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# Improving User Retention Through Rubber Banding



## The Race

“What!? How did you win!? I was in first and you were in last the whole time! What happened!?”

My sister Lilly and I were wrapping up an intense game of Mario Kart with our cousins. She was Peach and I was Mario, and I had left by a hefty margin the entire race. As we came around the final lap, she started to catch up, acquiring all sorts of weapons, mushrooms, bananas, and boosters. I was about to cross the finish line and at the very last second... bam!

She shot a turtle shell for a direct hit that sent Mario high up into the air, twirling round and round as she zoomed past me to take first place and win the race.

## The Mechanics of Mario Kart

Mario Kart is a simple but amazing go-kart-style racing game. For anyone who has ever played Mario Kart, you know how addicting it can be even though it’s fairly simple. You race around a track and each player is able to grab weapons.

What was it about this activity that kept us so engaged?

For example, you can pick up a banana peel, which you can hold onto and then use it when another player is behind you to make them slip on it.

We weren't paid to keep playing or compensated in any way, but we would continue for hours on end.

*What was it about this activity that kept us so engaged?*

## Power-Ups

One feature of *Mario Kart* is the use of various power-up items players can grab by driving into item boxes laid out on the course. These power-ups include mushrooms to give players a speed boost, Koopa Shells to be thrown at opponents, banana peels, and explosive boxes that can be laid on the course as hazards.

Players’ current positions influence the type of weapons they can grab in the race. Players lagging far behind may receive more powerful items while the leader may receive small defensive items. They can also perform driving techniques during the race, such as mini-turbos, slipstreaming, and rocket starts.

*Often referred to as rubber banding, this gameplay mechanism allows other players a realistic chance to catch up to the leading player.*

## Rubber Banding

A popular feature in game design to increase engagement and retention, Dynamic game difficulty balancing (DGDB), also known as dynamic difficulty adjustment (DDA) or dynamic game balancing (DGB), is the process of automatically changing parameters, scenarios, and behaviors in a video game in real-time based on the player’s ability, to avoid making the player bored (if the game is too easy) or frustrated (if it is too hard).

**Often referred to as rubber banding**, this gameplay mechanism allows other players a realistic chance to catch up to the leading player. The idea is to keep the player engaged by letting them know they are never permanently in first or last.

While rubber banding is relatively apparent in *Mario Kart*, as you play, you subconsciously begin to learn that you are never truly out of the game.

**You understand that no matter how far behind you are, you are a few seconds away from grabbing a power-up that can propel you into first place.** Furthermore, if you are in first, that doesn't mean you'll stay there long.

## Duolingo and Rubber Banding

Duolingo leverages this approach, ensuring users don’t fall too far behind the group or get too far ahead.

A leaderboard cycle currently runs from Monday to Sunday, and each week, Duolingo pairs me with fifty new users. If I am in the top ten by week’s end, I am “promoted” to a higher league.

Dynamically adjusting my league ensures I am always competing against other users who are within the same activity range as me.

*Dynamically adjusting my league ensures I am always competing against other users who are within the same activity range as me.*

If I fall into the bottom five of any league, I am placed back to a less competitive league. Effectively, Duolingo is using the same game-balancing technique as Mario Kart by shifting me in and out of groups based on my relative performance.

Duolingo has taken another page out of *Mario Kart* by offering power-ups that allow me to catch up if I fall behind. I am able to earn gems, which I can use to buy items from Duolingo’s shop. These items help me “catch-up” or “fix a mistake” if I find myself falling behind.

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