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Using Real-Time Visual Biofeedback for Second Language Instruction

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Abstract

This demonstration will illustrate how using real-time visual biofeedback, through a relatively new type of electropalatographic (EPG) sensor, might facilitate improved pronunciation for learners of a second language (L2). The manner in which the EPG sensor is created and its use to track lingua-palatal articulation patterns will be described to individuals. This presentation will also include an explanation of how a student can visualize the contact patterns of their speech using the associated instructional software. A brief tutorial on the features of the instructional software will also be explained during the "show and tell" presentation.

Index Terms: electropalatography, second language instruction, second language acquisition, pronunciation training

1. Introduction

Dynamic palatometry or EPG is a computer-based system designed to provide real-time visual bio-feedback of how a speaker's tongue contacts the palate during speech production [1, 2]. Historically, EPG has been a tool in the assessment and treatment of both acquired and developmental speech disorders. Some of the same challenges faced by individuals with a communication disorder are often encountered by learners of an L2. In some cases, an individual may be resistant to learning the speech sounds of a language in a fluent or intelligible manner, even after receiving months or years of individual tutoring or instruction. Although an L2 instructor may perceptually identify that a speaker is having difficulty producing a speech sound, it may be difficult to assess what is the basis for the problem, especially sounds that are difficult to directly visualize.

Anecdotal evidence and a limited number of small-scope studies [3, 4, 5, 6] have reported positive results when EPG is used in L2 instruction. Instructional tools like EPG may provide a method for language instructors and learners to augment traditional L2 learning approaches with another source of biofeedback, a real-time visual display of their speech movements. A recently developed EPG system (sensor and associated instructional software) produced by SmartPalate International© may be an effective tool for improving the pronunciation of an individual's L2, considering that the monetary cost and time of production is practicable.

2. Demonstration Procedures

This demonstration will begin with a brief introduction into how real-time visual biofeedback may benefit L2 instructors and learners. The process by which the EPG pseudopalate is created from a dental impression and stone model by a local dentist as shown in Figure 1 and 2 will be explained. The pseudopalate sensor is similar to an orthodontic retainer and is approximately 2 millimeters thin. The EPG sensor is customized to fit the contours of individuals' teeth, extending from the alveolar ridge to the back molars. The sensors contain 124 gold-plated electrodes arranged in a grid pattern across the surface of the pseudopalate.

Figure 1: *Stone Model*

Figure 2: *EPG pseudopalate*

The presentation will show how a small microprocessor or data link, worn around the user's neck is used to transfer the electrode contact pattern data from the pseudopalate sensor to a computer through a USB connection, which is then displayed on a computer screen as illustrated in Figure 3.

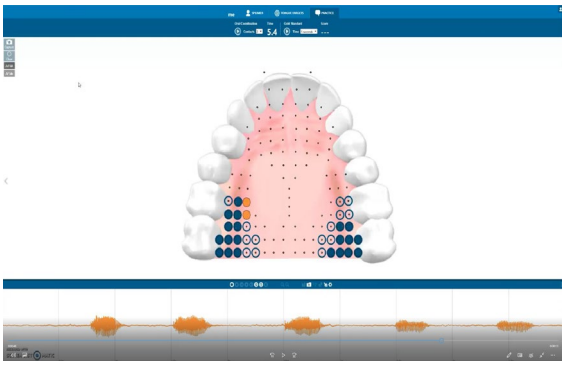

Figure 3: *EPG software*

The different features of the instructional software will then be demonstrated. The EPG software displays each of the 124 electrodes overtop of an anatomical figure of the upper teeth and hard palate. An electrode is highlighted when the speaker makes contact between their tongue and hard palate. The software allows you to set sound targets for individual speech sounds.

A demonstration will be given describing how the software can be customized to assist L2 student's production of sounds that are difficult to produce, such as the /l/ and /r/ phoneme contrast. EPG contact patterns for productions of the allophonic variations of the German voiceless palatal [ç] and velar fricatives [x] (ich-laut/ach-laut) will also be addressed in the presentation.

3. Conclusion

The aim of this demonstration will be to show the possible benefits and limitations of using EPG visual biofeedback to assist learners' pronunciation of an L2.

4. Acknowledgements

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I have no conflict of interest, financial or otherwise, regarding the company that produces the EPG device demonstrated in this presentation.

5. References

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