



Three articles on handedness

Article #1: Handedness

[Encyclopedia of Childhood and Adolescence](http://findarticles.com/p/articles/mi_g2602/is_0002/ai_2602000290) by [Zoran Minderovic](#) *Gale Encyclopedia of Childhood & Adolescence*. Gale Research, 1998. (online at http://findarticles.com/p/articles/mi_g2602/is_0002/ai_2602000290)

The term **handedness** describes a characteristic form of specialization whereby a person by preference uses one hand for clearly identified activities, such as writing. For example, a person who uses his or her right hand for activities requiring skill and coordination (e.g., writing, drawing, cutting) is defined as right-handed. Roughly 90% of humans are right-handed. Because left-handed children who are forced to write with their right hand sometimes develop the ability to write with both hands, the term ambidexterity is often used in everyday parlance to denote balanced handedness.

An often misunderstood phenomenon, handedness is a result of the human brain's unique development. While the human mind is intuitively understood as a single entity, research in brain physiology and anatomy has demonstrated that various areas of the brain control different mental aptitudes, and that the physiological structure of the brain affects our mental functions. The brain's fundamental structure is dual (there are two cerebral hemispheres), and this duality is an essential quality of the human body.

Generally speaking, each hemisphere is connected to sensory receptors on the opposite side of the body. In other words, the right hand is controlled by the left hemisphere of the cerebral cortex. When scientists started studying the brain's anatomy, they learned that the two hemispheres are not identical. In fact, the French physician and anthropologist **Paul Pierre Broca** (1824-1880) and the German neurologist and psychiatrist **Carl Wernicke** (1848-1905) produced empirical evidence that important language centers were located in the left hemisphere. Since Broca's findings were based on right-handed subjects, and since right-handedness is predominant in humans, psychologists felt prompted to develop the notion of the left hemisphere as the dominant part of the brain. Furthermore, Broca formulated a general rule stating that the language hemisphere is always opposite of a person's preferred side. In other words, the left hemisphere always controls a right-handed person's language abilities. According to Broca rule's, left-handedness would indicate a hemispheric switch.

Handedness research, however, uncovered a far more complex situation. While Broca's rule works for right-handers, left-handed people present a rather puzzling picture. Namely, researchers have discovered that only about two out of 10 left-handers follow Broca's rule. In other words, most left-handed people violate Broca's rule by having their language center in the left hemisphere. Furthermore, the idea of clearly defined cerebral dominance seems compromised by the fact that some 70% of left-handed people have bilateral hemispheric control of language.

While hemispheric dominance can be observed in animals, only humans have a clearly defined type of dominance. In other words, while animals may be right or left "pawed," only humans are predominantly right-handed. The American developmental psychologist Arnold Gesell (1880-1961), known for his pioneering work in scientific observation of child behavior, noted that as early as the age of four weeks infants display signs of handedness. At that age, according to Gesell, right-handed children assume a "fencing" position, right arm and hand extended; by the age of one, right-handedness is clearly established, the child using the right hand for a variety of operations, and the left for holding and gripping.

Predominant right-handedness in humans has led researchers to define right-handedness as genetically coded. If left-handedness also had a genetic basis, was it possible to establish inheritance patterns? However, empirical studies, even studies of identical twins, have failed to establish left-handedness as a genetic trait. For example, a person with two left-handed parents has only a 35% chance of being left-handed.

In the past, left-handedness was associated with mental deficiency, as well as emotional and behavioral problems, which led to the popular belief, strengthened by folklore, that left-handed people were somehow flawed. In addition, left-handedness has also been associated with immunological problems and a shorter life span. While not devoid of any foundation, these ideas are based on inconclusive, and sometimes even deceptive, evidence. For example, statistics may indicate a shorter life-span for left-handers, but what statistics omit is the fact that higher mortality should probably be attributed to accidents in an often dangerous right-hand world.

An even greater challenge than right-handed scissors and can openers is what psychologist Stanley Coren calls "handism," the belief that right-handedness is "better" than left-handedness. The idea that left-handers need to conform to a dominant standard has traditionally been translated into punitive educational practices whereby left-handed children were physically forced to write with their right hand. While there is a growing awareness among educators and parents that left-handedness should not be suppressed, the left-handed child is still exposed to a variety of pressures, some subtle, some crude, to conform. These pressures are reinforced by a tradition of maligning left-handed people. Major religious traditions, such as Christianity, Buddhism, and Islam, have described left-handedness in negative terms.

Current language is also a rich repository of recorded animosity toward left-handers. For example, the word left evolved from the Anglo-Saxon *lyft*, which means weak. The Latin word *sinister*, meaning left and unfavorable, is still used to denote something evil, and *gauche*, the French word for left, generally indicates awkwardness. The numerous expressions which imply that left is the opposite of good include a left-handed compliment.

Being a left-handed child still has many disadvantages, despite the efforts made to accept left-handedness. Even children whose parents and teacher tolerate their left-handedness often suffer in school. For example, a left-handed student's paper may be down-graded for being "sloppy" because of the teacher's unconscious reaction to handwriting that just doesn't seem "right." In addition, art and science projects may receive unfair criticism because the teacher did not realize that the left-handed student was struggling with instruments and equipment designed for the right-handed majority. In essence, as advocates of left-handers have pointed out, it is not enough just to tolerate left-handedness: the right-handed world should become user-friendly for individuals exhibiting all the varieties of handedness.



Article #2: What Makes a Lefty: Myths and Mysteries Persist

By [Corey Binns](http://www.livescience.com/health/060321_left_hand.html), Special to LiveScience (online at http://www.livescience.com/health/060321_left_hand.html)

Can openers, scissors and spiral-bound notebooks discriminate against lefties. Despite such challenges, 10 to 12 percent of the human population has historically preferred the left hand.

Why doesn't the number ever waiver? Nobody knows for sure, but new research supports a body of evidence that suggests genetics have a hand in it all.

In the meantime, the myth remains that lefties are more artistic. And the idea that left-handed fighters have an advantage persists on scant evidence, supported by Scottish lore and Rocky Balboa's heroics in the ring.

Look, Mom: Both hands!

Like many traits, handedness is probably determined by a complex interaction between genes and the environment, experts figure.

Left-handers are more likely to have a left-handed relative. But researchers have yet to find the gene or set of genes that pick one hand over the other.

Most scientists agree that handedness exists on a continuum. The idea helps explain why some people bowl with their left but hold a spoon in their right. Truly ambidextrous people, who have indifferent preference for either hand, are extremely rare.

In a new study, researchers measured the width of elbows in living people and in skeletons from a medieval British farming community.

The researchers assumed the 9-to-1 ratio of handedness would match the ratio of bigger right to left elbows. The prediction held true in the modern-day group, but not for the medieval bones.

Most of the ancient farmers' left and right elbows were the same size.

"It's obvious that they were using both hands equally," said anthropologist Amanda Blackburn from the University of Manitoba. "It's not fair to say they were ambidextrous in the true sense of the word, but they may have had a tendency to use both hands equally. It's a behavior they may have learned rather than just being born like that."

The findings will be published in the April issue of the journal *Current Anthropology*.

Oppressing the left

Lefties have long suffered. In India and Indonesia, eating with the left hand is considered impolite. Chinese characters prove extremely difficult to write with the left hand. Not so long ago, teachers slapped the wrists of left-handed American elementary students.

Humans have shown the ability to learn to use their non-preferred hand after injuries, when required to perform manual labor, or in the face of cultural pressure.

Yet preference for handedness appears to take root in the womb, or even earlier.

One genetic model, called the right shift theory and developed by psychologist Marian Annett at the University of Leicester, suggests that a single gene increases the likelihood of being right-handed.

"The essence of my right shift theory is that there is a gene that helps to develop speech in the left hemisphere of the brain and increases the probability of right-handedness," Annett told *LiveScience*.

Whatever evolutionary jog made humans left-brain dominant for speech also made us right-side dominant, Annett argues. Since our [closest relatives](#)—chimpanzees—can't talk, the gene must have arisen in recent evolutionary history. One study found most [chimps prefer to fish](#) for termites with their left hand. But other recent research shows most chimpanzees favor their right hand when throwing overhand.

"The prevailing genetic model seems to be pretty strong. There are only a few weak points that are yet to be addressed. Not only can they not pinpoint a gene, there's conflicting data out there too," said David Wolman, author of "A Left Hand Turn Around the World" (Da Capo Press, 2005).

In a twist on the genetic model, the gene for hand preference might also be the gene for [hair whorl direction](#), the way a person's hair turns on the top of their head. Half of people with counterclockwise whorls prefer their left hand, according to research by Amar Klar at the National Cancer Institute.

The same system that patterns hair and handedness could also play a role in the asymmetrical organization of the brain. "It is clear that the same genetics control both traits, along with the side of the brain where language is processed," said Klar.

The artistic myth

The answer to left-handedness is likely in the brain, and probably has to do with that organ's asymmetry, scientists generally believe. Somewhere in our lopsided brains is something, probably a gene or two that determines which hand prefers to throw a ball and which hand likes to write.

Unfortunately, scientists can't open up someone's brain and see a sign for hand preference Wolman said.

For anyone to move their left hand, or anything on their left side, instructions come from the right side of the brain. Motor centers of the brain control the hands; lefties have more dominant motor centers on the right side of their brain.

But just because the directions come from the side of the brain associated with artistic function, doesn't mean a lefty's more likely to compose a Shakespearean sonnet.

"The big myth is that the right side of the brain is somehow a creativity bull's-eye. That's not the case, and doesn't have anything to do with handedness. You need resources from both sides of your brain to be creative. All people use both sides of the brain," Wolman told *LiveScience*.

Fighting advantage

Lefties have had the upper hand in hand-to-hand combat since the Bronze Age, and even today, in the boxing ring. Left-handedness could be beneficial in times of violence, and genetically passed from one generation of fighters to the next, as shown by Charlotte Faurie and Michel Raymond of the University of Montpellier II in France.

While a righty fought with a sword in his right hand and a shield in his left, a left-handed swordsman could make strong surprise attack on the opponent's unprotected right side. Recall Rocky Balboa's last-minute switch to his southpaw.

The Kerr family of Scotland, known for sinister swordsmanship, went so far as to build Ferniehirst Castle with an unusual staircase that spiraled counterclockwise. The architecture provided left-handed fighters more freedom to swing their sword.

Today, the common Scottish terms Kerr-handed, kerry-fisted and corry-fisted mean left-handed.

The concept of lefties advantageously killing off all the righties doesn't hold strong, however. The 9-to-1 ratio of right- to left-handedness existed long before the advent of sword and shield warfare and continues to this day.

Some researchers suggest prenatal levels of testosterone determine hand preference. Brain damage from trauma in the delivery room is another explanation. "Proud lefties cringe at the thought of it," said the left-handed Wolman.

"The genetic model has wider support among the laterality community than brain damage at birth or levels of hormones in the womb," Wolman said. "At the end of the day, everyone seems to go back to the gene."



The picture on the left shows a counterclockwise hair whorl. One-half of people with counterclockwise whorls are left-handed, while only a small percentage of people with a clockwise whorl (pictured at right) are left-handed.

Article #2: Left-handedness: Does it mean anything?

source: http://psychology.hypnoticworld.com/influence_personality/handedness.php

(note: this source is Hypnotic World, so although interesting, do not presume this is the definitive science source on left-handedness)

People who are left-handed are more dexterous with their left hand than with their right hand: they will probably also use their left hand for tasks such as personal care, cooking, and so on. Writing is not as good an indicator of handedness as it might seem, because many people who write with their right hand use their left for everything else.

Approximately 10-13% of the population is left-handed. People who can use both hands equally well are ambidextrous. True ambidexterity is rare.

Generally, males are three times more likely to be left-handed than females. Statistically, one twin of a pair has a 20% chance to be left-handed. Gay people may be up to 39% as likely to be left-handed as straight people (Habib, 2000).

Causes of left-handedness

No one knows for certain why the human population is right-handed-dominant, but a number of theories have been proposed.

Evolutionary theories: The warrior and his shield

This theory attempts to explain left-handedness by the position of a warrior's shield and his heart. Basically, since the heart is on the left side of the body, a warrior holding his shield with his left hand would be better able to protect his heart than if he held it with his right. Thus, a greater mortality of left-handers would explain the prevalence of right-handedness today.

There are a number of objections to this theory:

- The heart is not that far off center. While it is on the left side of the body, it is still fairly central in location. Protecting it with a shield would only result in a weak selective pressure, and there have not been enough generations since the Bronze Age.
- It predicts that more men would be right-handed than women. However, data indicates that more males are left-handed than females. Analysis of ancient cave paintings indicates that humanity was right-handed long before the Bronze Age.

Brain hemisphere division of labor

This is the most commonly accepted theory of handedness. The premise of this theory is that since both speaking and handiwork require fine motor skills, having one hemisphere of the brain do both would be more efficient than having it divided up. And since in most people, the left side of the brain controls speaking, right-handedness would prevail. It also predicts that left-handed people would have a reversed brain division of labor. Lastly, since other primates do not have a spoken language (at least of the type we have) there would be no stimulus for right-handed preference among them, and that is true.

Objections:

- It does not explain why the left hemisphere would always be the one controlling language. Why not 50% of the population left and 50% right?
While 95% of right-handers do indeed use the left side of the brain for speaking, it is more variable for left-handers. Some do use the right for linguistic skills, some use the left hemisphere, and others use both.
- On the balance, it appears that this theory could well explain some left-handedness, but it has too many gaps to explain all left-handedness.

Is left-handedness genetic?

Handedness runs in families, although even when both parents are left-handed, there is only a 26% chance of their child being left-handed. Thus, it is clear that genetics is not the only cause. Handedness must also be influenced by some of the other theories presented here.

Apparently, the Clan Kerr of Scotland built their castles with counter-clockwise staircases, so that left-handed swordsmen would be better able to defend it. However, a 1993 study found no statistically significant increase in left-handedness among people with the family name Kerr or Carr.

Many members of the British royal family are left-handed. Genetics is usually used to explain this.

Environmental theories on left handedness

Birth stress

Left-handed people cringe at this theory, because its basic premise is that left-handedness is due to brain damage during the birth process. Unfortunately, some statistics do back this theory up. Difficult or stressful births happen far more commonly among babies who grow up to be left-handed or ambidextrous. Birth stress is also associated with a number of birth defects and complications, including cerebral palsy and autism.

But there are objections; you can breathe easy now:

- Throughout history and throughout the world, the level of medicine and technology to assist with childbirth has improved. In spite of that, the proportion of left-handed people has not decreased. (In a sense, it has increased because more people see left-handedness as the benign trait it is.)
- It does not explain why humans are right-handed by default, with only birth stress making them left-handed. It could, however, explain left-handedness in combination with some of the other theories presented here.

Parental pressure

This theory explains right-handed dominance by claiming that since the parents who raised us are mostly right-handed, we came to be mostly right-handed and so on.

Objections:

- It does not explain how right-handed dominance started in the first place.
- The handedness of children is more closely related to their biological parents than to adoptive parents.
- It does not explain why left-handedness has persisted for so long.

Social stigma and repression of left-handedness

Throughout history being left-handed was considered as negative - the Latin word sinister meant "left". Hence the many negative connotations associated with the word "left-handed": clumsy, awkward, unlucky, insincere, sinister, malicious, and so on. There have been, however, many famous left-handed people, and the associated right brain hemisphere that is said to be more active in left-handed people, has been found in some circumstances to be associated with genius and is correlated with artistic and visual skill.

Until very recently in Taiwan, left-handed people were strongly encouraged to switch to being right-handed (or at least, switch to writing with the right hand). It is more difficult to write legible Chinese characters with the left hand than it is to write Latin letters. Remember that "easy" and "difficult" depend on the person using those terms, so your writing may be neater. Because it is supposedly easier to write when moving your hand towards its side of the body, it is easier to write the Roman alphabet with your right hand than with your left. Conversely, Arabic and Hebrew, which go from right to left, would be easier to write with the left hand. Again, "easier" and "harder" are subjective.

It is possible that sun worship relates to the association of the left with evil. People in the northern hemisphere, looking south, would see the sun rise on their left, move rightwards across the sky, and set on their right. In the southern hemisphere the opposite happens. Among cultures from the southern hemisphere, right-handedness is still dominant. No study on left-side connotations from those cultures has been done.

However, since most sun-worshipping cultures see the setting sun as it dying or vanishing, the right side would indicate the negative associations associated with a setting sun. This is the opposite trend from that.

Left-sidedness

In humans

Studies show that left-handedness does not necessarily correspond with "left-sidedness" (using your left foot to kick with, for example). The same thing holds with "agedness."

In animals

Most primates also exhibit a preference for using one hand over the other although their populations are not right-hand preferential.

Famous Left-handers

Rulers/politicians

- Alexander the Great
- Charlemagne
- Julius Caesar
- Napoleon Bonaparte
- King Louis XVI
- Queen Victoria of England
- George II of Great Britain
- Prince Charles, of England
- Prince William of Wales
- Fidel Castro

U.S. Presidents

- James A. Garfield
- Herbert Hoover
- Harry S. Truman
- Gerald Ford
- Ronald Reagan (converted to right-handedness in childhood)
- George H.W. Bush
- Bill Clinton

U.S. Politicians

- Senator Bill Bradley, Rhodes scholar, basketball star
- Barney Frank
- Benjamin Franklin
- Ross Perot
- Nelson Rockefeller

Criminals

- Osama bin Laden
- John Dillinger, bank robber
- Boston Strangler (Albert Henry DiSalvo), serial killer
- Jack-the-Ripper (?), serial killer

Artists

- Pablo Picasso
- Michelangelo
- Raphael
- Leonardo da Vinci

Musicians

- Eminem, rapper
- Natalie Cole

- Kurt Cobain (Nirvana)
- Phil Collins (Genesis)
- Billy Corgan (Smashing Pumpkins)
- Bela Fleck, jazz musician
- Glenn Frey (the Eagles)
- Judy Garland
- Kevin Griffin, guitarist & lead singer (Better than Ezra)
- Jimi Hendrix, guitar player, singer
- Isaac Hayes
- Tony Iommi, guitarist (Black Sabbath)
- Mark Knopfler, guitarist (Dire Straits, Notting Hillbillies)
- Chuck Mangione, trumpet
- Paul McCartney (the Beatles; Wings)
- Robert Plant (Led Zeppelin)
- Cole Porter, song-writer
- John Lydon a.k.a. Johnny Rotten (Sex Pistols / Public Image Ltd.)
- Seal
- Paul Simon (Simon & Garfunkel)
- Ringo Starr (?) (The Beatles)
- Michael Stipe (R.E.M.)

Actors

- Tim Allen
- Sacha Baron Cohen (Ali G and Borat)
- Matthew Broderick
- James Cameron
- Jim Carrey
- Tom Cruise
- Matt Dillon
- Celine Dion
- Robert DeNiro
- Whoopi Goldberg
- Mark Hamill
- Goldie Hawn
- Jim Henson, puppeteer of Kermit the Frog
- Angelina Jolie
- Nicole Kidman
- Steve McQueen
- Marilyn Monroe
- Sarah Jessica Parker
- Joe Piscopo, comedian
- Robert Redford
- Keanu Reeves
- Julia Roberts
- Jerry Seinfeld, comedian
- Terence Stamp
- Jon Stewart
- Emma Thompson

- Dick Van Dyke
- Bruce Willis
- Oprah Winfrey
- Joanne Woodward
- Milla Jovovich

Athletes

- Greg Louganis (diving)
- Mark Spitz (swimming)
- Bruce Jenner (decathlon)
- Dorothy Hamill (skating)
- Oscar de la Hoya (boxing)
- John McEnroe (tennis)
- Martina Navratilova (tennis)
- Monica Seles (tennis)
- Whitey Ford (pitcher)
- Barry Bonds (baseball)
- Ty Cobb (baseball)
- Ken Griffey, Jr. (baseball)
- "Shoeless" Joe Jackson (baseball)
- Reggie Jackson (baseball)
- David Justice (baseball)
- Don Mattingly (baseball)
- Babe Ruth (baseball)
- Casey Stengel (baseball)

Miscellaneous

- Lord Baden-Powell, founder of the Boy Scouts (ambidextrous)
- Edwin Buzz Aldrin, astronaut
- Henry Ford, automobile manufacturer
- Matt Groening, Simpsons cartoonist (as is his most famous character, Bart Simpson)
- Joan of Arc, French saint
- Helen Keller, advocate for the blind
- Jay Leno, TV host
- David Letterman, TV host
- David Rockefeller, banker