Gear Shifting: Back to the Basics Phase 1

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ABSTRACT

A gear shifting study to improve child biking was conducted by Meghan Murphy, a first-year student at Frostburg State University. The problem is the difficulty of comprehending why gears are needed. Children do not understand the complexity of gear shifting. At young ages, children do not have enough biking experience and knowledge to transition between gears properly. According to the *Journal of Sport & Exercise Psychology*, children at younger ages of 5-7 years do not use a strategy while riding their bike compared to older children of 8-10 years of age. The second part of their study showed that all age groups made fewer errors when given a strategy for riding (Liu, T., & Jensen, J. L., 2007). Also, Cannoni stated that mechanical reasoning develops around the ages of 7 and 8. At an average age of 8 years, the child can state how a bike works (Cannoni, Elenora, et al., 2018). It could be reasoned that at these young ages, children are still trying to understand the bike and cannot fully comprehend gear shifting. Gear shifting comes with experiencing and understanding the terrain. Children are not developed enough to completely apprehend this topic, so they need help learning this fundamental bike ability.

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PURPOSE

The purpose of this study was to better understand the process of learning how to shift gears at a young age. A survey was administrated to collect data. This study helped gained insight into useful aspects which will help develop a gear shifting app. For the following year, the goal is to create an app that could help children ages 7 years old and older to know when to change gears properly. The final product will assist children in learning to shift gears properly and efficiently.

METHOD

A survey of sixteen questions was created to better understand how bikers shift between gears. Microsoft Forms was used to capture the results from the bikers taking the survey. The survey was sent out through multiple forms of online communication. In the beginning, bike groups in Maryland, Pennsylvania, and West Virginia were contacted over email asking them to share the survey with their group members. Due to lack of participation, the survey was added to Facebook biking groups. This increased the response number to one-hundred and eighteen participants.

EXAMPLE QUESTION FROM SURVEY

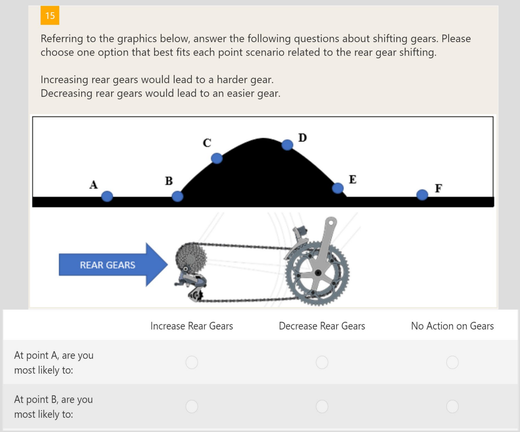


Figure 1

SELECTED ANECDOTAL EVIDENCE

- "Anticipate the hill, don't wait to gear down after you've started up the hill. You lose momentum quickly and may get stuck in a gear that is much too hard."
- "Don't force them and break your chain. Don't stick your fingers in your cassette when looking at your gears. Don't throw your bike."
- "Understand RPM and what that feels like, and shift to hit the RPM target."

RESULTS

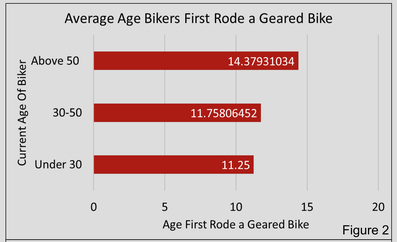


Figure 2

In figure 2, bikers above the age of 50 had an older age in which they first rode a geared bike. Bikers under 30 began riding a geared bike at a younger age. There is over a 3-year difference between under 30 and above 50 years of age. As the biker population gets younger, so does their age in which they first rode a geared bike.

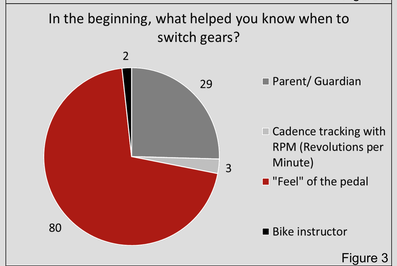


Figure 3

Figure 3 shows the majority of bikers used the "Feel" of the pedal to determine when to switch gears. The 2nd largest portion was a parent/guardian that helped.

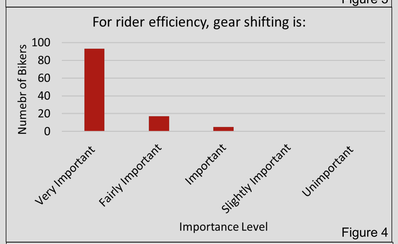


Figure 4

In figure 4, all bikers responded that gear shifting is important to very important. Slightly important and unimportant where not selected by any biker. The majority of bikers felt that gear shifting is very important for rider efficiency.

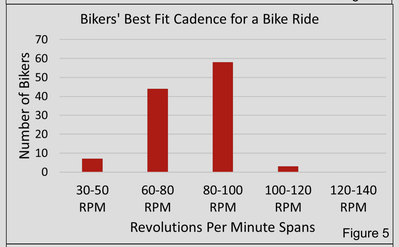


Figure 5

Figure 5 showed that the most popular responses for the best cadence was 60-80 RPM and 80-100 RPM. The other three categories had less than 10 bikers who choose it as a preferred cadence. The most selected cadence was between 80 and 100 revolutions per minute.

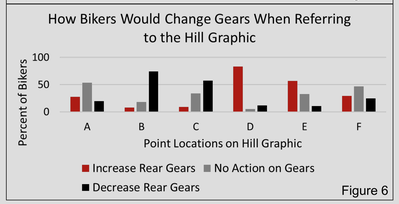


Figure 6

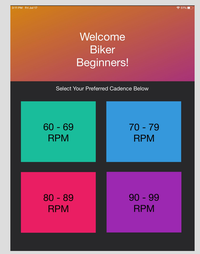
At every single location on the hill (see figure 1 on the left), each choice was selected shown in figure 6. The majority took no action on gears at points A and F. At points B and C, the majority decreased rear gears. At points D and E, the majority increased rear gears. Points A and F were on flat terrain. Points B and C were going up a hill. Points D and E were going down a hill.

CONCLUSION

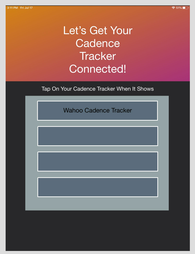
Learning how to shift gears is essential to becoming a skillful biker. Lessons on gear shifting are crucial for children to learn what an appropriate cadence feels like to them. There are many factors that can effect the cadence and when to switch gears. Due to the complexity, children need aided to understand how to be a proficient biker. The study helped to give important data which will allow the app to be created accurately and assist children to becoming improved bikers.

PHASE 2: APP CREATION

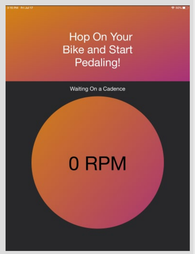
The study was conducted to help create a friendly and easy to use cadence app for children. It will allow the user's parent/guardian to choose a preferred cadence. The app will determine whether the cadence from the Bluetooth sensor is in the selected range and inform the child if there is need to increase or decrease their gears.



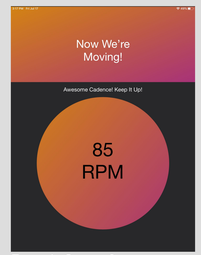
Home Screen



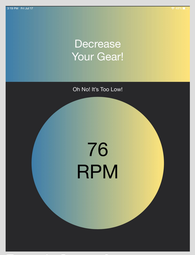
Bluetooth Setting Screen



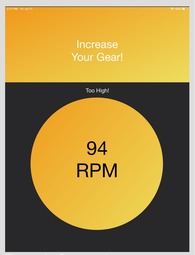
Example Screen 1



Example Screen 2



Example Screen 3



Example Screen 4

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