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Reflections on Speech Motor Control Based on Phonatory and DDK Tasks in Dysarthric Subjects with Lesions in Different Cerebellar Loci

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INTRODUCTION

Cerebellar involvement in speech motor control has been well supported by observations made on subjects with ataxic dysarthria (Kent & Kent 2000). Most of these studies involved subjects with nonfocal lesions, which were not restricted only to the cerebellum and included etiological factors, which varied from degenerative to diffuse lesions in cerebellum. The observations based on these studies are now questioned since the emerging concept strongly suggests a differential localization pattern for speech in different cerebellar loci (Kent, Duffy, Slama, Kent & Clift 2001). Supporting this notion, Boutsen & Christman (2002), attributed the role of right cerebellar hemisphere in syllabic durations and the role of left cerebellar hemisphere in overall speech rate control. The "Differential cue lateralisation hypothesis" and the explanation of cerebro-cerebellar interactions by van Lancker and Sidtis (1992) substantiate this stand. As per this hypothesis, the spectral aspects of speech are controlled by right cerebral hemisphere (and consequently the left cerebellar hemisphere due to contralateral connection) and temporal aspects of speech are controlled by left cerebral hemisphere (and consequently the right cerebellar hemisphere due to contralateral connection).

Uncommon or different clusters of speech system errors are reported in ataxic dysarthria, which is explained based on a differential localization of speech function within and between the two cerebellar lobes (Duffy 1995). Further, the differences in characteristic features of ataxic dysarthria are also reported to be sensitive to the selected speech task (Kent, Kent, Rosenbek, Vorperian & Weismer 1997). No study has attempted to examine in detail the speech characteristics associated with lesions in different cerebellar loci. Few studies which made an attempt