



The one-footed ape

Can we train elite football players to use both their feet?

We think we know a great deal about footedness in football. However, careful observations of what players do on the pitch reveals that our elite football heroes are much more one-footed than we think. David Carey of Bangor University explains.

Our sports pages are full of stories about football. Every year, one or two stories emerge which either bemoan the lack of 'two-footers' in the British game, or praise the incredible prowess of the left-footed player in a particular season. One of the best football players in the world right now is left-footer Lionel Messi of Barcelona. On the other hand, claims suggest that Cristiano Ronaldo can use both feet and is considered by some to be a better player than Messi.



The left-footed Lionel Messi

Key words

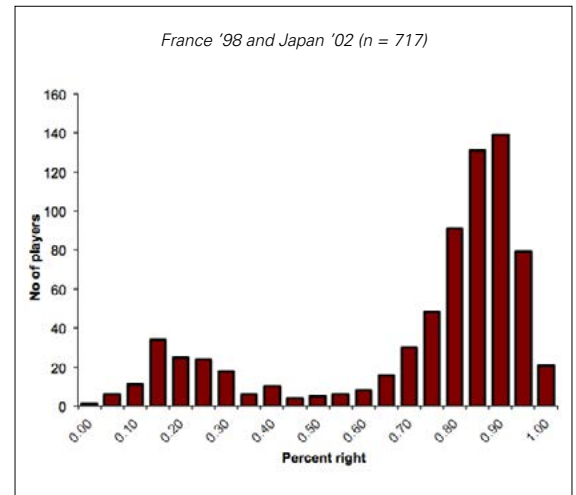
footedness
handedness
brain asymmetry
sport physiology



The two-footed Cristiano Ronaldo

In fact, we know remarkably little about how to make players more two-footed. Arguably, even the best coaching techniques in the world to date, are not particularly successful at doing so. We know this because research has shown that even the most elite players, as a group, are about as one-footed as the rest of us. Analysis of several matches from the World Cup in 1998 revealed that approximately 80-85% of 236 players use their right foot considerably more than their left, while the remaining players use their left foot considerably more than their right. What was amazing was the remarkable absence of two-footed players, even in this sample of some of the best trained and practised athletes in the world. Since that time, many more professional players have been analysed, and the story has not changed in the slightest.

The graph (Figure 1) shows the number of individual players against the degree of right footedness (measured by how often each individual player uses his left or right foot). This is what scientists call a bimodal distribution (it has two modes, one around 85% right footed and the other around 15% right footed).



The number of players as a function of how right-footed they were in terms of use. Very right-sided players are to the right of the graph; very left-sided players to the left.

The astute amongst you may realise that ‘15% right-footed’ players are, of course, 85% left-footed players. You will also notice that the data are perfectly consistent with observations made by every football fan and pundit: left-footed players are rare, as are two-footed players, see the middle part of the graph.

Footballers and the rest of us

The proportions of left- and right-footers are surprisingly similar to those found in the general population. In this latter case, footedness is usually defined by responses to questionnaire items like “Which foot would you use to kick a ball?” or “Which foot do you lead with on a skateboard or a surfboard?” Taken together, these data suggest that all the efforts of players, coaches, academies and trainers to produce more two-footed players have not been particularly successful. Foot preference of this sort is probably something that people are born with.

That fact alone is surprising enough. Human beings are bipedal – unlike many other species, *Homo sapiens* gets around on two legs. From a motor control perspective, asymmetries in strength or coordination between our two legs would be unlikely – we need to make many fine postural and muscular adjustments with our feet and legs thousands of times each day. Therefore preferring one leg over the other for tasks like kicking, dribbling and tackling in the first place is rather peculiar.

One hypothesis to explain a foot bias is that, with practice and experience, tasks that have to be

performed asymmetrically (like kicking a ball) are in some sense like handwriting or throwing – once a side is chosen, by using it repeatedly it becomes skilled and practiced. If that is the case, why aren't roughly 50% of all people right-footed and the remaining 50% left-footed? The asymmetry in the asymmetry (so to speak) is the real puzzle that scientists need to work out.

Our asymmetric brains

Some scientists believe that the most plausible explanation is that foot preference is related to brain asymmetry in the control of movement. The left cerebral hemisphere is very important for speech and language in most people, although it is moderated by handedness (and by implication here, footedness). In anyone, in spite of their particular hand or foot preference, each side of the body is largely controlled by the 'contralateral' hemisphere (the hemisphere on the opposite side of the limb). The idea here is that if one half of the brain, say the left, is good at controlling speech muscles, it will end up driving the right side of the body for more skilled actions, like kicking, throwing and writing.

Of course, this theory isn't perfect: some of us are 'crossed' in terms of our hand and foot preference (this must be the case, as roughly 90% of people are right handed while about 80% are right footed), so in some people either hand or foot, but not both, will be largely controlled by the side of the brain dominant for the control of speech.

A final suggestion that handedness and footedness are biologically predestined is related to a sex difference: men are more likely to be left-handed than women. A popular non-biological explanation for this phenomenon is that women are more receptive to 'anti-sinistral bias'; that is, parents and teachers may actively discourage youngsters from writing with their left hands, something that used to be quite common.

An experiment comes to mind here: are there similar biases against being left-footed? Probably not – if anything, these asymmetries are relatively unnoticed by most people or, if your mother or father is football daft, then the contrary may be true (left-footed players are rare, isn't it fantastic that you are left-footed!). On-going research at the universities of Bangor in Wales and Bergen in Norway suggests that fewer elite women players are left footed than their male counterparts. If this difference holds up, it really questions the idea that the hand difference between men and women is accounted for by anti-left sided bias – as you get the same differences where there isn't one.

Clearly much research remains to be done on how footedness relates to brain asymmetry – some of these experiments can be done in the lab. The tougher studies will need to look at players in the field, to help establish whether or not coaching and practice can make much of a difference to how often a player uses one foot or the other.



England Women's captain Casey Stoney is right-footed, while Brazil Women's captain Marta Vieira da Silva is left-footed.

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Look here!

David Carey and colleagues analysed footedness of players at the 1998 World Cup in France: <http://bit.ly/1umvFfD>

Find out how handedness and footedness compare:

<http://www.footballtechnicallab.com/the-myth-of-the-two-footed-footballer-part-1/>