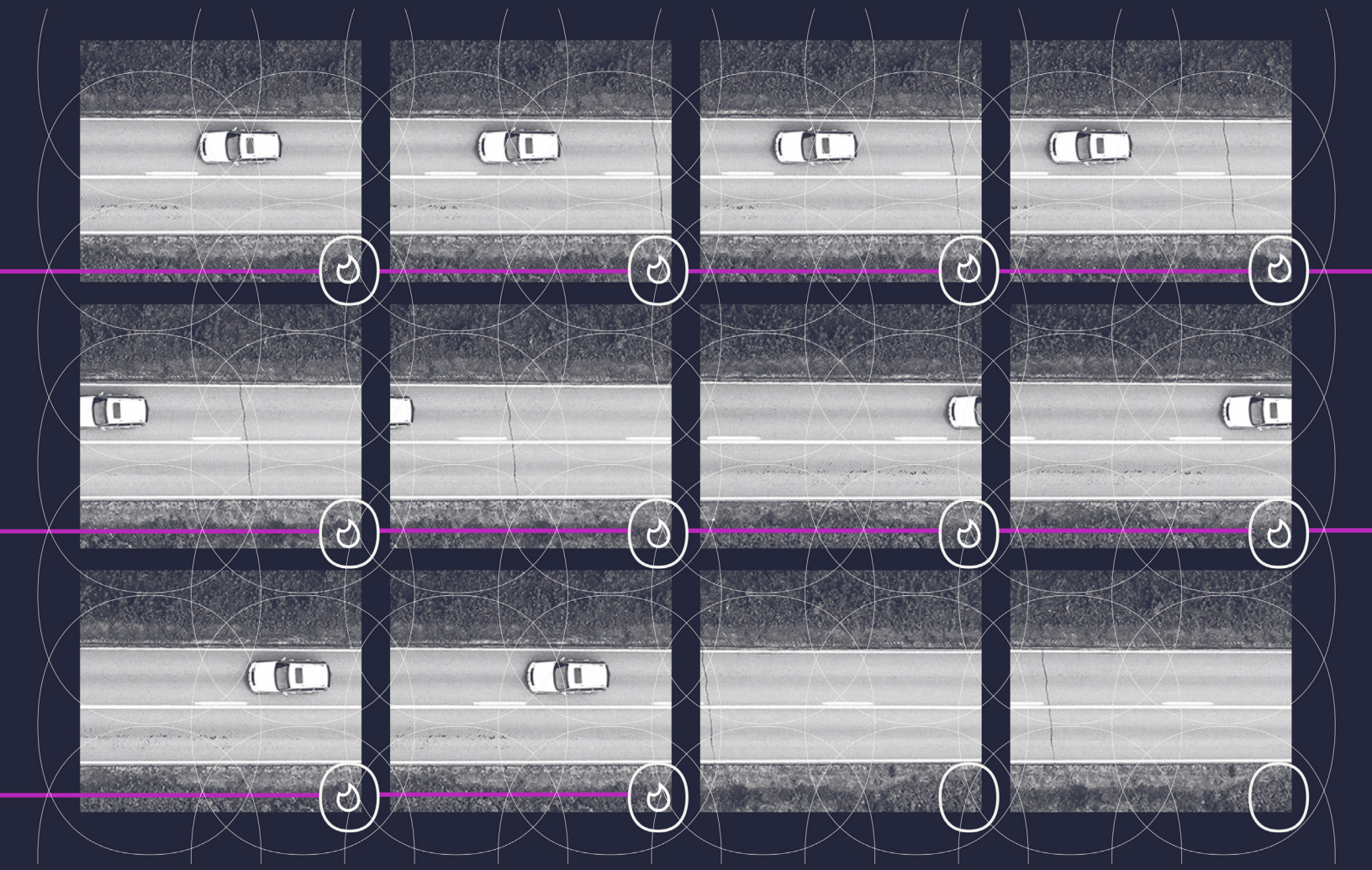

Case Study

June 2024

Quanata™
a State Farm® company

Quanata reduces distracted driving with persuasive technologies

Contents

Executive Summary

According to the National Highway Traffic Safety Administration (NHTSA), distracted driving caused 3,308 fatalities and 289,310 injuries in 2022, with smartphones implicated in 12.1% of these fatal incidents.[1]

Many smartphone apps, designed to capture user attention, contribute to this issue. However, the same behavioral science techniques apps use to engage users can also help reduce distractions while driving.

At Quanata, we've leveraged these principles to build the engine that drives HiRoad® — an insurance company we power, giving us reliable data on how telematics-enabled recognition and reward systems positively influence safer driving behaviors.

This case study will highlight effective strategies we've implemented, with a deep dive into “streaks” that encourage better habits and reduce road accidents and fatalities. We will explain how these streaks have led to a measurable decrease in distracted driving.

of fatal distracted driving incidents implicated smartphones[1]

1 **National Highway Traffic Safety Administration. (2023).** Traffic safety facts 2021: A compilation of motor vehicle crash data. Retrieved from https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813559

Company Profile

Quanata develops context-based, technology-driven, risk prediction and mitigation solutions. We integrate telematics, persuasive technology, and data insights to help companies identify and retain drivers who value developing habits that lead to fewer accidents.

Being a State Farm® company, along with the customer-facing work we do through HiRoad, provides a stable platform for the development and deployment of these innovations.

3,308

people died in distraction-affected crashes, in 2022.[3]

3 **National Highway Traffic Safety Administration. (2023).** Traffic Safety Facts 2021: A Compilation of Motor Vehicle Crash Data. Retrieved from https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813559

Introduction

Distracted driving has been a problem since cars first hit the road in the late 1800s. Widespread adoption of mobile technology has accelerated the risks associated with distraction, turning it into a threat responsible for thousands of deaths and billions of dollars in damage annually.[2]

In 2022 alone, 3,308 fatalities and an estimated 289,310 injuries were attributed to distracted driving.[3] The economic impact, last measured in 2019, was approximately $98 billion annually.[4]

While many forms of distractions contribute to these accidents, the accelerating pace of smartphone use cannot be ignored. About 31% of Americans have been involved in, or know someone involved in, a crash due to a driver using a mobile device.[5]

47%

of drivers admitted to texting while driving[6]

57%

of drivers admit to adjusting a GPS while driving[6]

Surveys by The Zebra, an online insurance comparison platform, show that in 2024, 47% of drivers admitted to texting and 57% to adjusting a GPS while driving.[6] Using Federal Highway Administration numbers, this suggests as many as 106,000,000 US-licensed drivers are texting while driving. If you have any doubts, take a look around at your fellow drivers next time you're stuck in traffic.

2 **National Highway Traffic Safety Administration. (2023).** Traffic safety facts 2021: A compilation of motor vehicle crash data. Retrieved from https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813559

3 **National Highway Traffic Safety Administration. (2023).** Traffic Safety Facts 2021: A Compilation of Motor Vehicle Crash Data. Retrieved from https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813559

4 **National Highway Traffic Safety Administration. (2023).** Traffic Safety Facts 2021: A Compilation of Motor Vehicle Crash Data. Retrieved from https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813559#:~:text=This%20report%20estimated%20distraction%20from,in%20economic%20 costs%20in%202019

5 **Advocates for Highway and Auto Safety. (2023).** Distracted Driving Fact Sheet. Retrieved from https://www.saferoads.org/wp-content/uploads/2023/10/Distracted-Driving-Fact-Sheet-2023-10-02-FINAL.pdf

6 **The Zebra. (n.d.).** Texting and driving statistics. Retrieved from https://www.thezebra.com/resources/research/texting-and-driving-statistics/

We're on a mission

Addressing distracted driving, specifically when caused by smartphones, could transform the insurance industry. That's why it's a focus for Quanata. By tackling this issue, we're paving the way to a change that could save thousands of lives and avoid tens of billions of dollars in property damage and medical bills.

Quanata is uniquely suited for this challenge. We're creating context-based insurance solutions that merge telematics-enabled products with persuasive technology and data-driven insights to encourage safer driving behaviors. And we've assembled a team of experienced insurtech, data science, actuarial, product, and engineering experts who are passionate about driver safety.

HiRoad is an innovative auto insurance company that implements behavior-based pricing and positive reinforcement, to enhance safety and benefit drivers and communities alike. It's a real-life testing ground for some of our most important work.

Through HiRoad, we've applied new technology and contextual data to create solutions that have led to positive shifts in driving behavior — specifically reducing distracted driving. We believe this can extend across the insurance landscape and into adjacent industries.

Quanata is at the forefront of reducing distracted driving with persuasive technologies.

The HiRoad app is designed to reinforce good habits.

HiRoad is driven by innovation

Through our parent company State Farm, HiRoad is able to access one of the world's largest driving data sets and benefits from the experience of top insurance industry professionals. It also boasts an "A" rating from A.M. Best, a sign of strong financial health.

The HiRoad app is like a fitness tracker for driving that uses smartphone technology and telematics to monitor and enhance driving behaviors through rewards and gamification to promote safer driving habits. Our approach uses behavior design and persuasive technologies similar to those in apps like Facebook and TikTok.

HiRoad has achieved significant results, especially with "Mindful Mobilites." This is what they call their tech-savvy customers who readily adopt technologies that foster mindful behaviors. It's important to note that HiRoad is committed to aiming for profitable growth across all segments and demographics.

Mindful Mobilites

- Tech-savvy 24-35 year-olds
- Use apps for self-improvement and wellness
- Prefer innovative, socially responsible brands
- Early adopters of new technology
- Value experiences over possessions
- Favor time-saving technologies
- Open to sharing personal data for enhanced services
- Will switch providers for cost savings

> Distracted driving is any activity that diverts attention from driving, including talking or texting on your phone, eating and drinking, talking to people in your vehicle, fiddling with the stereo, entertainment or navigation system — anything that takes your attention away from the task of safe driving.”

— National Highway Traffic Safety Administration

Problem

Cars were on the road for about 100 years when the first mobile phone, the Motorola DynaTAC 8000X, hit the streets. These phones were a must have status symbol for the tech-savvy business professionals who needed to work on the go.

In 1997, the New England Journal of Medicine conducted the first study of the effects of cell phone use on driving. They reported that cell phone use while driving increased collision risk around 400%.[7] This was still at a time when a mobile phone didn't have any capabilities outside of making and receiving calls. Now, 92% of Americans own smartphones, which distract users visually, manually, and cognitively. They've become an essential part of life, but can be hazardous in vehicles.[8]

2-6x

Accident risk was 2-6 times greater when drivers were using smartphones[9]

13%

Crashes involving cell phone use accounted for about 13 percent of fatal crashes between 2011-2021[10]

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7 **New England Journal of Medicine. (1997).** Association between cellular-telephone calls and motor vehicle collisions. Retrieved from https://www.nejm.org/doi/full/10.1056/NEJM199702133360701

8 **ConsumerAffairs. (n.d.).** How many Americans own a smartphone?. Retrieved from https://www.consumeraffairs.com/cell_phones/how-many-americans-own-a-smartphone.html#intro

9 **Proceedings of the National Academy of Sciences. (2016).** Sustained experience of emotion after loss of memory in patients with amnesia. Retrieved from https://www.pnas.org/doi/10.1073/pnas.1513271113

10 **National Safety Council. (n.d.).** Distracted driving. Retrieved from https://injuryfacts.nsc.org/motor-vehicle/motor-vehicle-safety-issues/distracted-driving/

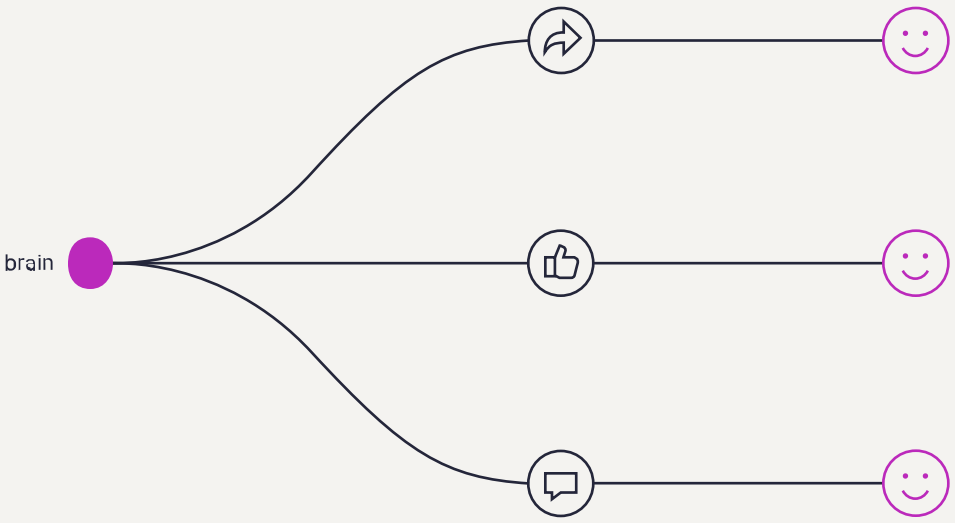
Are smartphones *too* smart?

Despite understanding the dangers of distracted driving, smartphones have been engineered to feed directly into the type of interaction our brains were wired to respond to. In fact, many recent studies show that our brains are evolved to seek instant gratification, which smartphones exploit by triggering dopamine hits.[11] This makes it difficult to resist them.

These devices are designed by some of the smartest people on Earth to be engaging and user-friendly. They keep us connected with notifications that tap into psychological triggers such as likes, shares, or comments.

Apps employ techniques such as push notifications to create a fear of missing out (FOMO), encouraging frequent checks. These elements are crafted to maximize engagement — even when you're idling in traffic.

Dopamine is a neurotransmitter in the brain that plays a crucial role in reward, motivation, and pleasure by transmitting signals between nerve cells.[12]



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11 **Haynes, T. (2018, May 1).** Dopamine, smartphones & you: A battle for your time. Science in the News. Retrieved May 22, 2024, from https://sitn.hms.harvard.edu/flash/2018/dopamine-smartphones-battle-time/

12 **"Dopamine."** Psychology Today. https://www.psychologytoday.com/us/basics/dopamine.

We reinforce good habits by recognizing and rewarding positive behaviors.

At Quanata, we believe in driving positive behavioral change at an individual level.

What can be done?

As distracted driving fatalities approach those from drunk driving, it's crucial to enforce and expand measures against this risk. Despite laws like texting bans reducing accidents, smartphone distraction remains atrocious.[13] More creative, effective, and human solutions are needed.

At Quanata, we believe in driving positive behavioral change at an individual level. This fits perfectly with HiRoad's approach to recognizing and rewarding good driving. To enhance their "engagement flywheel" in their app, they've employed positive reinforcement and gamification models influenced by behavior scientists and authors like BJ Fogg, Richard Thaler, and Nir Eyal.

Their insights into human behavior have been influential in Silicon Valley, especially in developing apps that captivate user attention.

If you've ever used apps like Instagram, TikTok, or Duolingo, you've experienced the type of user engagement strategies inspired by their principles.

Using technology for good

One of the things we're doing at Quanata is taking a fresh look at the tools used to cause distraction and redirecting that technology as a solution to distraction.

To do that well, we must also be cognizant of privacy and data security concerns while actively encouraging and rewarding non-driving interaction.

Models of behavior theory

Fogg's Behavior Model

BJ Fogg, a Stanford behavior scientist, explains that behavior change happens when motivation, ability, and a prompt align. We apply this by targeting when drivers are motivated, making the desired action easy, and providing timely prompts.

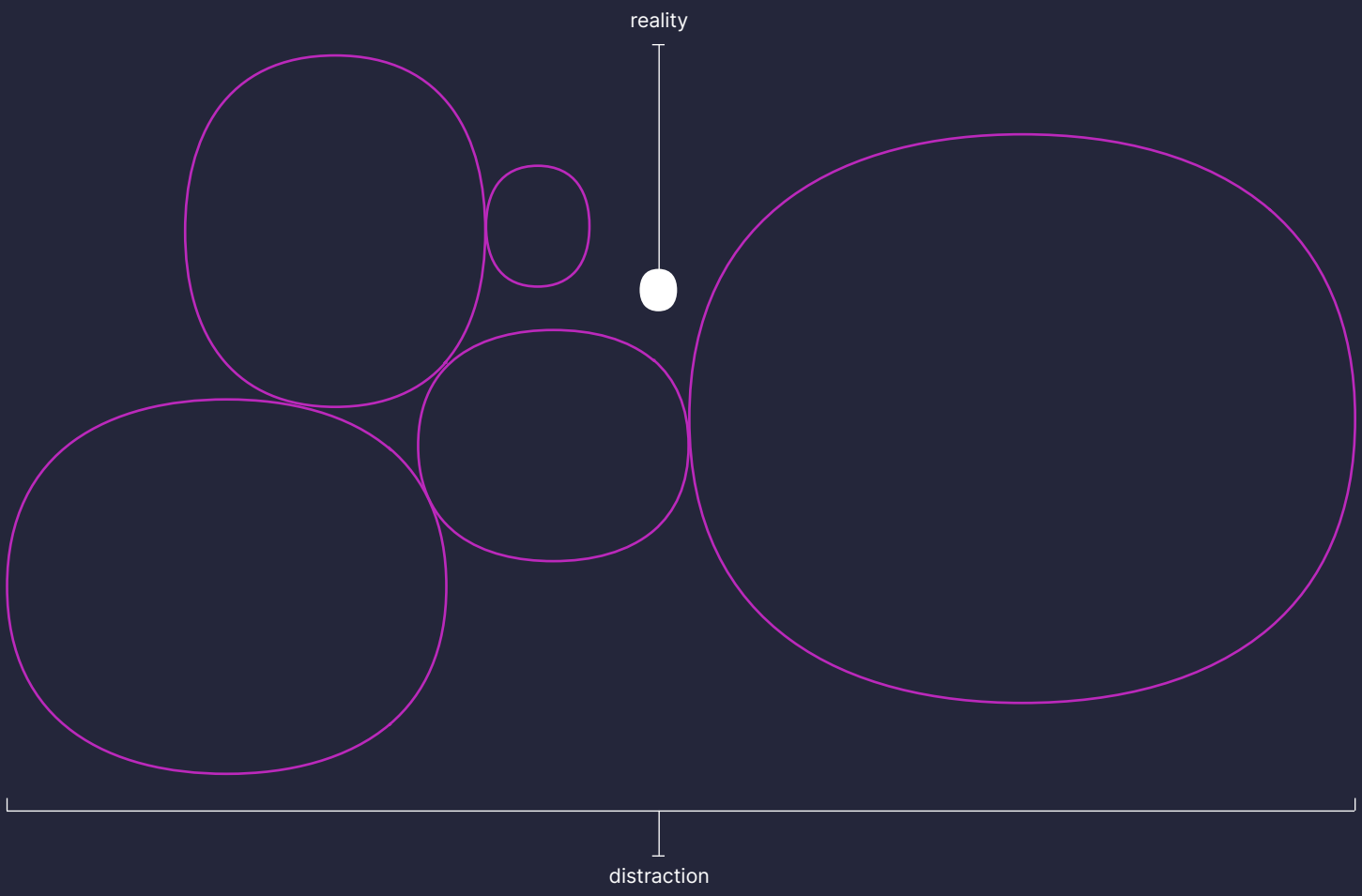
Thaler's Nudge Theory

Nobel laureate Richard Thaler's nudge theory involves subtly guiding choices without limiting freedom. We use this by sending non-invasive notifications and alerts to encourage safer driving at effective times.

Eyal's Hook Model

Nir Eyal, author of Hooked and Indistractable, articulated the Hook Model, where a trigger initiates a behavior, an action is taken, followed by a variable reward, and then investment, making behaviors stick.

13 **Flaherty, M. R., Kim, A. M., Salt, M. D., & Lee, L. K. (2020).** Distracted driving laws and motor vehicle crash fatalities. Pediatrics, 145(6), e20193621. https://doi.org/10.1542/peds.2019-3621



“Most people don’t want to acknowledge the uncomfortable truth that distraction is always an unhealthy escape from reality.”

— Nir Eyal, *Indistractable*

Methodology

Quanata's methodology for improving driving behavior with the HiRoad app, uses established behavior design principles because we know they work. Consider the use of behavior design in applications like Duolingo, a language learning app. This language instruction app uses positive reinforcement to encourage daily language practice — a pretty admirable use of behavior design.

In developing our engagement flywheel, we've crafted a variety of challenges and rewards that cater to different motivational triggers—social recognition, personal achievement, and even financial incentives. The emphasis remains on creating a rewarding experience that encourages repeat engagement without feeling punitive or manipulative.

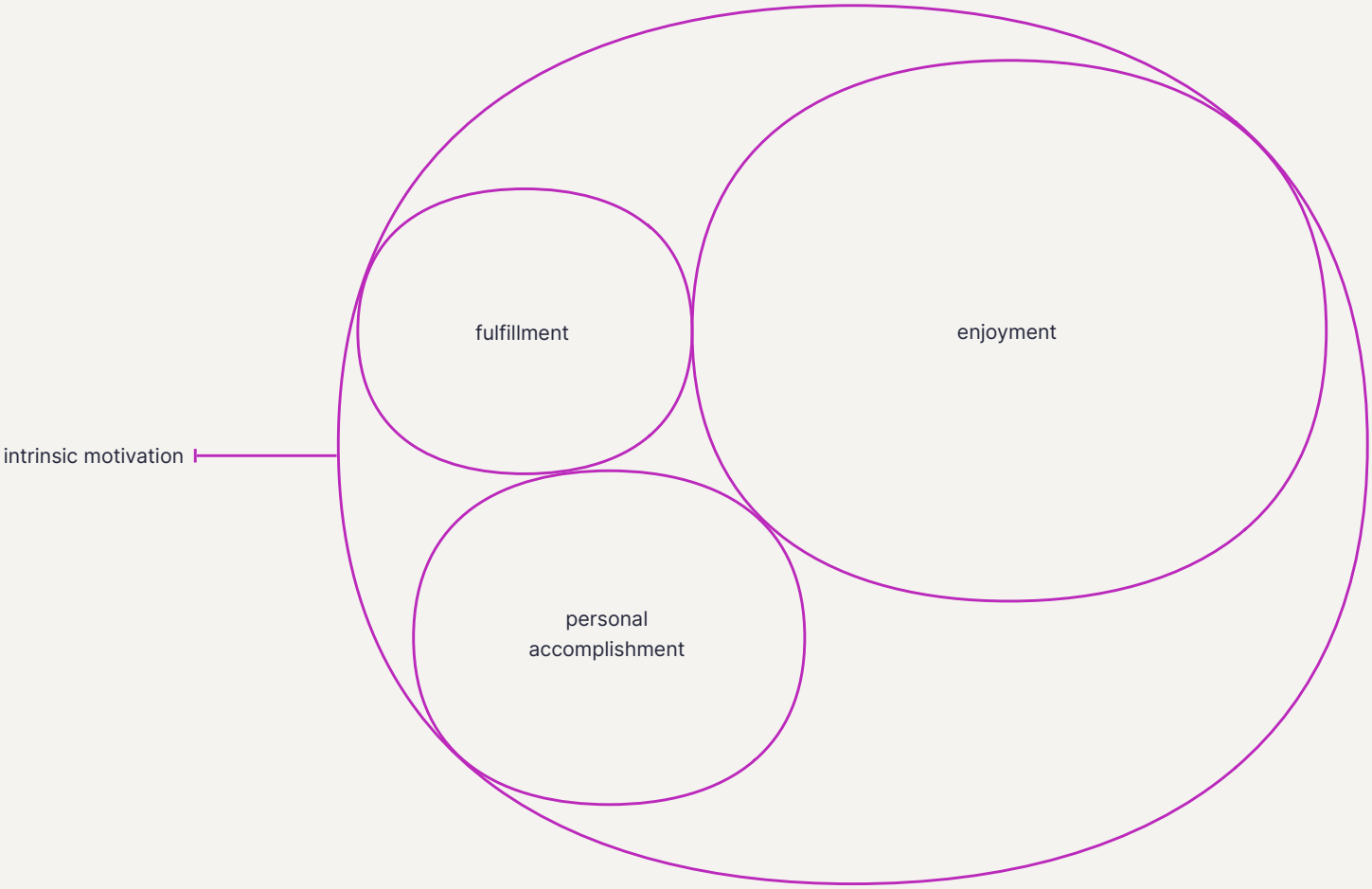
The engaging power of streaks

"Streaks" are one of our favorite tools in the behavior design toolbox. They reward users for consecutive actions, incentivizing consistency and engagement. They appeal to the psychological desire for completion, and consistency, motivating users to maintain their streaks and avoid interrupting their chain of wins.

Duolingo, for example, uses streaks to encourage daily language practice. This taps into loss aversion, where the fear of breaking a streak drives continued behavior, and the consistency principle, where people try to align with past actions.[14]

Streaks are effective for habit formation. They provide visual progress reinforcement and satisfy users' sense of accomplishment. Streaks also influence intrinsic and extrinsic motivations, through the lure of personal growth and tangible incentives.

14 **Nie, S., Wang, M., Li, J., Luo, H., & Zhang, H. (2023).** The neural dynamics of loss aversion. Imagination, Cognition and Personality, 42(4), 339-357. https://doi.org/10.1162/imag_a_00047



Extrinsic vs. intrinsic motivation for drivers

Motivation can come from many different areas but typically fall into two categories: *extrinsic* and *intrinsic.*

Intrinsic motivations are driven by internal rewards, such as enjoyment, fulfillment, or a sense of personal accomplishment. Extrinsic motivations are driven by external rewards or consequences, like money or YouTube likes.[15]

Intrinsic motivations lead to deeper engagement and satisfaction, while extrinsic motivation promotes specific behaviors (e.g., "do X to win a prize"). Over-reliance on external rewards can diminish intrinsic interest if those rewards are removed or not delivered.[16]

We emphasize intrinsic motivation through streaks, which reduces costs (for things like prizes) and avoids disappointing users.

While we do use tangible incentives to drive specific behaviors, drivers motivated by intrinsic factors, like road safety, engage more deeply, leading to more success.

We can enhance user engagement by applying game design elements through gamification. These tasks are easy to learn and feel familiar. Gamification mimics the dopamine response triggered by setting and achieving progressively challenging goals, similar to engaging video games and apps.

The familiarity with game-based tasks ensures a shallow learning curve. Because we all grew up with video games, many intuitively understand how game-based tasks work.

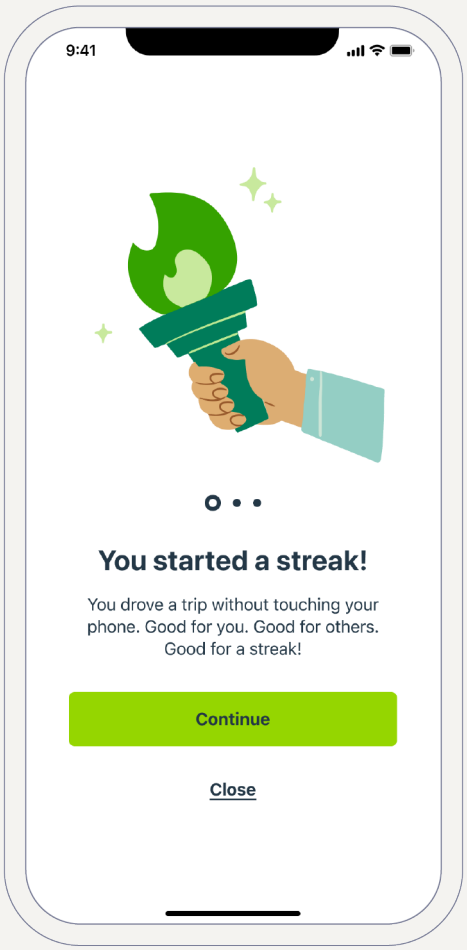
15 **Nickerson, C. (2020).** Differences between extrinsic and intrinsic motivation. Simply Psychology. https://www.simplypsychology.org/differences-between-extrinsic-and-intrinsic-motivation.html

16 **Black, S., & Allen, J. D. (2018).** Insights from educational psychology part 7: Rewards, motivation, and performance. The Reference Librarian, 59(4), 205–218. https://doi.org/10.1080/02763877.2018.1499164

Streaks environment

Streaks reward drivers for consecutive distraction-free trips and encourage safe driving behaviors. The HiRoad user interface guides users through this process.

1



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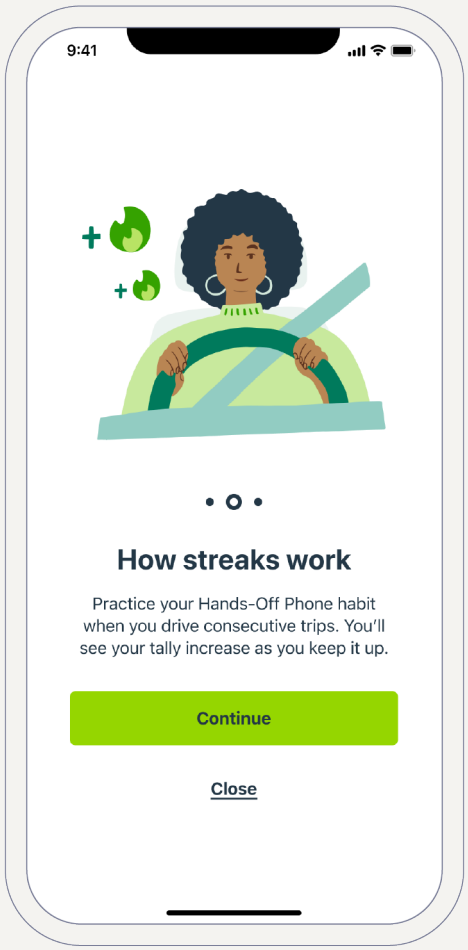

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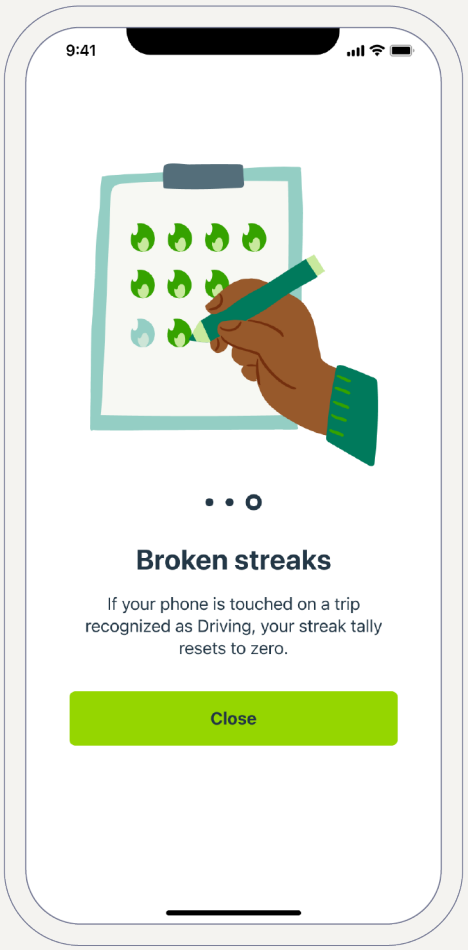

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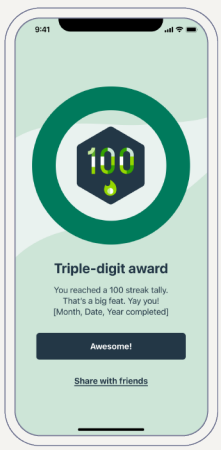

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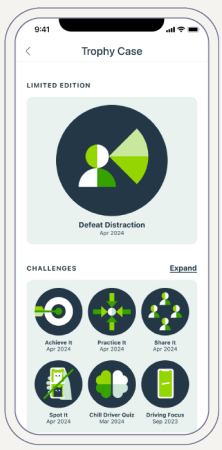

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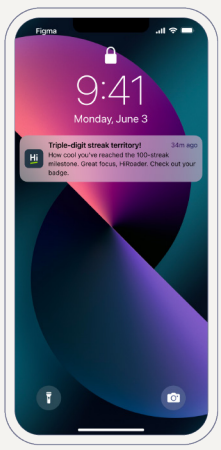


From left to right, top to bottom

1-3: Streaks onboarding experience
4: Streaks badge after hitting milestones
5: Trophy Case for distraction free awards
6: Push notification to get users in app

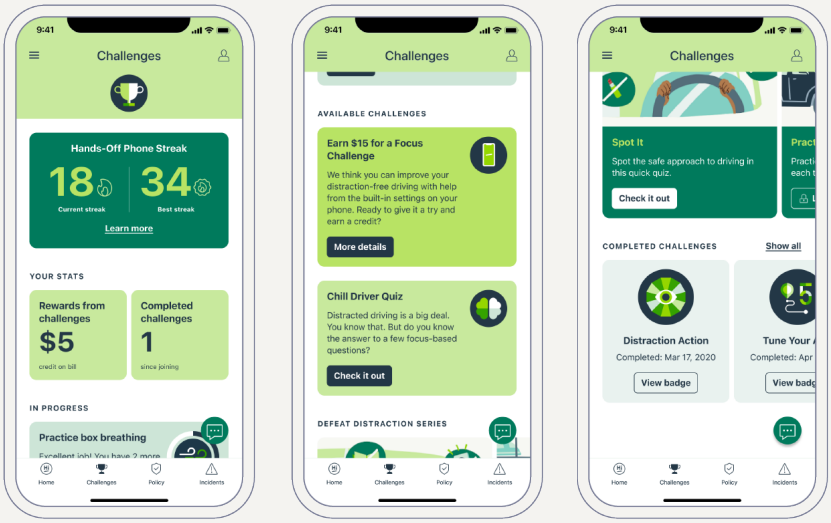
Not actual consumer images. Images are for illustrative purposes only. Actual screens and visuals may vary.

The HiRoad app ecosystem

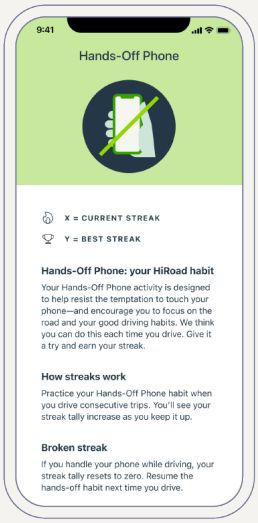
Streaks are an important part of how we get drivers on the right path, but they are just one small piece of a broader, interconnected approach. Users access all of our behavior focused activities through the **Challenges tab**.

This is a dedicated space in the HiRoad app where users can take on driving-related challenges and activities designed to promote safer driving habits. Each challenge is aimed at enhancing specific aspects of driving behavior and tap into both intrinsic and extrinsic motivations at optimal times.

Achieving milestones and streaks can involve successfully completing a challenge or a series of challenges, which we can use to reward users with in-game awards or actual discounts and credits towards their insurance policy.



One great example, the **Hands-Off Phone** habit, features notifications and screen takeovers to celebrate the initiation and continuation of phone-free driving streaks. Each uninterrupted trip without phone use builds the streak, enhancing safe driving habits. However, if a user handles their phone during a trip, the streak resets to zero.



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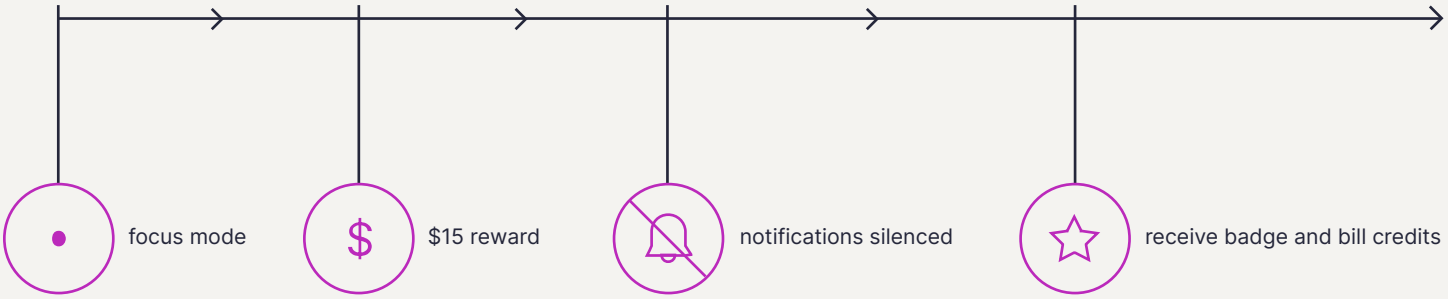
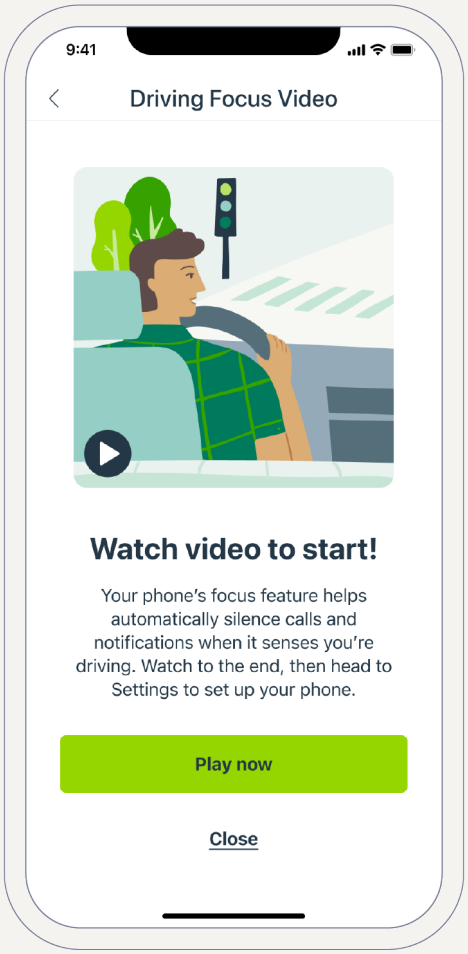


Driving focus rewards

Another, the **Driving Focus** challenge, encourages distraction-free driving by offering a $15 reward for activating the "focus mode" on their smartphones, which automatically silences notifications. It includes an educational video customized for iOS and Android and rewards users with a badge and bill credits.

We also allow users to select up to three dynamic images that update monthly to showcase their driving scores, discounts, and savings on insurance. This sharing capability is designed to engage users by allowing them to share achievements on social media platforms like Instagram and Facebook Messenger.

We intend our work to prove its value through real-world use. User interviews and surveys provide direct feedback, showing what works and what needs improvement. User testing reveals preferences for monetary vs. motivational rewards, guiding our design strategy for clarity and ease of use.



Not actual consumer images. Images are for illustrative purposes only. Actual screens and visuals may vary.

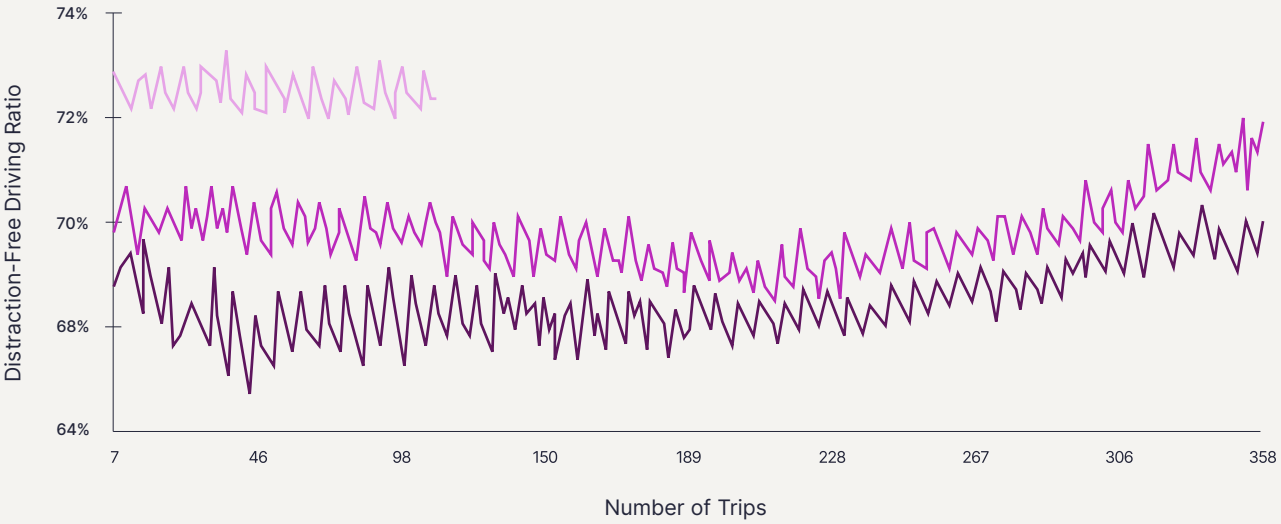
Results

HiRoad uses a metric called the Distraction-Free Driving Ratio (DFDR) to measure how often people drive without touching their phones.

For example, if you go on 10 car rides and don't use your phone in distracting ways during 7 of those, your DFDR would be 70% (7 out of 10). This score shows how well you keep your phone use under control while driving, which can dramatically affect your level of distraction.

Overall Distraction-Free Driving Ratio trend line

Improving every year across the entire book of business



Year
- 2024
- 2023
- 2022

DFDR = % of trips where the driver does not interact with their phone

At the individual driver level, more HiRoad customers have demonstrated better driving habits. The introduction of the streaks feature aligns with this individual-level improvement, which has been statistically proven to enhance DFDR scores by about a percentage point.

HiRoad's (Re)Engagement Flywheel — including the steps Trigger, Action, Reward, Investment, and a return to Trigger — plays a central role. Because of this, we assume some results are achieved through the total variety of behavior modifying challenges and activities.

Positive Engagement Habit Loop

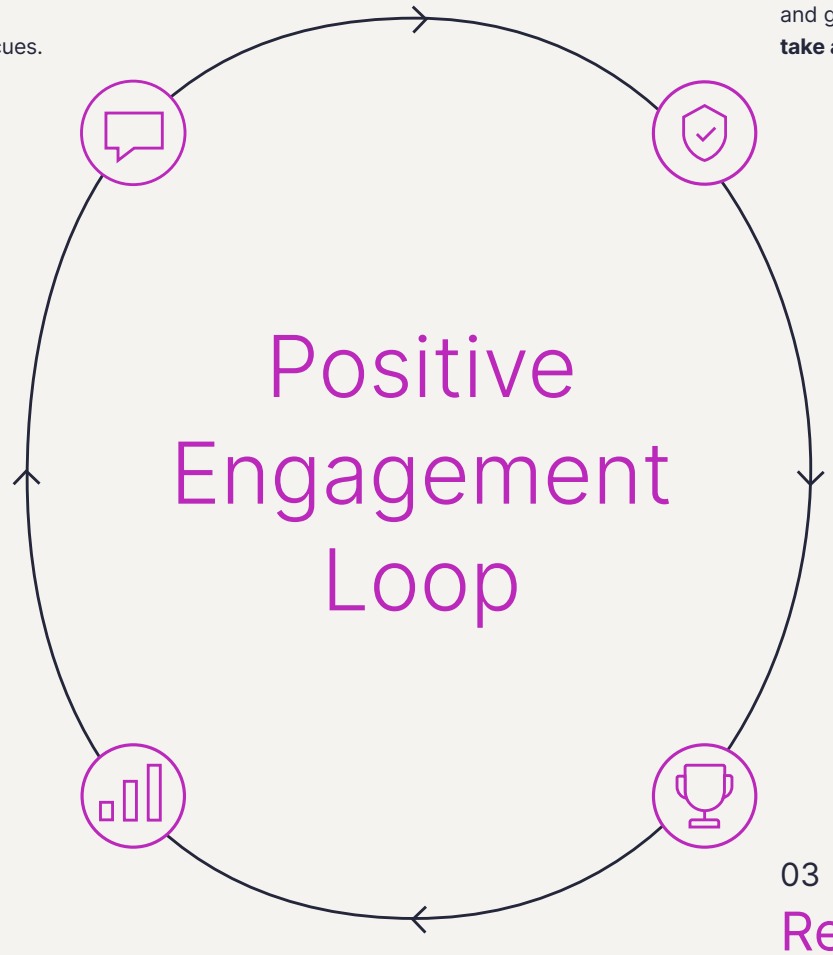
Trigger + Action + Reward + Investment

01
Trigger

We **make it easy** to know what to do by leveraging conditional prompts and providing visual cues.

02
Action

By providing a combination of data and guidance, **we prompt users to take actions.**



04
Investment

The more actions our customers take, the more they feel invested **and the more they value the product.**

03
Reward

We **reward user actions and outcomes** with extrinsic and intrinsic rewards. Together, our small actions make a big impact.

Hands-Off Phone streaks significantly impacted driving behavior.

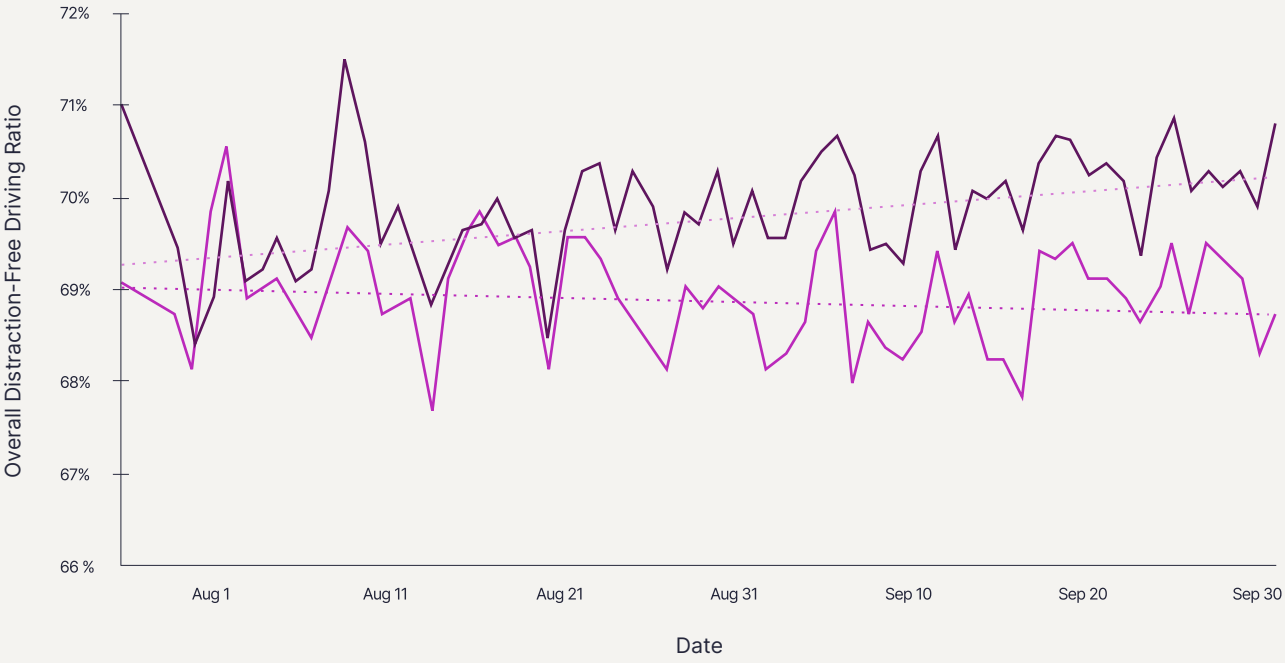
Streak-specific results

HiRoads's Hands-Off Phone habit feature monitors whether drivers use their phones during trips. If a driver completes a trip without handling their phone, it counts as a successful trip.

When a HiRoad customer logs their first successful distraction-free trip, they receive a push notification celebrating the start of this good habit. When they visit the app, they're introduced to the concept of streaks, which track consecutive trips taken without phone handling.

Streak Results

Hands-Off Phone habit vs. Control



Cohort group	Size
Control	6316
Treatment	6609

Observed a 200 bps lift in distraction-free ratio between cohorts (p = 0.0012)
*Difference in cohorts due to people joining and leaving mid-experiment

Hands-Off Phone habit vs. Control

HiRoad compared two groups: a control group of drivers who did not receive any additional in-app streak UI interactions and an experimental group who did.

The results showed the experimental group achieved a higher DFDR than the control group, indicating an increase in distraction-free trips over time. The control group's performance remained fairly stable.

HiRoad observed a significant improvement in the experimental group's behavior, **with a more than 2 percentage point increase** in the distraction-free ratio compared to the

control group. This difference was statistically significant, with a p-value of 0.0012, indicating the improvement was most likely not due to chance.

At the individual level, there was an average DFDR improvement of 74 basis points (bps), increasing from 72.66% to 73.40%. This improvement is statistically significant at the 95% confidence level, with a p-value of 0.0028.

$2.95B

A 3% reduction in these incidents could save up to $2.95 billion annually, benefiting drivers and reducing community burdens on emergency services and insurance premiums based on US estimates.

Saving lives, saving money

Measurable results in improving driving behavior have been achieved since applying streaks and other behavior modification practices to the HiRoad app. Streaks alone have accounted for a measurable 1% relative improvement.

Overall, HiRoad has observed a year-over-year reduction in distracted driving of about 3%. This is driven by streaks, a collection of other safe-driving initiatives, and other factors. These include in-app messages, sharing features, a mindful breathing challenge, and more.

While this change may seem modest, at scale, this is a substantial reduction over a short amount of time. A 3% reduction in distracted driving could translate to thousands of accidents prevented each year.

There are potential financial benefits as well. According to the NHTSA, distracted driving-related crashes cost $98.2 billion in 2019. A 3% reduction in these incidents could save up to $2.95 billion annually, benefiting drivers and reducing community burdens on emergency services and insurance premiums. Even if we focus on the 1% improvement at the individual level from streaks, that's nearly $750 million saved.

Conclusion

Our findings show that using behavior design principles, like streaks, rewards, and gamification — commonly employed by the top companies in Silicon Valley — lead to significant improvements in driver safety.

By integrating these principles into the HiRoad app, we have successfully influenced real-life safer driving behaviors, ultimately saving lives and reducing the economic impact of road accidents.

We believe expanding the impact of these ideas into driving technologies on a larger scale will save lives. Our methodology addresses the current issue of distracted driving and sets a foundation for future applications in various contexts where behavior change can lead to positive outcomes.

Hopefully, you are encouraged to look into the work of the behavior scientists we've highlighted and consider how work like theirs can improve outcomes for your customers.

Work with us

At Quanata, we seek to collaborate with forward-thinkers who are passionate about building technology for societal benefit. Interested in learning more? Contact us at quanata.com/contact.