



Player Improvement in Rhythm Games

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2.671 Measurement and Instrumentation



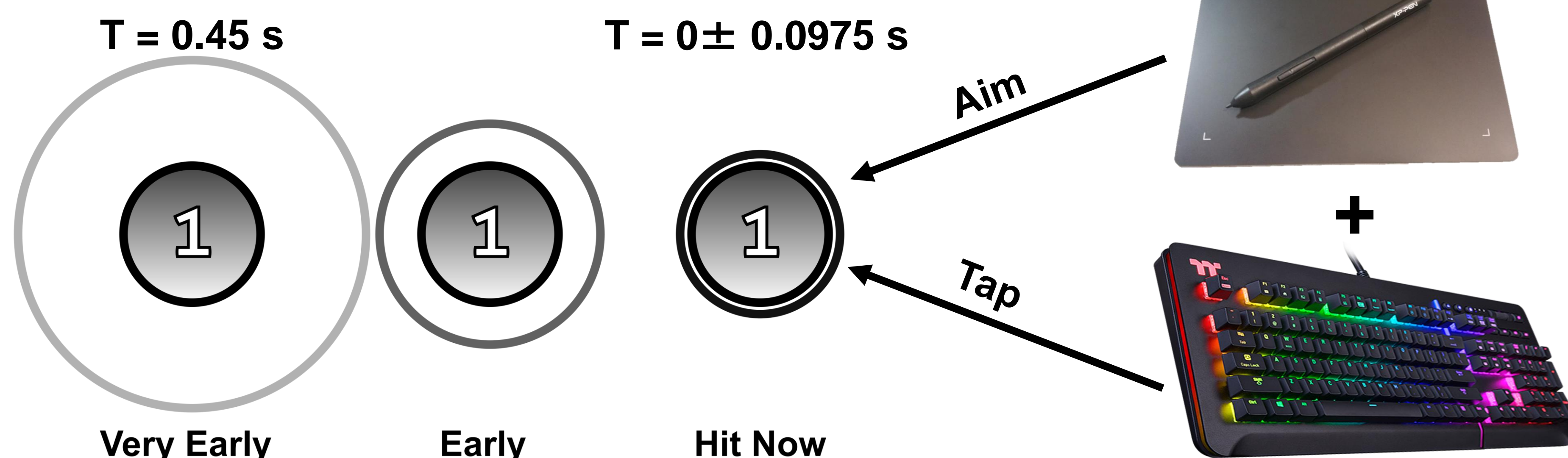
Abstract

The game osu! is skill-based rhythm video game about clicking circle-shaped objects to a song's rhythm according to a "map" created by the game's community. Players are constantly improving with time; therefore, understanding patterns in score improvement is valuable information for players seeking top scores. The player attempted six maps, three hard maps and three average difficulty maps. For each map, the player sight-read it then played it about 10 to 15 more times, recording their performance each time. Score and unstable rate, also known as tapping consistency, showed that there was improvement by attempts 6-10, after which performance diminished. Better unstable rate was achieved with maps of average difficulty compared to harder maps by 1% with 95% confidence.

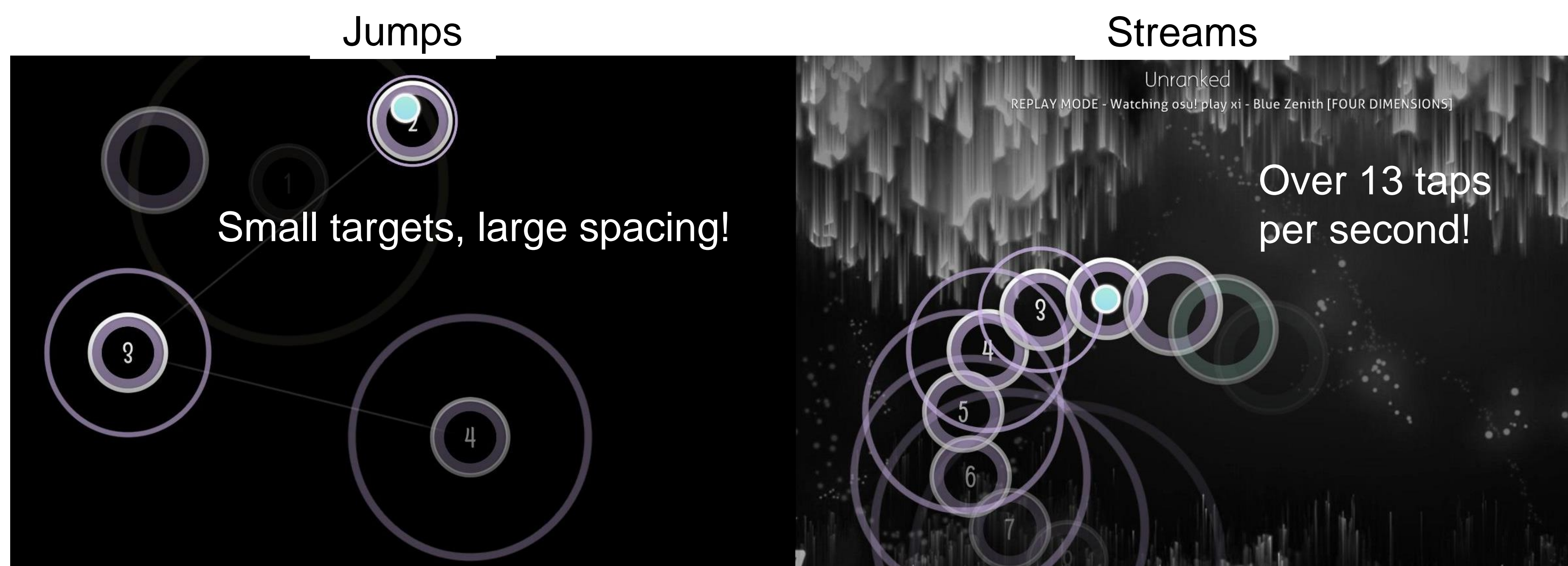
Background

A **map** is a predetermined placement of targets based on a song. Players must aim and click on these objects as on time as possible in order to gain the most points.

T = time until middle of perfect hit window.



Difficult Patterns in Maps



On hit, the player receives a base score of 50 - 300 based on how on time they tap. **Accuracy:** The average base score.

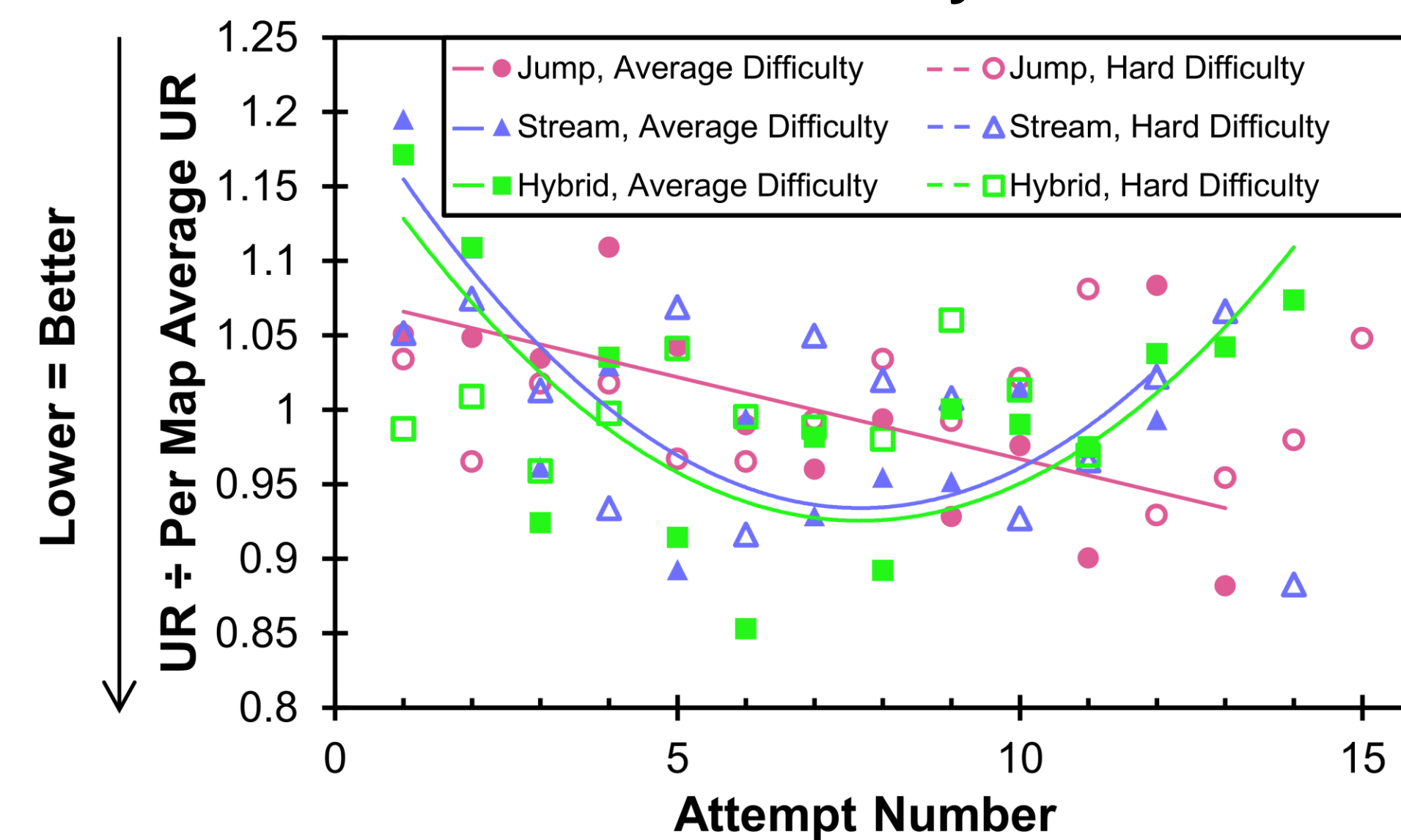
Combo: The amount of objects hit in succession without a miss.

Score: Sum of current combo times base score on the current object.

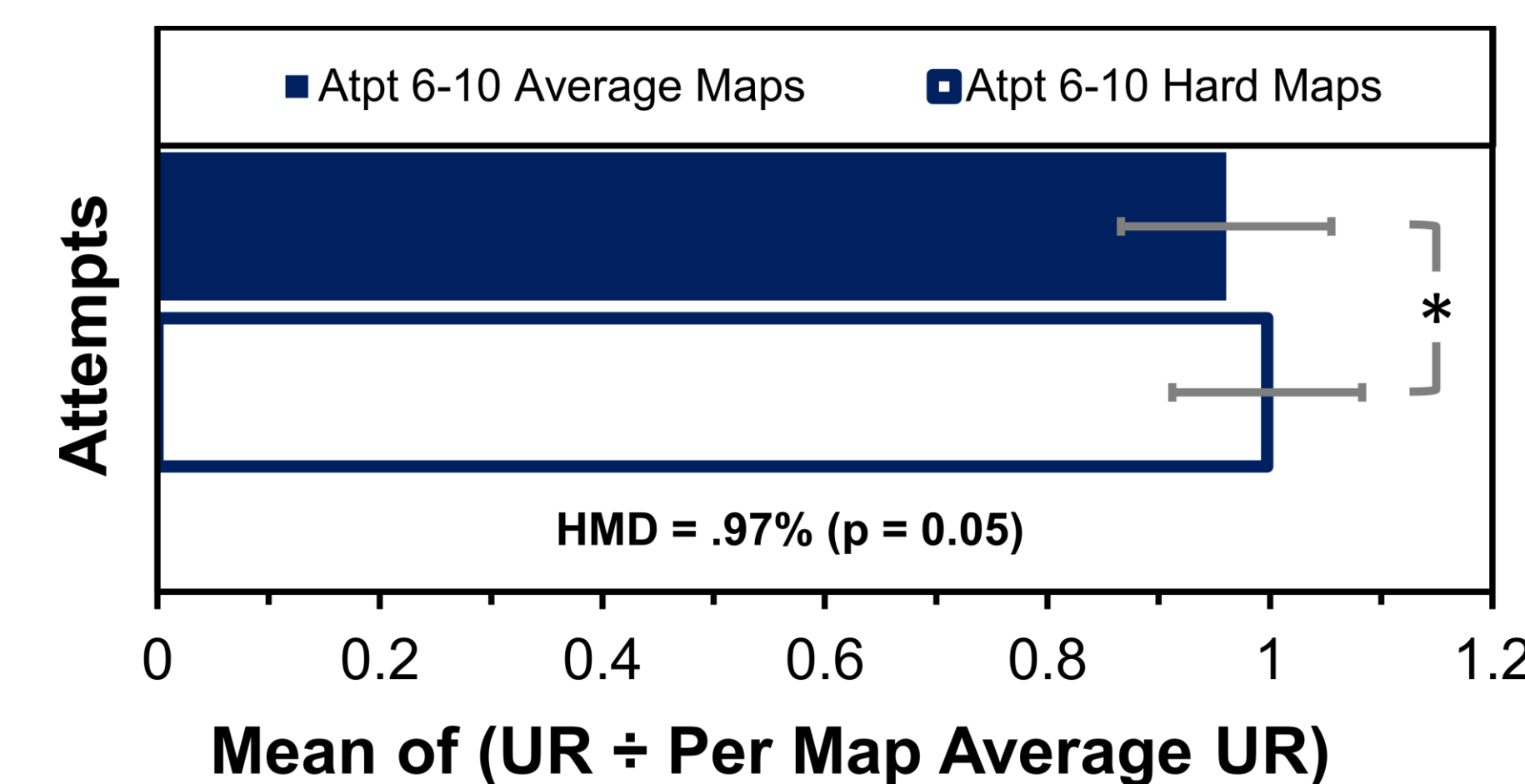
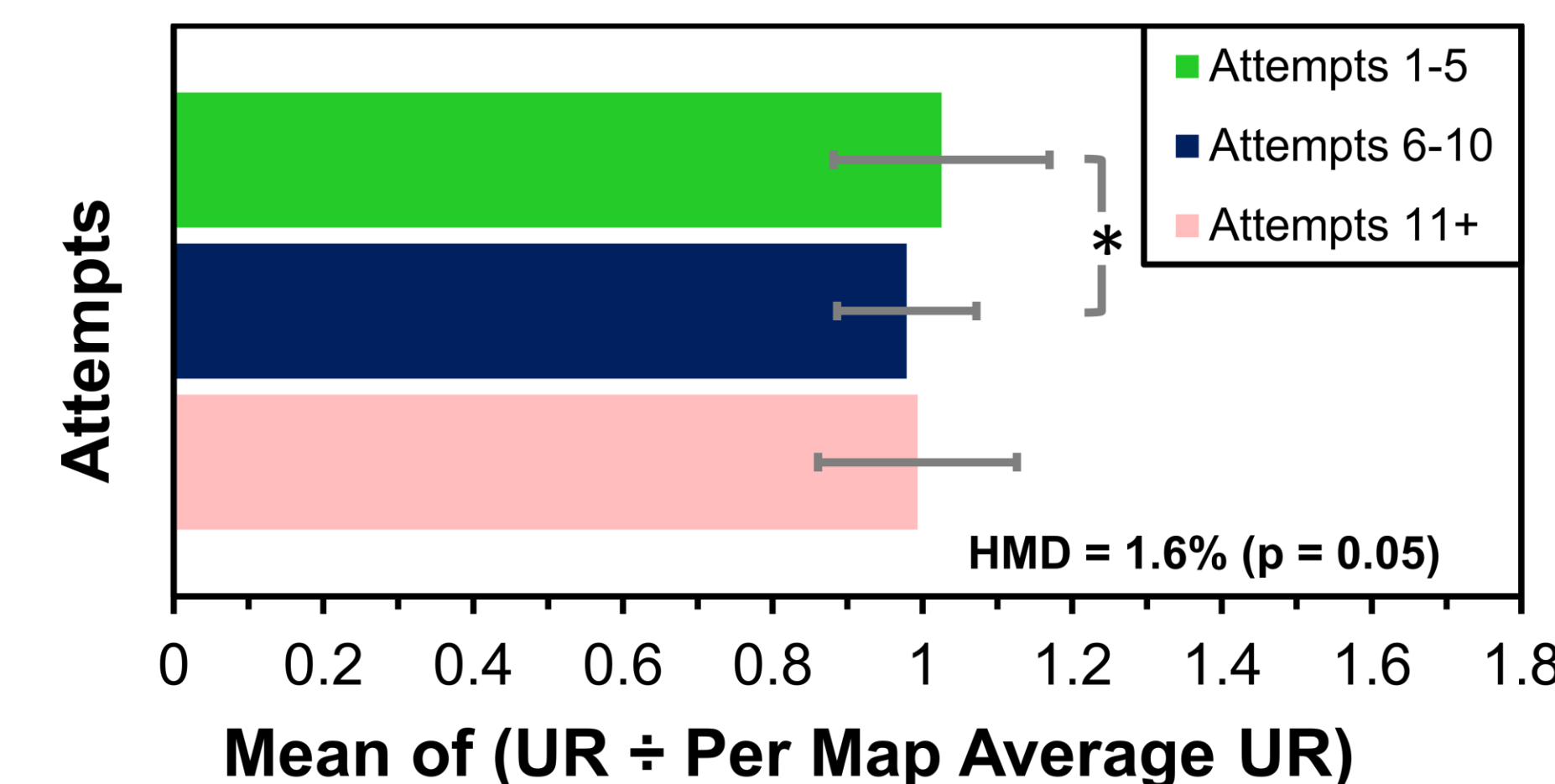
Unstable rate (UR): The **consistency** of the timing of the tap, standard deviation of the average tap time error times 10 [1].

Results & Discussion

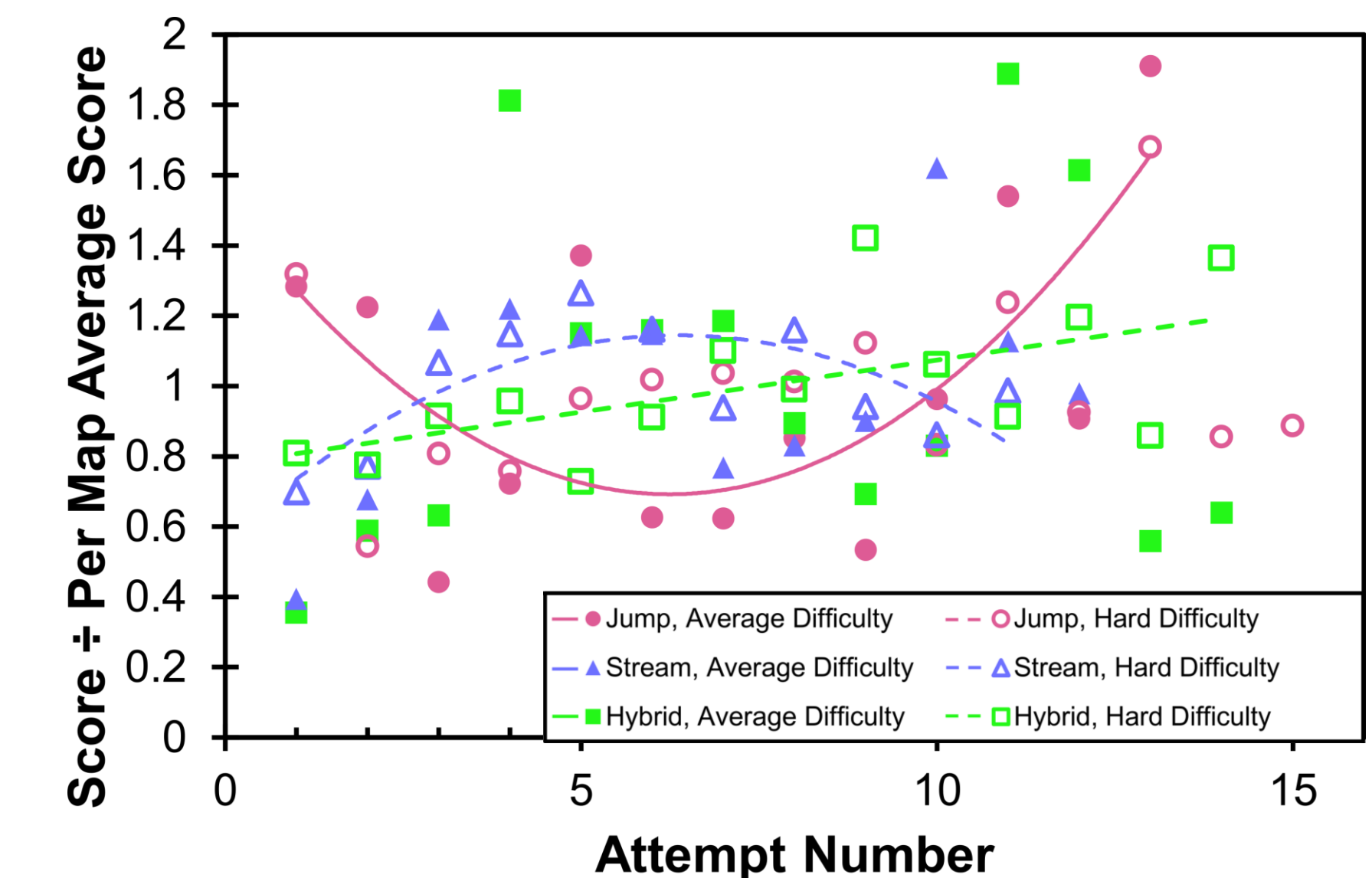
UR/Consistency



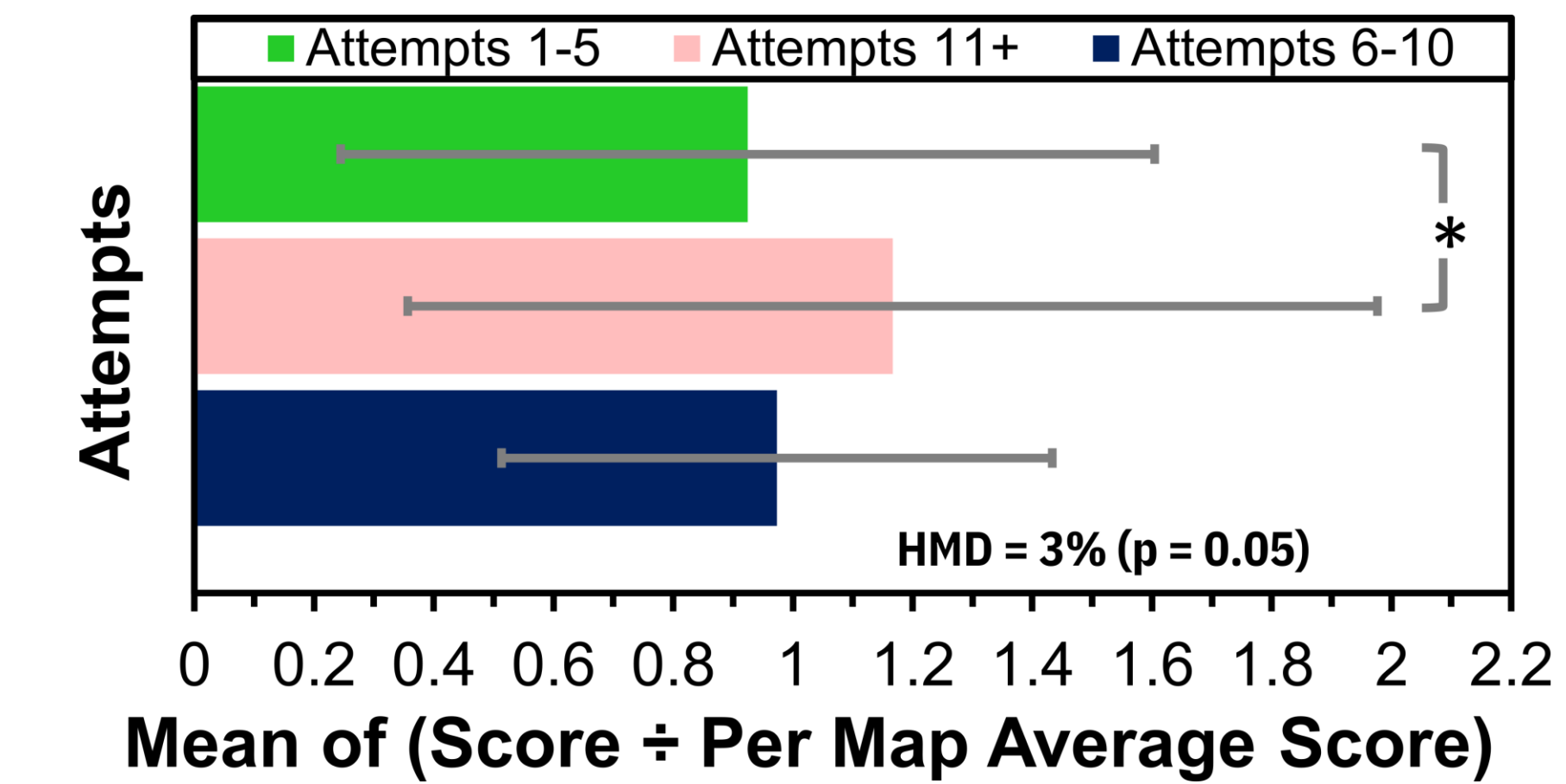
	Quadratic	Linear	Constant
Jump, Average Difficulty	--	-0.0110±0.0094	1.077±0.074
Stream, Average Difficulty	0.0050±0.0031	-0.076±0.041	1.23±0.12
Hybrid, Average Difficulty	0.0046±0.0024	-0.070±0.037	1.19±0.12



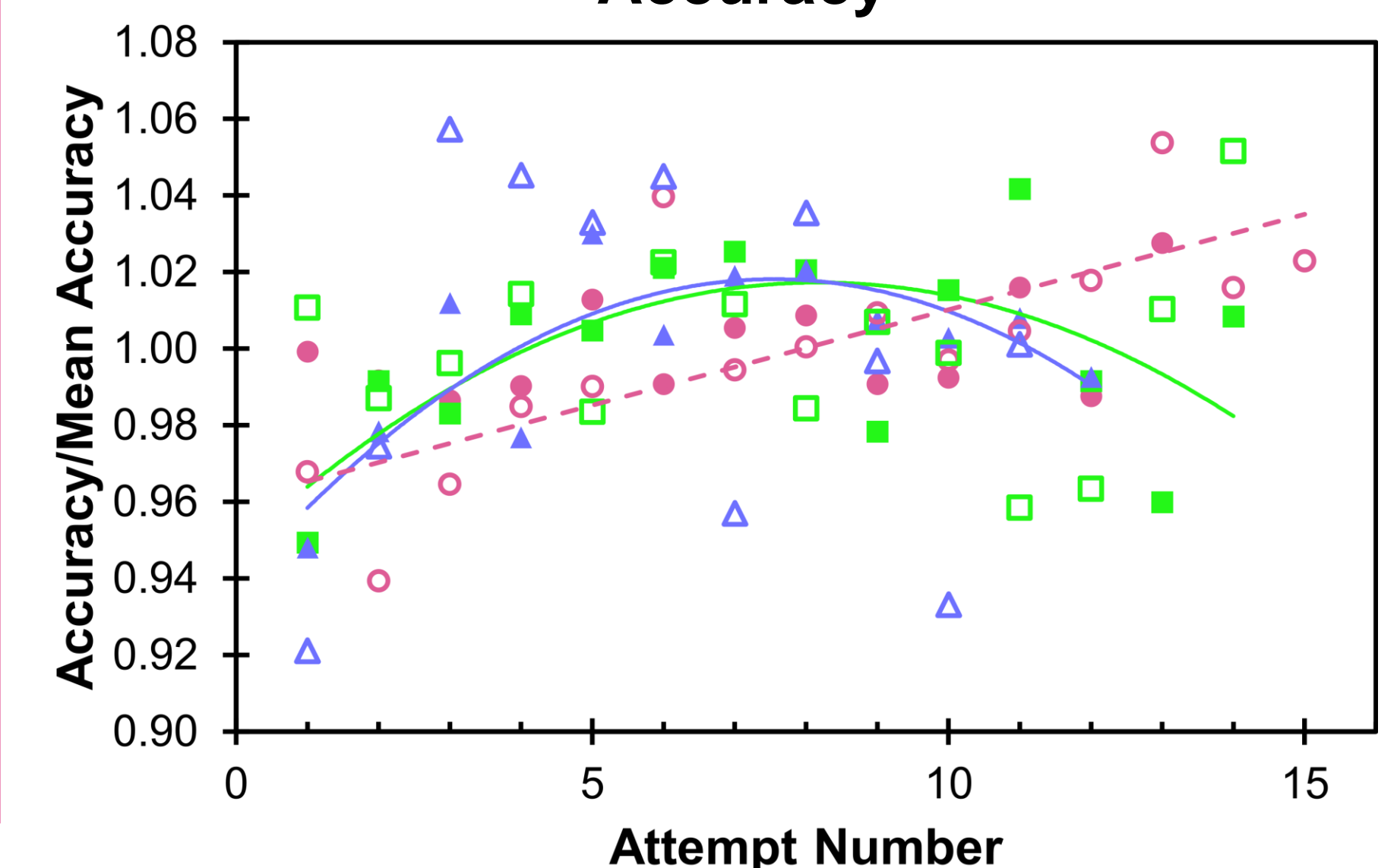
Score



	Quadratic	Linear	Constant
Jump, Average Difficulty	0.021±0.017	-0.26±0.25	1.52±0.76
Stream, Hard Difficulty	-0.014±0.010	0.18±0.12	0.57±0.33
Hybrid, Hard Difficulty	--	0.030±0.025	0.78±0.22



Accuracy



Conclusions

Via t-tests with p = 0.05:

- **Consistency improved by attempts 5-10 in all maps** by 1.6% with 95% confidence, but became insignificantly different past the 10th attempt.
- **Maps of average relative difficulty had increased consistency** versus maps of hard difficulty by 0.97% with 95% confidence.
- **Overall performance as represented by score was significantly better for attempts past 11** in all maps by 5% with 95% confidence. There was no significant difference between difficulties in any set of attempts.
- Player has the highest performance potential around attempts 6-10. Fatigue causes performance to falter after the window, lack of map knowledge before the window.

Acknowledgements

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References

[1] "Accuracy" [Online]. Available: <https://osu.ppy.sh/help/wiki/Accuracy>. [Accessed: 27-Sep-2019].

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