovery can be reopened through alternate sensorial feedback. For instance, visual feedback of sound, such as formants display, allows a comparison between the ideal native French /y/ and the pronunciation of the Thai subject. Through intentional cerebral effort, learners can repeat and refamiliarize themselves with new perceptions, leading to extensive neuronal activities in various regions of the brain. These activities reflect the restructuring of neural network connections, which supports the process of acquiring and solidifying the new perception.

The authors propose that addressing perception problems in adult language learners be achieved through multi–sensorial training. By utilizing objective instrumentation measurements to visualize and compare the learner's pronunciation with the ideal native one, an alternate sensorial speech perception training can be developed to correct and enhance non–native phoneme perception and pronunciation. Furthermore, the application of the same approach could potentially benefit individuals who are deaf and have limited speech abilities, allowing them to undergo communicative speech training in the future.

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