# Kinematic determents of change of direction tasks in division 1 male basketball players

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## Introduction

Recently, the plant foot contact time (PFGCT) has gained more attention in athletes' change of direction (COD) performance [8]. On the other hand, the COD deficit's importance has made researchers interested [4,5,6]. However, none of the studies has examined the associations between those two aspects.

***PURPOSE:*** *This study aimed to determine the relationships between PFGCT and COD deficit.*

## Methods

- 14 male collegiate basketball players participated in this study (weight: 84.83 ± 12.26 kg, height: 187.07 ± 8.48 cm) [3].
- The 10m sprint, 45-degree COD, and 180-degree COD tests were performed (Figure 3),and total time (TT), entry velocity (EnV), and exit velocity (ExV) were recorded and calculated through SmartSpeed Timing Gates (Figure 1). And PFGCTs were collected through Optojump photoelectric system[2]. (Figure 1,2)
- COD deficits were then calculated by subtracting the 10m sprint time from the TT of the COD tests[4,5]. (Figure 4)
- Pearson's correlations were used to examine the relationships between PFGCT, COD deficit, EnV, ExV, and TT of both 45-degree COD and 180-degree COD tests.

**Figure 1**. SmartSpeed Timing Gates (left) and Optojump photoelectric system (right).

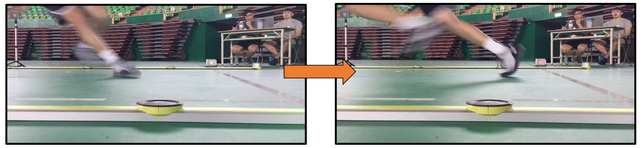

**Figure 2**. PFGCT, from ground-contact (left) to toe-off (right).

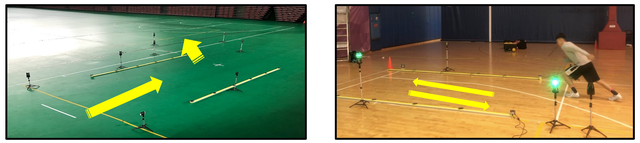

**Figure 3**. 45-degree COD test (left) and 180-degree COD test (right).

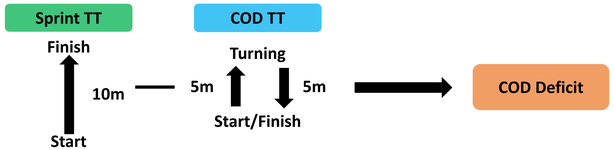


**Figure 4.** COD Deficit calculation.

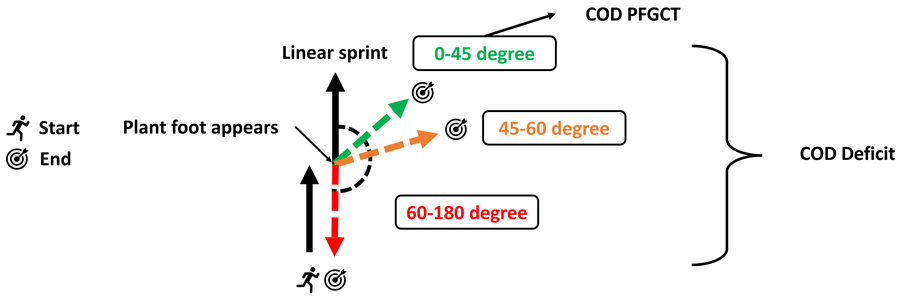


**Figure 5.** Classify angle of COD with representative COD kinematic variables[1].

| Variables | 45-degree COD-TT | 45-degree COD-EnV | 45-degree COD-ExV | 45-degree COD-PFGCT | 45-degree COD Deficit |
|---|---|---|---|---|---|
| 45-degree COD-TT | 1 | -.769** | -.854** | .298 | .633* |
| 45-degree COD-EnV | - | 1 | .791** | -.070 | -.611* |
| 45-degree COD-ExV | - | - | 1 | -.234 | -.720** |
| 45-degree COD-PFGCT | - | - | - | 1 | .272 |
| 45-degree COD Deficit | - | - | - | - | 1 |

**Figure 6.** Relationship between 45-degree COD kinematic variables.
COD: Change of direction; TT: total time; EnV: Entry velocity; ExV: Entry velocity; PFGCT: Plant Foot Ground Contact time. *Significant $p$<.05. **; Significant $p$<.01.

| Variables | 180-degree COD-TT | 180-degree COD-EnV | 180-degree COD-ExV | 180-degree COD-PFGCT | 180-degree COD Deficit |
|---|---|---|---|---|---|
| 180-degree COD-TT | 1 | -.515 | -.698** | .540* | .761** |
| 180-degree COD-EnV | - | 1 | .811** | -.080 | -.024 |
| 180-degree COD-ExV | - | - | 1 | -.346 | -.412 |
| 180-degree COD-PFGCT | - | - | - | 1 | .554* |
| 180-degree COD Deficit | - | - | - | - | 1 |

**Figure 7.** Relationship between 180-degree COD kinematic variables.
COD: Change of direction; TT: total time; EnV: Entry velocity; ExV: Entry velocity; PFGCT: Plant Foot Ground Contact time. *Significant $p$<.05. **; Significant $p$<.01.

## Results

- Significant positive correlation appeared only between 45-degree COD-TT and 45-degree COD deficit (r =.633, p <0.05). (Figure 6)
- There were no significant correlations revealed either COD-TT and COD-Deficit with COD-PFGCT under 45-degree COD. (Figure 6)
- Significant positive correlation appeared between 180-degree COD-TT and 180-degree COD deficit (r =.761, p <0.01). (Figure 7)
- There were significant correlations revealed either COD-TT (r =.540, p <0.05)and COD-Deficit (r =.554, p <0.05) with COD-PFGCT under 180-degree COD. (Figure 7)

## Conclusions

The results indicate that the PFGCT deals with the COD task only associated with sharper turns. Using COD deficit might be more appropriate regarding the kinematic determents of COD performance under various angles.

## Practical Applications

Although it might be out of the scoop of this study, PFGCT may imply athletes' braking capacity. The more significant angle of changing direction requires a higher demand for deceleration abilities. Unsurprisingly, coaches should take COD deficit as a better determent factor regarding COD performance.

## References

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