

'How Useful Do Athletes Find 2D Video Analysis Compared with 3D Motion Analysis?' : A Preliminary Study

Georgina M.Fenton¹, Sarah M.Churchill¹ and Paul C.Castle²

¹ Motion Analysis Research and Rehabilitation Centre (MARRC) University of Worcester, UK.

² School of Sport and Exercise Science Department, University of Worcester, Worcester, UK.

Introduction

With rapidly evolving performance analysis technology, comparison and in-depth understanding of Two-Dimensional (2D) (Figure 1) video and Three-Dimensional (3D) (Figure 2) motion analysis is likely to increase in the sporting arena. Although comparisons are emerging from the medical market (McLean et al., 2005), no research has directly compared 2D and 3D analysis within sport. The aim, therefore, of this study was to assess athletes' perceptions of usefulness of 2D video and 3D motion systems within sport.

Method

Nine athletes participated in the study. The standard of sporting performance ranged from 'keen recreational' to 'elite' level. Participants completed a bespoke, online survey (www.marrc.co.uk/quest/quest), which covered areas such as accessibility, reasons for analysis, clarity of feedback, and application.

Results

All 3D users chose the analysis to improve their performance compared to 50% of 2D users, the remaining 2D users had various reasons. The area of performance focused on was technique for all participants.

Table 1. Comparison of Usefulness between 2D and 3D analysis

Level of Usefulness	2D Users	3D Users
Very Useful	62.5%	100%
Somewhat Useful	25%	0.0%
Not Very Useful	0.0%	0.0%
Not Useful At All	12.5%	0.0%

All 2D participants had their analysis presented by video footage, with 25% of those also having force pressure data and 12.5% kinematics. All 3D users had kinematic data shown. Of those 66.7% also had video footage, and a further 33.3% had force pressure and the visual guidance of overlaid images.

Of 3D users 66.7% received the level of detail from their analysis that they were expecting compared to 62.5% of 2D users.

More 2D (71.4%) than 3D users (66.7%) felt their results were explained to them in a comprehensible manner.

All 3D users compared to 75% of 2D users would use the analysis again.

Table 2. Format in which 2D and 3D users received their results

Format Type	2D Users	3D Users
Video Footage	87.5%	66.7%
Verbal	62.5%	100.0%
Written	25.0%	33.3%
Graphs	9.4%	33.3%
Interactive CD	0.0%	0.0%

References:

Guadagnoli.M., Holcomb.W., and Davis.M (2002). The Efficacy of Video Feedback for Learning the Golf Swing. *Journal of Sports Science*, **20**, 615-622.

McLean.S.G., Walker.K., Ford.K.R., Myer.G.D., Hewett.T.E., and Van de Gobert. A.J. (2005). Evaluation of a Two Dimensional Analysis Method as a Screening and Evaluation Tool for Anterior Cruciate Ligament Injury. *British Journal of Sports Medicine*, **39**, 355-362.



Figure 1. 2D Analysis
(Image Courtesy of Frost Golf Academy)

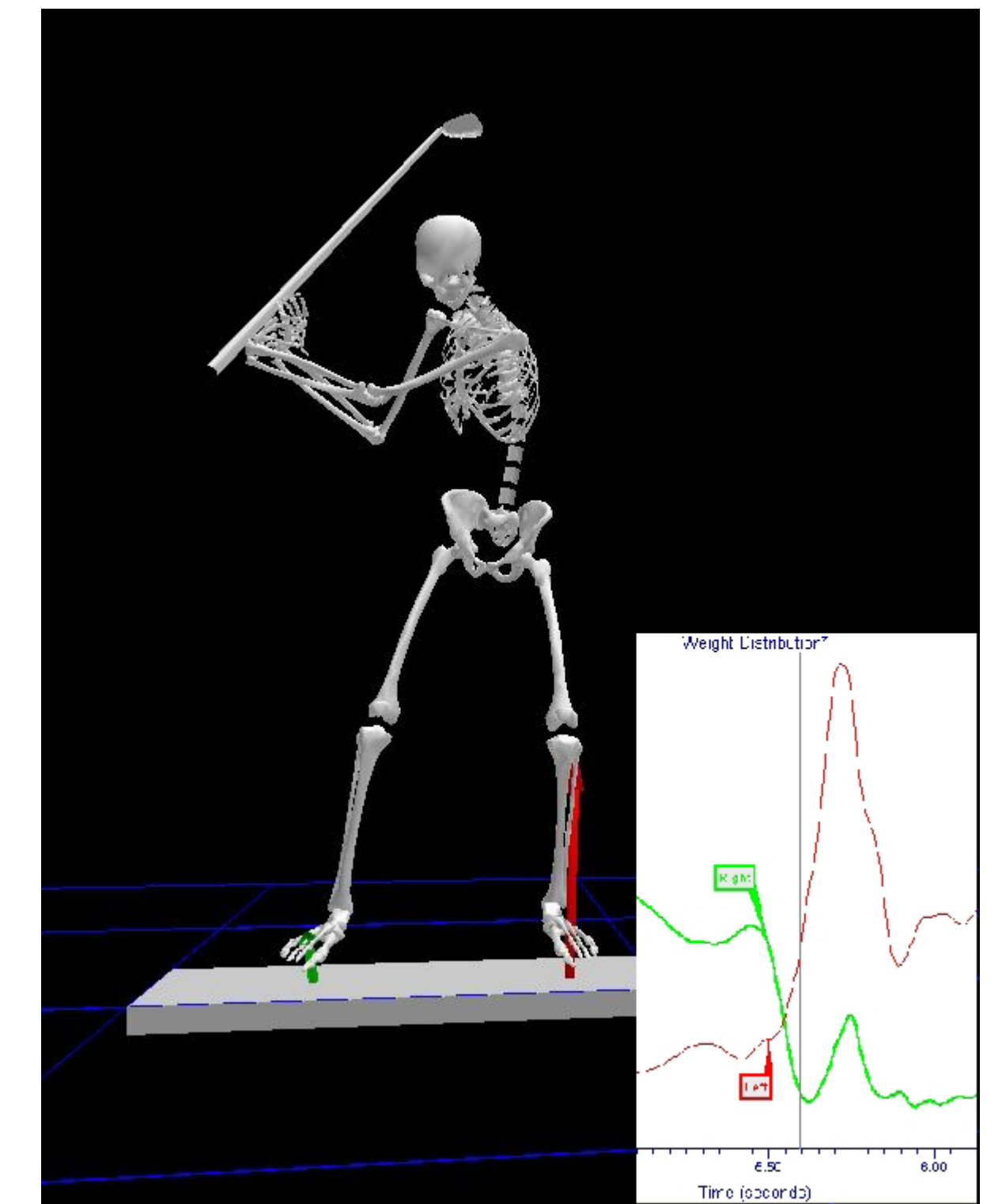


Figure 2. 3D Analysis
(Image Courtesy of MARRC)

Table 3. Which personnel coordinated each part of the analysis

Sections of the Analysis	Personnel	2D Users	3D Users
Suggested the Analysis	Coach	62.5%	66.7%
	Other	50.0%	33.3%
Collecting the Data	Coach	37.5%	33.3%
	Friends/Family	12.5%	0.0%
Analysing the Data	Coach	62.5%	100.0%
	Themselves	50.0%	33.3%
	Other	37.5%	66.7%
Altering the Training	Coach	50.0%	66.7%
	Themselves	25.0%	0.0%
	Other	50.0%	33.3%

Discussion

Two prominent results are that 3D users rated the whole experience more positively and confirmed that they would use the service again. Within the medical sector, 3D analysis presents financial, spatial and temporal costs, thus limiting use (McLean et al., 2005). These limitations may also be apparent in the sporting market. Anecdotal evidence showed that preparation time and space was disrupting for the athlete, but they were not aware of the cost. There were less 3D-respondents, which may suggest a lack of awareness of 3D analysis.

Only half of the 2D users used the analysis to improve performance, suggesting 2D analysis is used for a range of reasons, this may be due to its flexibility and accessibility.

Findings show that more 3D users received the expected level of detail from their results than 2D users. However 2D users felt the results were better explained. This may indicate that although 3D is believed to be more detailed, the way in which feedback is provided to the athlete is essential. This is supported by Guadagnoli (2002). This might explain why the most common way of displaying results to 2D users is through video footage, whereas the most frequently used format to provide 3D results is verbal.

Having explored these trends, further studies will concentrate on examining mediating factors influencing athletes' perceptions of 2D and 3D analysis.