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## Split-second brain function at baseball hitting

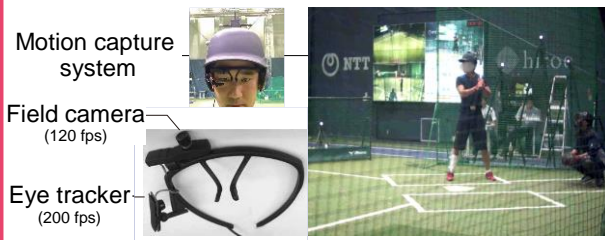
- Instantaneous cooperation between vision and action -

### Abstract

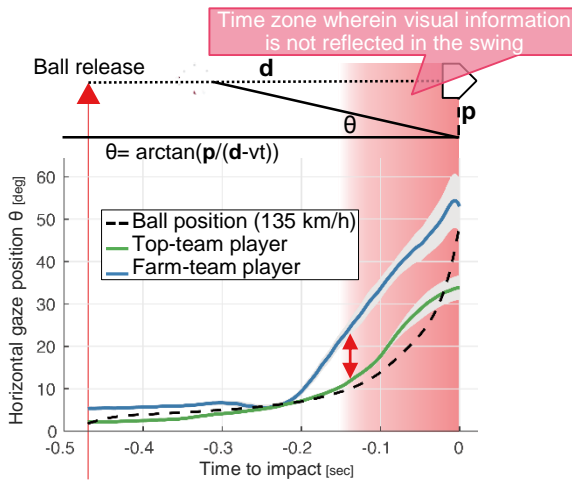
In ball games, it is necessary to move the body appropriately in reaction to a ball moving at high speed, but the mechanism of such movement is not known. In this study, we **examined the brain mechanism that captures a fast moving ball in a limited time** by 1) measuring the eye and body movements of professional baseball players while they were actually hitting and 2) performing basic experiments using an optical illusion. By measuring eye and body movements in a scenario close to the actual game, we succeeded in capturing the **sophisticated skills used by top athletes**. In basic experiments using the illusion, we clarified **how the brain uses visual information to control body movements**. Our goal is twofold: to uncover the implicit brain functions for vision and action and to establish a **new training method to train people in techniques for optimal body control according to the situation**. This will help improve the motor skills of a wide range of people, from children to the elderly, as well as top athletes.

### How do professional baseball players hit a fastball?

**Experiment** Measured eye and body movements using wearable sensors in a situation close to a real game



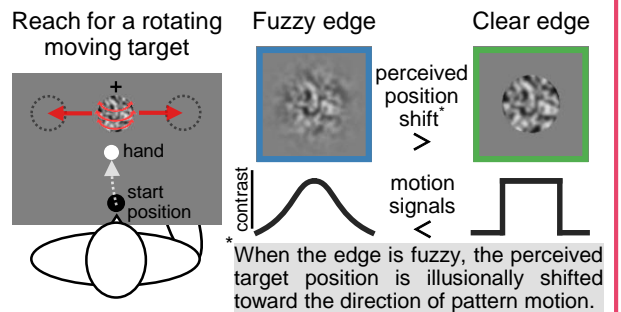
**Results** Good hitters capture a ball by linking eye and body movements until such a time as no visual information is reflected in the swing.



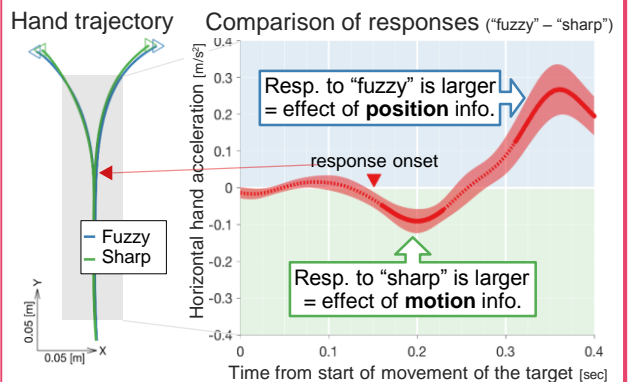
Not only visual information but also motor commands in the brain are used.

### Why can a fastball be hit in a very limited time?

**Experiment** Tested whether motor responses to a moving target is driven by **position** or **motion** brain information



**Results** Arm movements are first driven by target motion information and then adjusted by the position information.



The bat's trajectory starts to change before the ball's position is located.

### References

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- 2) H. Ueda, N. Abekawa, S. Ito, H. Gomi, "Temporal development of an interaction effect between internal motion and contour signals of drifting target on reaching adjustment," in Proc. *The 47th Annual Meeting of the Society for Neuroscience*, 2017.

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