

# EPG and Palatometry Use in Treatment

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**Abstract:** Electropalatography (EPG) has been used in research for more than 30 years to understand the production of typical speech sounds in multiple languages. It has also been used to explore disordered sound production in a wide variety of ages and conditions. It has useful applications in both assessing and treating a variety of speech-related disorders, including: Cleft-palate, hearing impairment and cochlear implants, developmental articulation and phonological disorders, apraxia of speech, dysarthria, swallowing, and fluency. It has been used successfully in children, adolescents and adults.

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EPG provides the user with a real-time visual representation of lingua-palatal contact patterns. This information has been useful to researchers in exploring typical and disordered sound production in a variety of languages. For examples see (Gibbon, Lee, & Yuen, 2007; McAuliffe & Cornwell, 2008; McAuliffe & Ward, 2006). This information has also proven to be useful in both assessing and treating articulation difficulties.

EPG use in treatment was first reported in 1977 by Abe, Fukusako, and Sawashima. Their publication described the treatment of 60 patients with cleft palate. Since that time, researchers and designers have worked together to make EPG more practical, affordable and accessible to clinicians, for examples see (Barry, 1989; Gibbon & Paterson, 2006; Hamlet, 1973; Hamlet & Stone, 1978; Hardcastle, Gibbon, & Jones, 1991; Hardcastle, Jones, Knight, Trudgeon, & Calder, 1989; Schmidt, 2007; Wrench, 2007).

## Treatment of Articulation and Phonological disorders

Numerous studies have been published concerning the use of EPG in the treatment of many articulation and phonological disorders in both children and adults. These studies include those for rhotic sounds (Schmidt, 2007); velar and alveolar plosives, fricatives and affricates (Carter & Edwards, 2004; Dent, 2001; Dent, Gibbon, & Hardcastle, 1995; Friel, 1998; Gibbon, 1999; Gibbon, Dent, & Hardcastle, 1993; Gibbon, Hardcastle, Dent, & Nixon, 1996; Gibbon, Mcneil, Wood, & Watson, 2003; Hardcastle, Barry, & Clark, 1987; Hardcastle et al., 1991; McAuliffe & Ward, 2006; Schmidt, 2007); velar nasal ng (Gibbon et al., 2003; Schmidt, 2007); lateralization of sibilant fricatives and affricates (Dagenais, Critz-Crosby, & Adams, 1994; Dent et al., 1995; Gibbon & Hardcastle, 1987; Gibbon et al., 1996; Gibbon, Hardcastle, & Moore, 1990; Syder, 1998); phonological disorders (Dagenais, 1995; Dent, 2001; Dent et al., 1995; Hardcastle et al., 1987; Hardcastle et al., 1991; McAuliffe & Ward, 2006).

In 2006, Gibbon surveyed speech-language therapists in Scotland who treated children with articulation disorders or cleft-palate over the course of 10 years. The results indicated that speech-language therapists judged that the majority of participants had improved their articulation to some extent, and almost all had increased awareness their own articulation difficulties.

**Accent Modification** (Bright, 1999; Gibbon, Hardcastle, & Suzuki, 1991; Hazan, 2005; Schmidt & Beamer, 1998)

**Cleft-palate** (Abe et al., 1977; Bernhardt, Bacsfalvi, Gick, Radanov, & Williams, 2005; Butcher, 1996; Dent et al., 1995; Fujiwara, 2007; Gibbon, 2004; Gibbon et al., 1998; Gibbon, Ellis, & Crampin, 2004; Gibbon & Hardcastle, 1989; Gibbon et al., 2001; Gibbon, Smeaton-Ewins, & Crampin, 2005; Hardcastle et al., 1991; McAuliffe & Ward, 2006; Michi, Suzuki, Yamashita, & Imai, 1986; Michi, Yamashita, Imai, Suzuki, & Yoshida, 1993; Schmidt, 2007; Suzuki, 1989; Whitehill, Stokes, & Yonnie, 1996)

## Hearing Impairment

(Bernhardt et al., 2005; Bernhardt, Gick, Bacsfalvi, & Ashdown, 2003; Crawford, 1995; Dagenais, 1992; Dagenais, Critz-Crosby, Fletcher, & McCutcheon, 1994; Dent, 2001; Dew, Glaister, & Roach, 1989; Martin, Hirson, Herman, Thomas, & Pring, 2007; Schmidt, 2007)

## Cochlear Implant

(Bernhardt, Loyst, Pichora-Fuller, & Williams, 2000; Butcher, 1996; Panteleimidou, Herman, & Thomas, 2003)

**Apraxia of Speech** (Hardcastle et al., 1991; Howard & Varley, 1995; Lundeborg & McAllister, 2007; McAuliffe & Ward, 2006; Schmidt, 2007)

**Dysarthria** (Barry, 1995; Goldstein, Wolfram, Vogel, & Hoole, 1994; Hamilton, 1993; Hardcastle et al., 1987; Morgan, Liegeois, & Occomore, 2007)

**Swallowing** (Chi-Fishman & Stone, 1996)

**Stuttering** (Forster & Hardcastle, 1998)

**TBI** (Goldstein et al., 1994; Hartelius, 2005; Kuruvilla, Murdoch, & Goozee, 2008; Morgan et al., 2007)

**Glossectomy** (Suzuki, 1989)

**Down Syndrome** (Gibbon et al., 2003; Hamilton, 1993; Timmins, Cleland, Wood, Hardcastle, & Wishart, 2009; Wood, Wishart, Hardcastle, Cleland, & Timmins, 2009)

**Cerebral Palsy** (Gibbon & Wood, 2003)

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