

# Does the Human Body Express a True Lateral Dominance?

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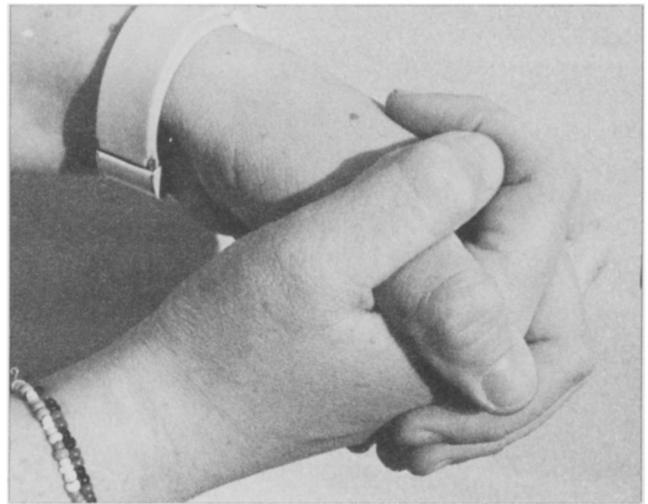
ON the average, one out of every ten students in the United States favors his or her left hand while nine prefer their right. This disparity has often led to unjust ridicule and torment. Extension of the left hand in greeting, for example, is considered by most to be poor etiquette, and the manipulation of objects with the left hand generally is considered awkward and mediocre. Parents of left-handed children often encourage them to use their right hand; for generations, primary school educators have exerted pressure on left-handed students to adopt dextral usage. Only in the last decade have we recognized the plight of left-handers and the severe handicap dextral society has placed on them (Blakeslee 1980; Lord 1986b).

The increased interest in recent years in dextral-sinistral side preference probably resulted from increased knowledge of cerebral asymmetry. Over the past 20 years there has been a renaissance fascination in the dualistic behavior of the right and left sides of the brain. Based on neurological investigations, long lists of behavioral characteristics directed by each hemisphere have been compiled, based on neurological investigations (Blakeslee 1980; Lord 1986a; Witelson 1985). Roger Sperry, a noted cognitive psychologist and Nobel Laureate, describes the left brain as regional, segmental and analytical. The right brain is more holistic, iconic and spatial in its cognitive operation (Sperry 1975). Such neuropsychological studies suggest a brain make-up that many researchers feel typifies the cerebral anatomy of a right-handed person; they are not as sure for those who are left-handed. Studies show that for most right-handers, the hemisphere that controls verbal-analytical thinking also controls sensory and motor activities (Grist 1984; Plato 1984).

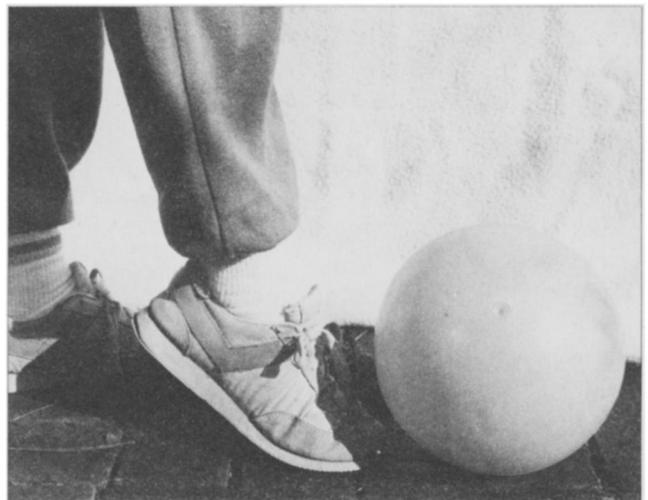
Since more than three-quarters of the afferent and efferent neural pathways cross to the opposite side of the body in the brainstem, the left hemisphere controls the motor and sensory information to and from the right side of the body. The right hemisphere directs similar motor and sensory activities on a person's left side. Some research suggests that most people are right-handed because their left hemi-

sphere is larger (Bello 1986). Post-mortem autopsies tend to support the fact that the two cerebral hemispheres are asymmetrical (Yakovlev & Rakic 1966).

This difference in the size of the two brains has led many to conclude that one hemisphere is dominant



To test for thumb preference the subject is asked to interlock her fingers. The experimenter notes which thumb covers the other.



To test for foot preference a ball is rolled to a subject who is directed to kick it into a small box. The experimenter should note which foot is used.

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over the other. Bliss and Morella (1980), contemporary researchers on dextral-sinistral relationships, state that, "cerebral dominance is obviously related to . . . (an) . . . autonomic preference for one side of the anatomy over the other," while psychologist James DeKay (1974) states when a person's right hemisphere is dominant, that person will be left-handed. This logic, however, is called into question by studies on sinistral individuals. Noted neurosurgeon Joseph Bogen (1969) has stated that while right-handers are all pretty much alike neurologically, left-handers vary enormously. In a recent study, a group of lefties was given a series of tasks to perform (Fincher 1977). To the researcher's surprise, not one person in the sample was exactly like another and no member was entirely left-handed. The study found, for example, that many lefties unscrewed jar lids with one hand and unscrewed the tops of toothpaste tubes with the other.

This has led many behavioral scientists to speculate the sinistral condition results from true cerebral symmetry; that is, neither hemisphere exhibits complete control of the body's motor functions. Psychotheorist Robert Trotter (1974) suggests that while right-handedness results from left hemisphere dominance, right hemisphere dominance rarely exists, so left-handed individuals are directed equally by both hemispheres. Neuroscientists have termed this phenomenon cross-cerebral or mixed dominance.

Mixed dominance may, however, led to psychological distress in the individual. For years, psychologists have noted that more left-handers experience pre-school and early school adjustment problems and tend to be more individualistic in their behavior (Halpern & Coren 1988; Horgan 1988). Furthermore, many more adult misfits are left-handed than would be statistically predicted. Research psychologist Jon Durkin (1977) predicts one out of every four individuals in the U.S. has some degree of cross-dominance of their cerebral hemispheres.

Furthermore, man's structural anatomy contributes to cross-dominance hypotheses. When a sagittal plane is extended through the body, each side holds one member of the paired organs (i.e., eye, arm, lung, kidney). The matching counterparts establish the bilateral symmetry of the human form. Physiological and behavioral studies show the body generally favors one member in each pair. Respiratory activity, muscular strength, tactile discrimination and renal filtration, for example, are more developed on the right side of the body for most people (Lord 1986a). "Think of the fact," write Bliss and Morella (1980), "that we are not only left- or right-handed, but also have a dominant eye, dominant leg and foot, even a dominant thumb. Cerebral dominance is obviously related to this apparently automatic preference for one side of the anatomy over the other."

In practice, however, contemporary studies indicate that many humans do not fit neatly into this brain dominance-lateral preference hypothesis (Byrne 1988; Lord 1986b). In a recent study of sixth-grade school children, for example, participants were tested for thumb, foot, eye and hand preference. Results indicated only nine of the 50 pupils tested were totally dominant on one side (Lord & Lord 1986).

With this in mind, a study was developed to find the proportion of cross-dominance in a population of young adults. Fifty undergraduate men and women were randomly selected and tested on 20 tasks designed to measure their preference in manual dexterity, hand strength and thumb, eye, leg and foot dominance (Figure 1). The tasks were developed from activities suggested in 1980 by Bliss and Morella

Thumbnail . . . . .	Nail more squared off on the dominant thumb at its base
Write . . . . .	The hand most frequently used in writing
Hand strength . . . . .	The strongest hand as measured by squeeze
Hand usage . . . . .	The hand most frequently used in a task (hammering)
Cross thumb . . . . .	The thumb on top when fingers are interlocked
Thumb to pinky . . . . .	The thumb to pinky angle nearest 180° when touching at their tips
Circle the Xs . . . . .	Counter clockwise (right dominant) or clockwise (left dominant) circle of an X
Take off shoe . . . . .	The shoe most frequently taken off first
Cross legs . . . . .	The leg most frequently crossed over the other
Step forward . . . . .	The leg used first when taking a step
Put on shoe . . . . .	The shoe most frequently put on first
Rip paper . . . . .	The direction a sheet of paper is ripped in two
Cylinder-eye usage . . . . .	The eye used when looking through a cylinder
Hole-eye usage . . . . .	Image held constant when viewed through a hole is shifted to right or left eye
Kick a ball . . . . .	The foot most frequently used to kick a ball
Raised arm . . . . .	The arm raised to summon attention to self
Fall forward step . . . . .	The leg extended to prevent a fall forward
Cross arm . . . . .	The arm on top when arms are folded across chest
Draw a profile . . . . .	The direction nose is pointing when face profile is drawn
Unscrew tight lid . . . . .	The hand used to unscrew a tight lid on a jar

Figure 1. A description of the 20 tasks to determine preference for the right or left side of the body.



nance (the interlocking fingers and prehensile tests), leg dominance (crossed legs and the first step tests) and shoe donning and removal (Table 1).

Data was next examined for the expected ratio of a dextral to sinistral dominance (10:1). This revealed that only five of the 20 tasks fell significantly within the expected frequencies (Table 2). Furthermore, one could argue all five traits could be strongly influenced by the environment. For example, some would suggest social pressure to adopt right hand usage also influences hand strength (DeKay 1974).

When test results were examined for right-left symmetry, additional observations of interest were noted (Figure 2). Research conducted two decades ago by Theodore Blau (1974) found that about half the population favored their left hand when asked to perform simple, unmediated tasks. When the data was scrutinized for symmetry, many of the tasks that had not reached significance on the previous analysis gained statistical importance. The majority of tasks, however, were too far from the projected symmetrical dichotomy to be considered a reliable measure. Only seven of the 20 tasks followed projected outcomes.

Overall, most tasks favored the right side of the body slightly. Only thumb and arm dominance, as determined by crossing and noting the top structure, were favored more on the left side of the body. Few tasks, however, were far enough from the predicted median to eliminate a chance occurrence.

Results of this study are indeed surprising. The initial hypothesis was that the vast majority of participants would show no cross-dominance; that is, right-handed subjects would express a right side preference for all traits. This assumption was based on research that body preference is contralaterally related to the dominant brain hemisphere. Instead, only a third of the tasks followed this prediction.

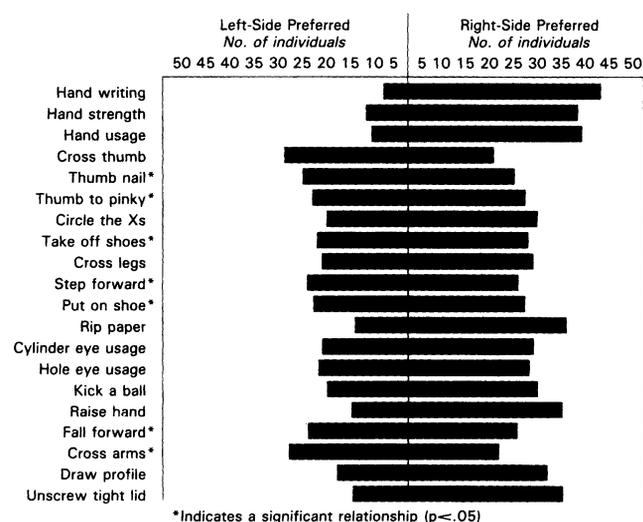


Figure 2. Number of individuals having a right-side or left-side preference for each of the 20 traits.

It may be that the environmental pressures favoring dextral usage are so strong they upset expected frequencies. However, tasks not directly influenced by environmental pressures (i.e., eye dominance) are also disparate. Although some tasks in the study may not be accurate indicators of sinistral-dextral dominance, most probably are. Therefore, lateral dominance in humans is not supported by this study.

This research supports the idea that everyone suffers, to some degree, from cross-dominance in their cerebral hemispheres. If cross-dominance leads to psychological and physiological disorders, as many researchers predict, then almost everyone suffers from disorders. The oddball is the individual who has perfect lateral dominance. The sinistrals of the world should rejoice; they are the minority no longer.

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