Manipulating Length Perception With Gyroscopes

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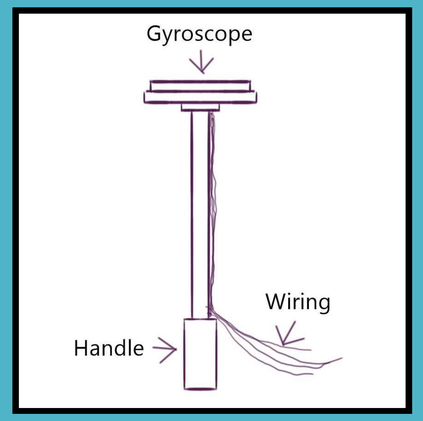


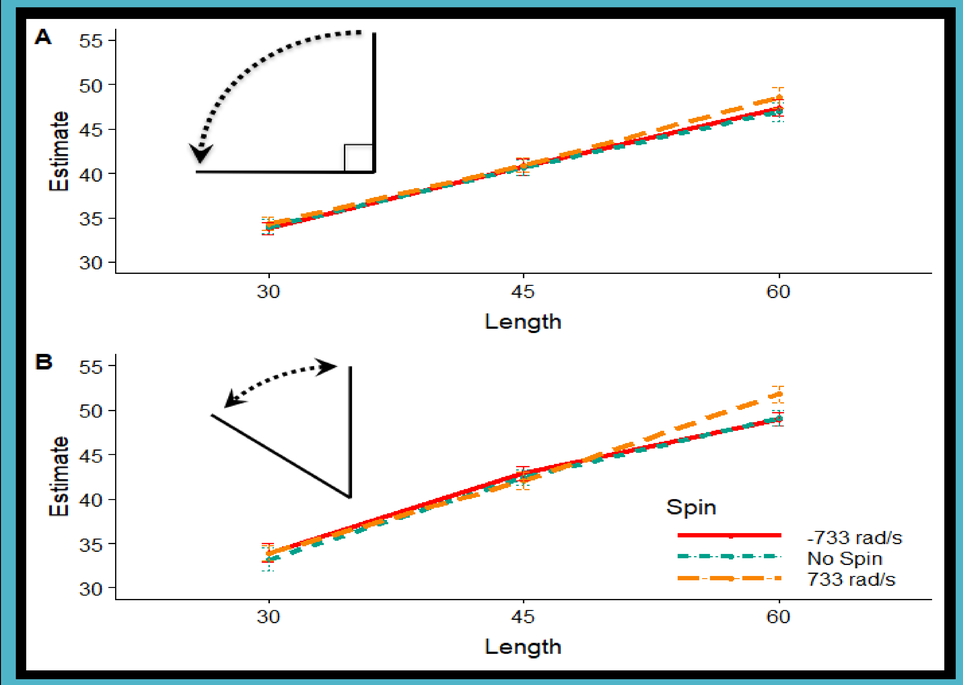
What Is The Study?

A spinning gyroscope applies torque through rotational inertia to its central axis. This torque can change how a held rod feels when swinging it around[1]. Could the rotational inertia of a gyroscope affect how an individual perceives the length of a rod?

Methods

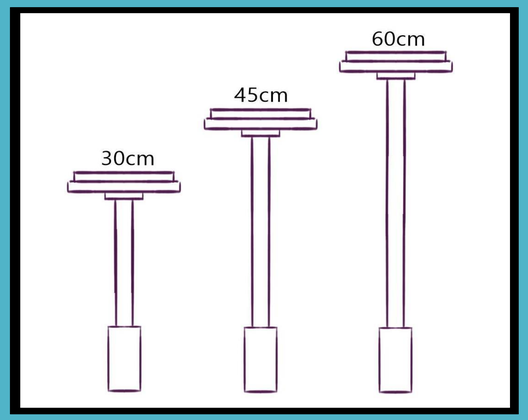
- **3 device lengths [30cm, 45cm, 60cm]**
- **3 gyroscope speeds [-733rad/s, 0rad/s, 733rad/s]**
- **2 wielding modes [90° one direction or 45° forward than backward]**
- **Participants (N=15) held their hands behind a curtain and were given a random device with a random speed**
- **They would swing the device 90° for the first 27 tests than 45° for the next 27.**
- **Participants would estimate the length of the device on a pully system marked with a flag in front of them after every swing.**

Results



Participants length estimates were analyzed with a 2x3x3 mixed effects within group ANOVA using R

- **The gyroscope's speed was not helpful in predicting the participants estimate, $F(2, 797) = 0.021$, $p = .9792$**
- **Participants did accurately guess which devices were longer or shorter compared to each other regardless of spin speed, $F(1, 797) = 410.44$, $p < .001$**
- **The 45° wielding mode had more accurate estimates than the 90°, but only slightly, $F(1, 797) = 4.112$, $p = .043$**



Discussion

- **Results are contrary to our hypothesis, the gyroscope's speed did not predict the participant's estimate**
- **Mass distribution did not change with the spin of the object**
- **90° first than 45° could have influenced participant prediction, possible counterbalancing needed**
- **Kick to pressure ratio was not thrown off by the spin[2]**

References

[1]Brooks, T. R. (2018). Contributions of Angular Momentum in Gyroscopes to Perception of Heaviness and Controllability (Doctoral dissertation)

[2]Burton, G., & Turvey, M. T. (1990). Perceiving the lengths of rods that are held but not wielded *Ecological Psychology*, 2, 295-324

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