

What is Handedness?

1 Handedness is the dominance of one hand over the other, or the unequal distribution of fine motor skills between the left and right hands. It refers to the tendency of humans to be more dextrous or skilled with one hand over the other, or sometimes merely the preference of one hand over the other. It is usually used with reference to fine motor skills and the performance of manual tasks, particularly everyday activities such as writing, throwing, etc.

Theories of Handedness

Neurological Theories

2 One theory for the existence of handedness and hand preference in humans, and particularly for the dominance of right-handedness, arises from brain neurology, and the way in which fine motor skills are processed in the brain.

3 In most people, the left hemisphere of the brain is largely responsible for speech – an activity that employs many fine motor skills, involving the mouth, tongue, etc. The left hemisphere of the brain is also responsible for coordinating the movement and motor skills of the right side of the body, with the right hemisphere largely controlling the left side of the body. It is argued by some that it is more efficient, and requires less energy consumption, for the brain to process these two important fine motor skill functions in the same hemisphere of the brain, hence the right-hand/left-hemisphere dominance of the majority of the population. The theory also goes some way to explaining why non-humans, who lack the faculty of speech, have not developed hand dominance to anything like the same extent as humans.

4 This idea is supported to some extent by a 2010 French study, which showed that, when people hear spoken syllables, there is synchronized neural activity in the areas in the left hemisphere of the brain which are involved in both speech and in hand and mouth motions. There is no **such activity** in response to smaller units of speech, i.e., phonemes. The study authors suggest that our brains are hard-wired to process language and gestures on the same side of the brain, which, for the right-handed majority of people, is the left side. This also supports the idea that speech initially arose from a combination of short sounds and hand gestures, typically made with the dominant right hand.

Pathological Theories

5 Most biological theories of handedness are so-called “pathological theories”, which essentially claim that left-handers are just brain-damaged right-handers. They start from the assumption that right-handedness is the natural norm and that left-handedness is an aberration. Within these theories, left-handedness is argued to be caused by one or more of various stressors or physical trauma, an assumption that many left-handers take issue with. Such theories revolve around the idea that, if the right half of the brain (which controls the left side of the body) is damaged during pregnancy or during the birth itself, then the default right-handedness of the baby remains unchanged. If, however, the left side of the brain is damaged due to some kind of trauma, then the brain’s natural plasticity will shift the responsibility for complex skilled movement to the right hemisphere of the brain, resulting in left-handedness.

Evolutionary Theories

6 Up until the 1980s, there was no evidence that other non-humans, even the higher apes, showed any signs of handedness. Although individual animals do tend to have a hand/paw preference, no preference was observed at the species or population level, where it appeared to remain close to 50% right and 50% left. The early assumption was, then, that

our handedness probably arose sometime after human evolution split from that of the other primates (i.e., the most developed and intelligent group of mammals, including humans, monkeys, and apes) some 5-7 million years ago, and that **it** probably developed as a result of, or alongside, another peculiarly human achievement, speech.

7 More recent work with captive chimpanzees by Bill Hopkins at the Yerkes Regional Primate Research Center in Atlanta, USA, though, has muddied the waters somewhat. Hopkins, whose work is admittedly contentious, claims that his chimpanzees exhibit a 70% right-handed preference for many tasks requiring manual dexterity, a rate that rises to almost 98% for very specific tasks, like the precise over-arm throwing of objects, although for food-related tasks (like cracking nuts or digging out honey, for example) the rate remains closer to 50-50. Hopkins has hypothesized from this that the evolutionary trigger for handedness was perhaps not speech at all but the increased need for motor coordination, and that this may therefore have occurred significantly further back in the evolutionary story, even before humanity's split with other primates.

Carrying Mothers Theory

8 William Calvin developed another evolutionary theory of handedness in the early 1980s. His starting point was the well-documented fact that the vast majority of mothers throughout history have carried their babies on their left side, partly to free up their dominant right hand for other tasks. Also, as the baby can easily hear the mother's comforting heartbeat, it tends to cry less. Calvin believes that women in the early days of mankind were also involved in hunting, and that those with the quieter left-carried babies were more successful hunters and breeders, thus perpetuating the dominance of right-handedness. The theory is, however, impossible to prove, as it is purely based on conjecture, and several drawback and inconsistencies immediately jump to mind.

Complementary Tasks Theory

9 Robert Sainburg's research has concentrated on further clarifying the roles played by the dominant and non-dominant hands, and he has developed a sort of evolutionary theory of handedness from this. His work has shown that, although the dominant hand is more accurate for many tasks, the non-dominant side is actually quicker and, perhaps even more importantly, responds better after destabilization. An everyday example of this is the so-called "barman effect", whereby a waiter can remove glasses with his dominant hand from a tray held in his non-dominant hand, automatically anticipating and compensating for the weight and balance destabilization. Sainburg has hypothesized from this that handedness may have developed in order to enable complementary tasks, and that the two hands became specialized for different functions, **each** being just as skillful in its own way.

Fighting Hypothesis

10 The so-called Fighting Hypothesis can be seen as another evolutionary explanation for the continued existence of left-handedness. It argues that left-handedness confers an advantage in combat - and therefore an evolutionary advantage - because the vast majority of opponents faced by left-handers are right-handers (the majority of the population), who are less practiced at dealing with the different angles, stances, etc, presented by left-handed combatants. The Fighting Hypothesis also claims to explain the greater frequency of left-handed males compared to left-handed females (which is repeatedly found in studies), on the grounds that male-male fighting is a more common occurrence than other combinations and so it is the males who stand to profit the most from the left-handed fighting advantage. However, although this theory may explain, at least to some extent, why left-handers have not died out completely in a world where the main evolutionary advantages appear to belong to right-handers, it does not provide a cogent theory for the development of handedness in the first place.

QUESTIONS

Answer the following questions according to the reading text. The questions are in the order the information appears in the text. For all of the questions, you just need to copy directly from the passage; you do not need to paraphrase or change the form of any words. Give precise answers and write the answer only; do not write anything else.

1. One neurological explanation posits that it is because humans are capable of _____ that they have developed right-hand dominance.
2. The 2010 French study lends support to the idea that the origin of speech can be traced to the co-occurrence of _____ and _____.
3. The author points out that pathological theories regard left-handedness as a/an _____, taking for granted that right-handedness is _____.
4. While it was previously assumed that handedness in humans evolved along with speech, Bill Hopkins attributed the development of handedness to _____.
5. William Calvin argued that babies carried by mothers on their left side were quieter because these babies could _____.
6. Robert Sainburg points out that the non-dominant hand has evolved to adjust better when _____ occurs during complementary tasks.
7. According to the Fighting Hypothesis, the finding that on average left-handed females are outnumbered by left-handed males can be attributed to the prevalence of _____.

Referrals:

What does each of the following underlined in the text refer to?

8. such activity (par. 4) = _____
9. it (par. 6) = _____
10. each (par. 9) = each of the _____