

BMMC Rider Training



Rubber-band / Yo-Yo / Slingshot / Slinky

Regardless of the name you give it, they all refer to the phenomenon of the gaps between motorcycles expanding and contracting while trying to stay in formation... generally as a result of the leader initiating a speed change.

I. Reaction Time

Reaction time for a motorcyclist confronted with an unexpected threat is, on average, 1-2 seconds. That is recognize to response. If the need to react is anticipated (such as when a turn has been announced), then riders can usually react within about 1 second after the bike ahead begins to react. When a group of riders change speeds very gradually, however, it usually takes 2-3 seconds for a rider to recognize this and begin to change his speed to maintain his position in the group.

This doesn't sound like much time, but experienced group riders manage their risks reasonably well with a minimum 1 second interval between each bike and a minimum 2 second interval between bikes that are traveling in the same track. When the group has more than 6 bikes in it, however, gradual changes in speed within the group can become tricky.

When the leader begins to accelerate, the second bike doesn't instantly start to travel at the faster rate. Instead, a gap grows between them while the second bike is reacting -- and it continues to grow until the second bike is fully up to the increased, stable speed of the leader. Once the speeds are the same, the gap will remain the same size. However, now the gap is larger than the 1 second spacing desired. Clearly here, the second bike must go faster than the leader for a brief period of time to "catch up."

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II. Example

If we assume that the leader speeds up from 60mph (88fps) to 70 mph (103fps) over a period of 2 seconds, the second bike will have to ride at 75 mph for 2 seconds (after his reaction time passes) in order to close the gap. Then another second to decelerate back to 70 mph to create a gap of the proper size (which now should be 103 feet because of the faster 70 mph speed rather than the 88 feet when traveling at 60 mph). If there were only 2 bikes in the group, this is easy to follow. But when the group is larger, the bikes riding further back in the pack begin to experience the “yo-yo” effect. This can be especially dangerous to all bikes from the second bike back to the sweep.



III. Consequences

Look at the problem the third and fourth bikes have to contend with - about 2 seconds after the second bike begins to accelerate, the third bike responds. Now, however, the second bike is moving at 75 mph rather than at the 70 mph the leader is holding. The third bike must use even more effort to catch up to the second bike than the second bike did to match his speed to the leader's new speed, if the timing gap (that one-second thingy) is to stay relatively in tact. He will have to move at 75 mph for 4 seconds, not 2, to catch up. The fourth bike will have to accelerate to 80 mph followed by a relatively fast deceleration back down to match the leader's speed



In a group of only 6 motorcycles, the last one will find the gap between himself and the fifth bike has grown to 143 feet before it begins to close, once he starts to speed up, given these average reaction times. And it will have been at least 11 seconds after the leader first began to accelerate before the sixth bike does.

Now, imagine what happens within the group if, while this is taking place, the leader has to apply his brakes!



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This slinky effect becomes extremely consequential if the leader happens to make an abrupt and major change in speed at certain critical moments, such as when approaching a sharp turn or entering the twisties. Leaders should be aware of the importance of avoiding sudden changes in speed if at all possible, to reduce the risks to those following.

IV. Reducing the Effect

The rubber-band effect can be reduced by following these guidelines:

- Leaders take extra care to make speed changes more gradually
- Leaders can announce speed changes over the CB, or visually using hand signals and, thus, to reduce reaction times for all
- All riders maintain good situational awareness so as to anticipate, or be ready for, any speed changes that may occur
- All riders restrain the impulse to roll on the throttle with gusto in order to quickly reestablish normal spacing (a good rule of thumb is to not exceed 10 mph over the posted speed limit while catching up)
- Leaders should not increase speed within 15 seconds of entering a curve which may require braking or some slowing down to maneuver it safely

V. Basic Understandings

1. All riders abandon the one-second spacing rule when riding the twisties.
2. Excluding the Lead and Sweep, never allow a group to become larger than 6 bikes if *even one* of the riders is inexperienced with group riding. And, never larger than 8, even if all are familiar with the riding habits of each other.

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3. The “slingshot effect” increases the potential for accidents because other vehicles (e.g. cars) may see the resulting gap in the formation as a perfect place to slip in.
4. If you think the “rubber band” effect is a problem when accelerating, think of what happens during braking!
5. The *average* length of a semi truck and trailer is 70’. That means that at 60 mph (88fps) you should be able to “visualize” at least a semi’s length between you and the bike ahead of you in the adjacent track. And more than 2 semis of space between you and the bike ahead of you in the same track. I’m willing to bet that these distances are a lot more than the average biker thinks, or uses. What it really means, though, is if you’re doing 60 mph and the bike in front of you goes down and blocks the lane, it will take you more than two semi’s length to react and try to stop. Without the two second spacing you *will* very soon be part of the accident.



Hope this helps.