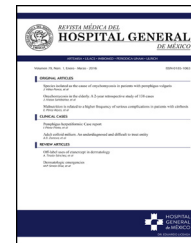




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ORIGINAL ARTICLE

## Language lateralization through dichotic listening in a group of patients with temporal lobe epilepsy

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### KEYWORDS

Dichotic listening;  
Language dominance;  
Hemispheric lateralization of language;  
Temporal lobe epilepsy

### Abstract

**Introduction:** Dichotic listening is one of the most common techniques used to determine the hemispheric lateralization of language, using pairs of stimuli that are presented simultaneously, one in each ear to induce auditory competition between the two ears. Right-ear advantage for the perception of words is considered the most important indicator of left hemispheric lateralization of language. Greater variability in hemispheric lateralization has been found in patients with temporal lobe epilepsy due to mechanisms of brain plasticity.

**Objective:** Confirm right-ear advantage for the perception of word pairs using the dichotic listening technique in a group of right-handed patients with temporal lobe epilepsy.

**Methods:** A 60 word-pair dichotic listening technique was used, controlling the appearance, duration and ending of each pair of stimuli. Twenty-seven (27) right-handed patients with temporal lobe epilepsy were studied, obtaining their laterality index based on the number of words perceived in each ear.

**Results:** Right-ear advantage with a significant difference ( $p < 0.0001$ ) was observed between both ears. According to the laterality index, 78% of the patients had left hemispheric lateralization of language.

**Conclusion:** The presence of right-ear advantage for the perception of word pairs is a constant pattern that suggests hemispheric lateralization of language in patients with epilepsy.

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## PALABRAS CLAVE

Escucha dicótica;  
Dominancia del  
lenguaje;  
Lateralización  
hemisférica del  
lenguaje;  
Epilepsia del lóbulo  
temporal

Considering its scope and limitations, dichotic listening can be used to screen preoperative patients with temporal lobe epilepsy. There are no reports on the Mexican population on this subject.

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## Lateralización del lenguaje mediante la escucha dicótica en un grupo de pacientes con epilepsia del lóbulo temporal

### Resumen

**Introducción:** La escucha dicótica (ED) es una de las técnicas más utilizada para la determinación de la lateralización hemisférica (LH) del lenguaje. Para ello se utilizan pares de estímulos que son presentados simultáneamente, uno en cada oído para inducir competencia. La ventaja del oído derecho (VOD) en la percepción de las palabras es considerada el indicador más importante de LH izquierda del lenguaje. Se ha encontrado mayor variabilidad en la lateralización en pacientes con epilepsia del lóbulo temporal (ELT) debido a mecanismos de plasticidad cerebral. **Objetivo:** Confirmar la VOD en la percepción de pares de palabras mediante la técnica de ED en un grupo de pacientes diestros con ELT.

**Metodología:** Se utilizó la técnica de ED compuesta de 60 pares de palabras controlando la aparición, duración y finalización de cada par de estímulos. Se estudiaron 27 pacientes diestros con ELT, en quienes se obtuvo el índice de lateralidad (IL) con base en la cantidad de palabras percibidas en cada oído.

**Resultados:** Se observó VOD con una diferencia significativa ( $p < 0.0001$ ) entre ambos oídos. De acuerdo al IL, el 78% de los pacientes presentaron lateralización hemisférica izquierda para el lenguaje.

**Conclusión:** La presencia de VOD en la percepción de pares de palabras es un patrón constante que sugiere la LH del lenguaje en pacientes con epilepsia. Considerando sus alcances y limitaciones puede utilizarse como escrutinio en pacientes con ELT prequirúrgicos. Debido a que no hay reportes al respecto en nuestro país, consideramos que este trabajo servirá para plantear nuevos estudios que en su metodología consideren algunas características de nuestra población. © 2017 Sociedad Médica del Hospital General de México. Publicado por Masson Doyma México S.A. Este es un artículo Open Access bajo la licencia CC BY-NC-ND (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Introduction

The dichotic listening (DL) technique consists of the simultaneous presentation of two different verbal stimuli (one in each ear).<sup>1</sup> Two syllables (e.g., "pa-ba") or two words are generally used to induce competition between the two auditory pathways. This competition comes to an end when the perception of one ear has an advantage over the other. DL can therefore determine which ear perceives a greater amount of stimuli.<sup>2</sup> Right-ear advantage (REA) in DL is a common phenomenon in most people and reflects the hemispheric lateralization (HL) of language, also known as language dominance. It consists of the ability of one of the two cerebral hemispheres to process verbal or written linguistic signs in terms of comprehension and expression.<sup>3-5</sup>

There are different versions of the DL test,<sup>5-8</sup> and in the most common ones the subject's task consists of identifying and repeating aloud the stimuli presented. All versions aim at determining ear advantage under the premise that only under DL conditions (competition stimuli) will each of the stimuli presented reach the contralateral hemisphere to be

(initially) processed in each temporal lobe. There are hemispheric differences in the processing of stimuli, with the left hemisphere generally taking advantage, because the information that reaches the right hemisphere must travel longer to reach the hemisphere in charge of stimulus processing.<sup>2</sup>

Because the basis of DL is the competition between the two ears, most authors have used very similar stimuli that differ only in the phonemes used to induce greater competition, thus obtaining a significant difference in the perception of stimuli between the ears.<sup>9-11</sup>

The use of this type of auditory stimuli pairs effectively renders the perception of phonological differences more difficult (increased competition). However, the current reports consider that consonant-vowel stimuli are processed by the brain bilaterally<sup>12</sup> because they correspond to early stages of phonological processing (see Fig. 1), thus reducing the possibility of finding a clear advantage by one ear. This point is highly relevant because the use of tests focused on this type of stimulus (consonant-vowel) has shown that the DL technique is not a reliable method for determining the HL of language.<sup>10</sup> By contrast, a study carried out by our

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