Laterality of the command center in relation to handedness and simple reaction time: a clinical perspective

To the Editor: To the extent that handedness has been a faithful guide to clinicians as to laterality of motor control in their patients (at least among the right-handers), the recent contrary pronouncement by Gonzalez and colleagues (2006) in the Journal invites comments. For more than a century, clinical neurologists have kept tabs on the exceptions to the above rule by cataloguing those cases as “crossed aphasia” and “crossed nonaphasia” in dextrals or sinistrals, as the case may be (Hund-Georgiadis et al. 2001), awaiting a verifiable resolution as to their status in the larger scheme of hemispheric asymmetries (specializations).

The new understanding that motor control at the population level is dichotomous, and that (behavioral) handedness is merely a statistical (as opposed to biological) reflection of the anatomy underpinning it, resolves the confounding of the two modes of laterality revealed in the authors’ interpretation of their findings.

Thus instead of movement times of the two hands, which they found to be equal in their right- and left-handed participants (p. 3498), the interest would have been in the reaction times of both sides, which the authors indicated they had measured (p. 3497). Because of right or left laterality of the command center, all of their participants will show a right- or left-hand lead in such measurements, representing laterality of motor control (the command center, major hemisphere) in their subjects regardless of their behavioral handedness (see following text). Evidence shows that roughly 80% of the subjects will show a right-hand lead (left hemisphere laterality) in such a test and the remainders a left-hand lead (representing interhemispheric transfer time; see following text) (Savage and Thomas 1993; Shen and Franz 2005). Numerous clinical studies have shown diversity (nonhomogeneity) among right- and left-handed groups. Thus nearly 10% of the right-handers and 50% of left-handers are wired for a laterality opposite to that displayed in their daily life, a ratio similar to that seen in the authors’ Figs. 2 and 3. Although the authors made reference to more recent examples of such contrasts in laterality of motor control (a dissociation between representation of tool-use skills and hand dominance) (Frey et al. 2005), Liepmann’s celebrated Imperial Counselor, who lost control of his ostensibly dominant right hand after a stroke involving the corpus callosum, is the first of such cases reported in the clinical literature (Goldenberg 2003). Hund-Georgiadis et al. (2003) provided a remarkable side-by-side pictorial of a situation similar to that in patients described by Frey et al. (2005) in two right-handers, using functional MRI of the brain. I previously reviewed the iatrogenic examples of these occurrences elsewhere (Derakhshan 2005). To sum, the command center controls movements of both sides of the body, using the callosum for the control of the side ipsilateral to it (Derakhshan 2005, 2006). Moving the nondominant side of the body requires callosal participation. Self-reported handedness is a code for the directionality of callosal traffic just mentioned, modified by human will.

This issue has practical implications in determination of laterality of seizure onset and for placement of electrodes in deep brain stimulation for tremor or Parkinson’s disease (Derakhshan 2006). As a clinical neurologist, I would be very grateful for the authors’ comments as well as for providing the additional information mentioned above.

REFERENCES


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