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Eve Marder, PhD
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Title: Laterality of the Command Center in Relation to Handedness and Simple Reaction Time: A Clinical Perspective

Dear 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 in the Journal invites comments:

For more than a century, clinical neurologists have kept tabs on the exceptions to the above rule by cataloging those cases as “crossed aphasia” and “crossed nonaphasia” in dextrals or sinistrals as the case may be, 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 (page 3498), the interest would have been in the reaction times of both sides; which the authors indicated they had measured (page 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 below). Evidence shows that about 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 below). Numerous clinical studies have shown diversity (nonhomogeneity) among right and left handed groups. Thus, ~90% of the right 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.

While 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), Liepmann’s celebrated Imperial Counselor, who lost control of his dominantly right hand following a stroke involving the corpus callosum, is the first of such cases reported in clinical literature. Hund-Georgiadis et al provided a remarkable side by side pictorial of a situation similar to the patients described by Frey et al in two right handers, employing functional MRI of the brain. I have reviewed the iatrogenic examples of these occurrences elsewhere. 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. 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. As a clinical neurologist, I would be very grateful for the authors’ comments as well as for providing the additional information mentioned above.
References:


