

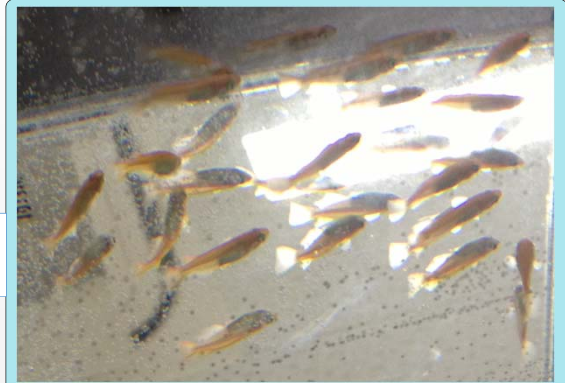
# Attraction Effect of Recomposed Visual Stimuli from Biological Motion in Medaka Fish

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## Abstract

Medaka fish (*Oryzias latipes*) is expected as the model organism to clarify the relationship between social behavior and genetic information. This study aims to clarify the visual factor of the motion to induce the shoaling behavior in medaka fish. For this goal, we conduct behavioral experiment that shows the recomposed biological motion and evaluate the attraction effect of each features in the motion. The result of the preliminary experiment suggests that the attraction effect of the pure biological motion is stronger than the deteriorated biological motion.



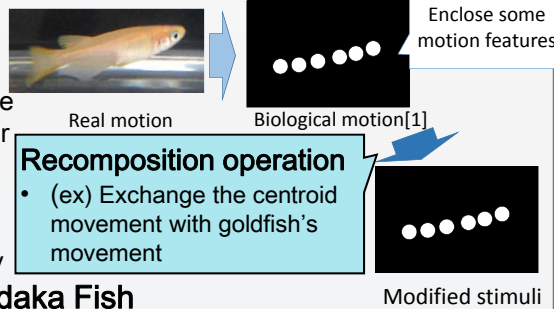
## Medaka fish

- About 3.2cm in body length
- As model organism (like Zebrafish), medaka is used for genetic research. Micro-injection method for medaka is established.
- Show shoaling behavior

## Motivation

### Target and approach

- To identify the minimum feature to induce the shoaling behavior among medaka fish
- Utilization CG animation generated by real motion and reposition the data partially



### Recomposition operation

- (ex) Exchange the centroid movement with goldfish's movement

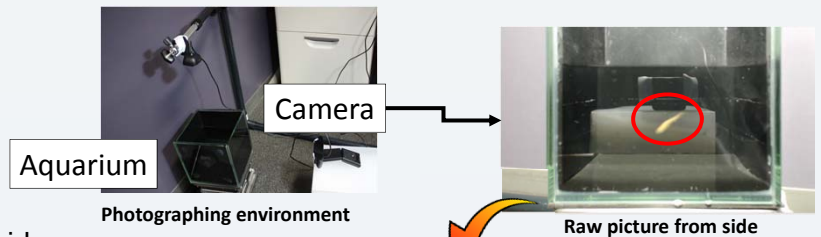
### Specific expectation for Medaka Fish

- Medaka is expected as model organism to study communication among the same species[2]. To clarify the characteristics of interaction in medaka will contribute to other species.

## Method

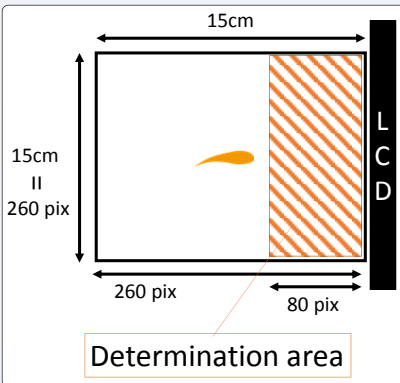
### 1. Generating visual stimuli

Capture medaka's motion using camera and converse the data to biological motion



### 2. Stimulus Presentation & Evaluation

- The stimulus was presented by LCD from one-side.



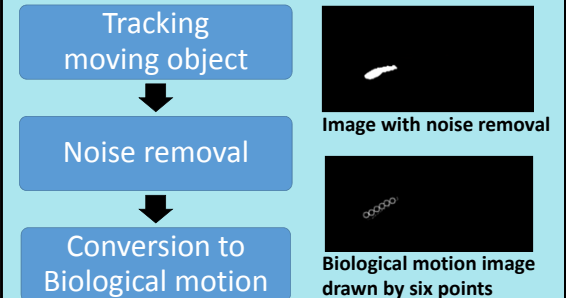
### Procedure

1. Accustoming the medaka to the aquarium (20 min)
2. Start measurement  
No stimulus (first 1min) + stimulus(4min)

### Non-biological motion as comparison

- The six dots always formed a straight line, and the distance between dots was fixed bounced off in random directions.
- BM(n=5) vs NBM(n=5)

### 1-(a). Image processing



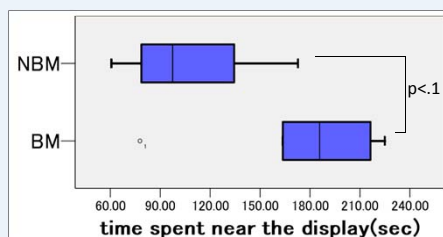
## Result

Biological motion stimulus attracted medaka is stronger than non-biological motion stimulus.

Independent t-test showed marginal difference of time spent near the display between BM and NBM.

Mean(BM) = 173.7(s)  
Mean(NBM) = 108.8(s)

[Expected time]  
310sec x 80/260pix = 95.4



## Conclusion

- Medaka presented with biological motion spent a long time near the display.
- The result suggest that the BM has more attraction effect than NBM.

### Future work

- Conduct additional experiments to detect the effective factor in pure biological motion to induce the shoaling behavior in medaka fish

[1] NAKAYASU, Tomohiro; WATANABE, Eiji. Biological motion stimuli are attractive to medaka fish. *Animal cognition*, 2014, 17.3: 559-575.

[2] OKUYAMA, Teruhiro, et al. A neural mechanism underlying mating preferences for familiar individuals in medaka fish. *Science*, 2014, 343.6166: 91-94.