



HOKKAIDO UNIVERSITY

Title	Relative value learning in <i>Drosophila melanogaster</i> larvae
Author(s)	RAHMAN, Sadniman
Degree Grantor	北海道大学
Degree Name	博士(生命科学)
Dissertation Number	甲第16785号
Issue Date	2026-03-25
DOI	https://doi.org/10.14943/doctoral.k16785
Doc URL	https://hdl.handle.net/2115/99630
Type	doctoral thesis
File Information	Sadniman_Rahman_review.pdf, 審査の要旨 https://creativecommons.org/licenses/by/4.0/



Doctoral Dissertation Evaluation Review

Degree requested: Doctor of Life Science

Applicant's name: Sadniman, Rahman

Examiner:

Chief examiner	Associate Professor	Tanaka, Nobuaki
Associate examiner	Professor	Soma, Masayo
Associate examiner	Professor	Ogawa, Hiroto
Associate examiner	Assistant Professor	Schleyer, Michael

Title of Doctoral Dissertation

Relative value learning in *Drosophila melanogaster* larvae
(キイロショウジョウバエ幼虫における相対的価値学習)

Results of Evaluation of the Doctoral Dissertation (Report)

The ability to learn from past experiences to inform future decision-making is crucial for animals. One question with important implications for adaptive decision-making is whether we learn about the absolute values of cues we encounter or about their relative values. Many studies in humans and vertebrates demonstrated relative value learning even when it leads to suboptimal decisions. Whereas some studies in insects have demonstrated that insects do discriminate values of different rewards or punishments and can learn accordingly, none of them clearly showed that the value of one option changes simply because another option with a different value had been presented. Thus, it has remained unclear whether organisms with simple nervous systems such as insects learn about relative values of rewards and punishments like vertebrates.

To answer the question, he investigated whether and how insects learn the values of rewards and punishments relatively during classical conditioning using *Drosophila melanogaster* larvae. Using associative odor-taste learning paradigms, he found that larvae determine their behavior by comparing the reward or punishment strengths during training, which corresponds to the relative value learning observed in vertebrates.

In conclusion, his thesis provides the first clear demonstration that *D. melanogaster* larvae learn relative values of rewards and punishments. Relative value learning is not a high-level cognitive feature restricted to vertebrates but an evolutionarily adaptive process which can be observed even in maggots. Considering that there are abundant genetic tools available in *D. melanogaster*, this study opens up the opportunity to reveal the neural mechanisms underlying relative value learning in unprecedented detail. Therefore, we acknowledge that Rahman Sadniman is qualified to be granted a Doctorate of Life Science from Hokkaido University.