

Investigation of Judging Point on Snowboard Big Air Based on Questionnaire and Biomechanical Analysis

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Summary

The subjectiveness within judged sports is controversial. We focused on Snowboard Big Air and sought the elements relating to the judge's evaluation based on a questionnaire and biomechanical analysis. Half of the evaluation items which were extracted from the interview survey were relevant to the score. Moreover, it was revealed that high jump, good posture control, and grabbing firmly are crucial elements in addition to landing.

Introduction

Snowboard Big Air (BA) is one of the judged sports. The score is evaluated by overall impression based on execution, difficulty, amplitude, variety, and progression [1]. However, it may contain a manifold point of view of judges as well as other judged sports because those are described somehow in a qualitative manner. Thus, detecting the elements of judgment would shed light on the components of performance depending on the judge's view both qualitatively and quantitatively. Herein, we aimed to investigate the elements relating to the judge's evaluation in BA.

Methods

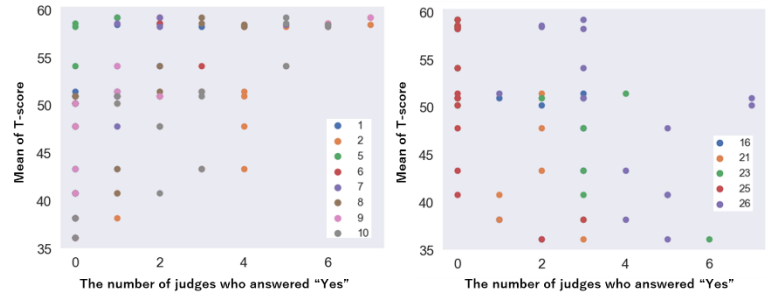
Seven female BA players performed back side 900 (turning 900 degrees in the air) and one free trial. During trials, we captured the motions by a markerless motion capture system with 16 cameras and three video cameras (top, side, and under views) in order to collect the kinematic data.

For the scoring and getting the evaluation points of the trials, seven judges watched the videos from the three points of view. After each trial, the judges scored by referring a range table made by a lead judge and answered "Yes" or "No" regarding 26 evaluation items and other evaluation reasons if they had. Those evaluation items were extracted from the interview survey for three experienced judges; those contents were categorized by the KJ method in advance. Based on the results, we analyzed the biomechanical parameters which is likely to connect with the evaluation item.

After adjusting the intra-score difference between judges by calculating T-score, Spearman's coefficient and regression analysis were conducted between the T-score and each evaluation point. Furthermore, to deep dive into physical aspects that are related to high scores, Pearson's or Spearman's correlation coefficient were calculated between the T-score and kinematic parameters.

Results and Discussion

Figure 1 shows the result of the relationship between the T-score and the number of judges who answered "Yes" at each evaluation point for 14 trials. The items shown in the figure had correlation (left: positive, right: negative, $|r| = 0.54 - 0.93$, $p < 0.05$), while the other evaluation items didn't. Also, Table 1 demonstrated the result of regression analysis ($R^2 = 0.63$, $p < 0.01$).



1: The board and body turned together during take-off, 2: Good control of the posture in the air, 5: Uniqueness of a technique, 6: Time spent grabbing the board, 7: Good placement of a grab, 8: Grabbing firmly, 9: High stability during landing, 10: Smoothness of a sequence movement, 16: Minor over or short rotation, 21: Unstable landing, 23: Falling down, 25: Landing on the body, 26: Others

Figure 1: The relationship between T-score and evaluation items

Those results indicated that failure of landing negatively impacted scores and the motion in the air such as high jump, good posture control, and grabbing firmly are vital. While we found the elements relating to the score like in the snowboard freestyle tricks [2], the part which is in the eye of the beholder in BA may remain, or unexplainable components exist to decide the score, since R^2 of regression analysis is moderate and "others" had a negative correlation with T-score ($r = 0.76$, $p = 0.049$).

Conclusions

In BA, landing had a strong impact on the judging. It is also revealed that the points related to stable posture, grab, and uniqueness are also the elements that relate to the judge's evaluation. While this research attempted to clarify the components both qualitatively and quantitatively, "others" can still be seen as judgment reasons which may make the judged sports somewhat subjective.

References

- [1] FIS. (2024). *International Competition Rules*, 81.
- [2] Merz C et al. (2025). *J. Sports Sci*, 1-9

Table 1: Result of regression analysis between the evaluation items and T-scores

	high-jump	trying to difficult trick	grabbing firmly	over/short rotation	body contact	fall down	Constant
β	2.97*	5.00**	5.08**	-5.77*	-10.79**	-12.96*	50.96**

*: $p < 0.05$, **: $p < 0.01$.