



The Reliability and Validity of Self-reported Footedness

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Introduction

In neuropsychological studies of hemispheric laterality, scientists normally consider the hand preference but infrequently the foot preference of their subjects. These lateral preferences are useful as indicators of hemispheric dominance, but foot preference predicts verbal and emotional material better than hand preference. Usually self-report inventories of hand preference contain 10 or more items, but remarkably self-reports of foot preference receive far less attention with 1-4 items. Moreover, inventories of hand preference have been extensively reviewed for reliability and validity, but inventories of foot preference have not received the same careful attention.

The body of evidence that relates foot preference to hemispheric lateralization is expanding. Searleman, Strauss, Watson, Day, and Elias have studied the relationship of footedness to language lateralization [4,5,7,8,9], and Elias has studied the relationship of footedness to emotional lateralization [6]. The findings by these researchers strongly encourage the refinement of self-report measures of foot preference. The present study models itself after the 11-item foot performance inventory of Chapman et al. [3] that has previously shown good internal consistency and test-retest reliability.

Methods

Participants.

- 4886 undergraduates (2892 female & 1994 male) completed a 24-item (13 hand & 11 foot) inventory of lateral preference.
- 55 individuals (23 female & 32 male) completed an 11-item performance inventory of foot preference.
- 50 subjects (27 female & 23 male) completed a second self-report 10-12 weeks later.

Inventories.

- The 13 items of the self-report handedness inventory of lateral preference were taken from Chapman & Chapman [2].
- The 11 items of the self-report footedness inventory of lateral preference were created for this study based on Chapman et al. [3].
- The 11 items of the performance footedness inventory were taken from Chapman et al. [3].

Procedures.

Subjects were instructed to indicate their lateral preference by choosing among "right," "left," or "either" for each item of the self-report inventories. Responses were scored "1" for right, "3" for left, and "2" for either (or one foot and then the other).

Subjects, for example, were asked to imagine the following circumstances for the self-report footedness inventory:

- You kick a soccer ball into a basket across the room. Which foot kicks the ball?
- You stamp an aluminum can into a perfect circle. Which foot stamps the can?
- You navigate a golf ball through a maze as quickly as you can with your bare foot. Which foot guides the ball?
- You write your name in the sand with your bare foot. Which foot writes your name?
- After writing your name in the sand, you smooth the sand with your bare foot to erase your name. Which foot smoothes the sand?
- Using your bare foot, you attempt to arrange five pebbles in a straight line with approximately 2 inches between pebbles. Which foot moves the pebbles?
- You attempt to balance a 3 foot long wooden rod vertically on your foot. On which foot does the rod rest?
- You attempt to roll a golf ball around a circle painted on the floor. Which foot guides the ball?
- Kicking one foot into the air, you try to get that foot as high as possible. Which foot is in the air?
- You sit down to tap out the rhythm of a simple tune (e.g. Yankee Doodle) with your foot. Which foot does the tapping?
- You stand on one foot and hop up and down as quickly as possible. On which foot do you stand?

For the performance inventory, subjects were asked to perform each of the 11 behaviors with one foot. The examiner described the procedure as a test of foot skill.

Results

Internal Consistency Estimate of Reliability.

- Coefficient alpha of the 13-item inventory of hand preference was .97.
- Coefficient alpha of the 11-item self-report foot preference inventory was .84.
- Coefficient alpha of the 11-item performance foot preference inventory was .91.

Table 1. Point-biserial correlations of self-report items with score on full scale

Self-report item	Correlation with scale
Kick a ball	.65
Stamp tin	.63
Golfball through maze	.56
Write name in sand	.59
Smooth sand	.34
Arrange pebbles	.62
Balance rod	.55
Golfball around circle	.64
Kick	.50
Tap "Yankee Doodle"	.37
Hop on one foot	.33

Table 2. Point-biserial correlations of performance items with score on full scale

Performance item	Correlation with scale
Kick a ball	.75
Stamp tin	.75
Golfball through maze	.64
Write name in sand	.76
Smooth sand	.66
Arrange pebbles	.66
Balance rod	.79
Golfball around circle	.84
Kick	.46
Tap "Yankee Doodle"	.65
Hop on one foot	.44

Discriminant Validity of Self-report Footedness.

Correlation between self-reports for handedness and footedness was .69 (.77 corrected for attenuation).

Test-Retest Stability of Footedness Scores.

The test-retest correlation of the footedness scale was .89 (1.00 corrected for attenuation).

Convergent Validity of Footedness.

The correlation between the self-report inventory of foot preference and the performance inventory of foot preference was .79 (.91 corrected for attenuation).

Table 3. Matrix of footedness self-report, footedness self-report retest, footedness performance, and handedness self-report

	Footedness self-report retest	Footedness performance	Handedness self-report
Footedness self-report	0.89	0.79	0.69
Footedness self-report retest	—	—	0.76
Footedness performance	—	—	0.69

Note: A total of 4886 participants completed self-report footedness and handedness inventories. Fifty-five participants completed a self-report and performance inventory of foot preference. Fifty participants completed a second self-report footedness inventory.

Table 4. Crosstabulation of scores on handedness and footedness inventories

Footedness Score	Handedness Score								
	13-15	16-18	19-21	22-24	25-27	28-30	31-33	34-36	37-39
11-13	32.2%	1.7%	2%	.1%	.1%	.1%	.1%	.1%	.1%
14-16	25.2%	5.1%	1.3%	.4%	.1%	.2%	.1%	.1%	.1%
17-19	11.5%	4.3%	1.9%	.7%	.2%	.2%	.1%	.1%	.1%
20-22	2.2%	1.2%	.8%	.5%	.2%	.1%	.2%	.1%	.2%
23-25	.6%	.3%	.2%	.2%	.1%	.3%	.3%	.2%	.3%
26-28	.3%	.1%	.1%	.1%	.0%	.2%	.3%	.3%	.7%
29-31	.1%	.1%	.0%	.1%	.1%	.1%	.3%	.6%	1.2%
32-33	.1%	.0%	.0%	.0%	.0%	.0%	.1%	.1%	.7%

Note: Low scores indicate right handedness or footedness. Numbers in the table indicate the percentage of subjects receiving a given combination of handedness and footedness scores.

Table 5. Probability of obtaining a given footedness score conditionalized on handedness score

Footedness Score	Handedness Score								
	13-15	16-18	19-21	22-24	25-27	28-30	31-33	34-36	37-39
11-13	44.6%	13.3%	4.4%	9.1%	12.5%	8.3%	6.7%	6.3%	2.9%
14-16	34.9%	39.8%	28.9%	18.2%	12.5%	16.7%	6.7%	6.3%	2.9%
17-19	15.9%	33.6%	42.2%	31.8%	25.0%	16.7%	6.7%	6.3%	2.9%
20-22	3.0%	9.4%	17.8%	22.7%	25.0%	8.3%	13.3%	6.3%	5.9%
23-25	.8%	2.3%	4.4%	9.1%	12.5%	25.0%	20.0%	12.5%	8.8%
26-28	.4%	.8%	2.2%	4.5%	0%	16.7%	20.0%	18.8%	20.6%
29-31	.1%	.8%	.0%	4.5%	12.5%	8.3%	20.0%	37.5%	35.3%
32-33	.1%	.0%	.0%	.0%	.0%	.0%	6.7%	6.3%	20.6%

Note: Low scores indicate right handedness or footedness. Numbers in the table indicate the percentage of subjects receiving a particular range of footedness score given the particular range of handedness.

- Most of the strongly right-handed subjects were right-footed, but a smaller proportion of the strongly left-handed subjects were left-footed.
- Left-handed subjects appear to have a larger spread of foot preference scores than do right-handers.

Conclusions

Handedness and Footedness are Related but Different Constructs.

Although highly related, handedness and footedness are not synonymous, correlating .69. Correcting for attenuation suggests the true scores – free of any errors of measurement – might correlate as high as .79.

Annett [1] cites cultural influences as partially driving the shift of handedness to the right. It is still to be determined whether footedness or handedness has a stronger relationship to other aspects of cerebral lateralization.

Performance Measure of Foot Preference Better than Self-Report.

In the previous study by Chapman et al. [3], 94% of the strongly right-handed subjects (scores between 13-18) are right-footed (scores between 11-16), but only 41% of the left-handed (above 33) subjects are left-footed (above 28).

This differs somewhat from this study's results (79% and 67%, respectively). The Chapman study, which compared self-report handedness to performance footedness, naturally constitutes the less biased measure of foot preference. The Chapman study, however, also oversampled left-handers, which the present study did not, resulting in relatively few strongly left-handed individuals.

Recommendations.

The 11-item self-report inventory of foot preference has sufficient validity and reliability to be recommended to other investigators. Since hand preference and foot preference are only partially related, they should probably be treated as separate variables in studies of cerebral lateralization.

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