

# Reliability and validity of a soccer passing test using the Footbonaut

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**German Journal of Exercise and Sport Research**  
Sportwissenschaft

ISSN 2509-3142  
Volume 48  
Number 3

Ger J Exerc Sport Res (2018) 48:334-340  
DOI 10.1007/s12662-018-0511-6

Volume 48 • Number 3 • September 2018

## German Journal of Exercise and Sport Research

Sportwissenschaft

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## Abstract · Zusammenfassung

## Methods

## Participants

Seventy-nine male soccer players (height:  $176.1 \pm 7.5$  cm; body mass:  $66 \pm 9.3$  kg; age: 15–16 years) from several soccer clubs volunteered to participate in the study. Forty-eight players (skilled) trained at least four times per week and attended a youth academy, certified by the German Football Association, with a special emphasis on talent development. The other 31 (lesser-skilled) players trained twice per week and played in lower leagues compared to the group of skilled players. The participants covered the complete range of playing positions, including seven goalkeepers, and were free of injuries or illness. The study was approved by an Institutional Review Board and all participants provided written consent. Written consent from the players' parents was also obtained.

## Footbonaut

The Footbonaut consists of a testing zone ( $14 \times 14$  m) surrounded by four walls. The walls consist of 72 high and low positioned square panels ( $1.40 \times 1.40$  m), each equipped with light barriers and light emitting diodes (LEDs). Eight ball-throwing machines are installed behind the middle panels in each wall. The other 64 panels are used as targets. Stimuli for the ball-throwing machine (indicating from which panel the ball is coming from) and the target panels (where the ball has to be shot) are given by lights and an acoustic signal located in the corners, according to the target location (see [Fig. 1](#)). Light barriers are used for time and accuracy measurements. The starting time is recorded when the ball passes the light barrier of the panel in front of the ball-throwing machines. The second time value is taken when the ball passes the light barrier of one of the 64 target panels. The system registers the accuracy as binary data.

## Procedures

Participants were requested to attend the Footbonaut for a test and a retest, with at

Ger J Exerc Sport Res 2018 · 48:334–340 <https://doi.org/10.1007/s12662-018-0511-6>  
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## Reliability and validity of a soccer passing test using the Footbonaut

## Abstract

The aim of this study was to investigate the reliability and validity of a soccer short passing test using the Footbonaut training system. Forty-eight young skilled soccer players and 31 lesser-skilled soccer players completed a test and a retest, each involving four sessions a day of a Footbonaut short passing test (FSPT). We found significant differences in mean execution times for skilled (mean [M] = 2487, standard deviation [SD] = 155) and lesser-skilled players (M = 2682, SD = 176) but no significant difference in accuracy (M = 74.13, SD = 7.65; M = 72.19, SD = 8.13) between groups. The results

from linear mixed-effects models show that there were no significant effects of repeated measurements on execution time. In contrast, we found an estimated increase of 0.86% in accuracy per session for both groups. In conclusion, the FSPT offers a reliable and valid method to differentiate young soccer players at different competitive levels, using execution time.

## Keywords

Soccer · Short passes · Execution time · Accuracy · Footbonaut

## Reliabilität und Validität eines Fußballpasstests mit dem Footbonaut

## Zusammenfassung

Ziel der vorliegenden Studie war es, die Reliabilität und Validität eines Fußballkurzpasstests unter Einsatz des Footbonaut-Trainingsystems zu prüfen. Hierfür absolvierten 48 leistungsstärkere und 31 leistungsschwächere Jugendfußballer einen Test und Retest, der jeweils vier Messreihen eines Footbonaut-Kurzpasstests pro Tag beinhaltete. Es konnten signifikante Unterschiede der mittleren Handlungszeit zwischen den leistungsstärkeren (Mittelwert [M] = 2487, Standardabweichung [SD] = 155) und leistungsschwächeren Spielern (M = 2682, SD = 176) nachgewiesen werden. Jedoch konnten keine signifikanten Unterschiede in der Genauigkeit (M = 74,13, SD = 7,65;

M = 72,19, SD = 8,13) zwischen den beiden Gruppen gefunden werden. Linear gemischte Modelle ergaben keine signifikanten Effekte wiederholter Messungen auf die mittlere Handlungszeit. In Bezug auf die Genauigkeit fand sich dagegen für beide Gruppen eine geschätzte Zunahme von 0,86% pro Messreihe. Zusammenfassend ist der Footbonaut-Kurzpasstest ein reliables und valides Verfahren, mit dem sich Jugendfußballer verschiedener Leistungsniveaus anhand der Ausführungszeit unterscheiden lassen.

## Schlüsselwörter

Fußball · Kurzpass · Handlungszeit · Genauigkeit · Footbonaut

least ten days' interval between the two test days. Between the test and retest sessions, players continued with their normal training and competition programs. None of the participants had ever experienced a trial or training session inside the Footbonaut. On the testing day the participants performed a warm-up session and four standardized test sessions in the Footbonaut, with a rest of 10 min between each session. All participants were encouraged "to play as fast and precisely as possible". The participants started the passing test at a central position in the Footbonaut test zone. A stan-

dardized session template consisting of 32 ball items was preassigned to define the FSPT. To avoid pattern recognition by the participants, the order of the ball sequences was first randomized. During the sessions the order of the ball items remained consistent for each participant. Nine ball items addressed targets according to the peripheral vision of the participant, thirteen targets demanded a  $\pm 90^\circ$  turn by the participant and ten targets were behind the participant (see [Fig. 2](#)). To heighten the ecological validity (distance to target  $\sim 7$  m) we focused on short ground passes. Therefore we used only