

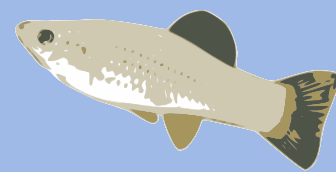
Collective jumping behaviour in the Amazon molly *Poecilia formosa*

F.A.Francisco^{1,2*}, A. L. Kesim³, D. Bierbach^{1,2}

1 Faculty of Life Sciences, Humboldt University, Berlin 10587, Germany

2 Excellence Cluster Science of Intelligence, Technical University, Berlin 10587, Germany

3 Department of Biology, Freie University, Berlin 14195, Germany



Fish can barely leave their aquatic habitat when environmental conditions get unsuitable. However, many species try to - fish jump out of the water to reach new water bodies or to escape attacking predators. But what social conditions influence a fish's decisions to risk its life by jumping out of the water?

Research Questions:

1) Does familiarity of social partners affect probability to jump?

2) Is the decision to jump socially facilitated by the behavior of group mates?

Methods:

We observed spontaneous jumping behavior in the clonal Amazon molly (*P. formosa*). This is a gynogenetically reproducing all-female species originating from the Atlantic coast of Mexico and the USA.

The jumping behavior of familiar and unfamiliar pairs was recorded in round bowls surrounded by water (N-familiar=20, N-unfamiliar=20). To estimate the effect of group size on jumping probability, larger groups of size 4, 8, 16 and 32 (N=4) were recorded in an open field setting.

All fish were recorded for 60 minutes and automatically tracked in order to score the location and timing of jumps.

Social contagion in groups was modelled as correlated process to estimate temporal effect of one jump triggering another.

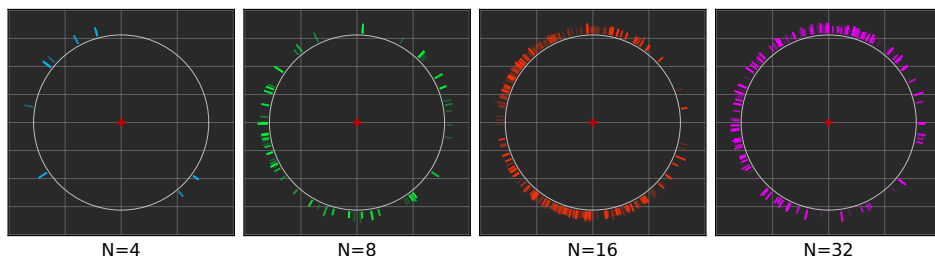


Figure 1: All detected jumps and the automatically detected arena boundaries. Shown are all jumps of the four replicates per group size.

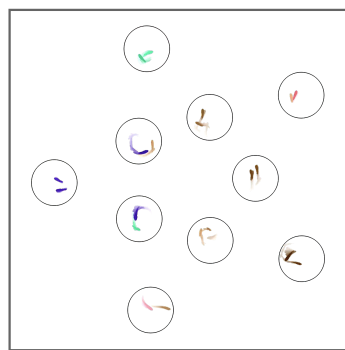


Figure 2: Top-Down View of the analysis of familiar and unfamiliar pairs.

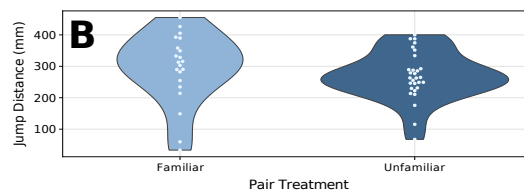
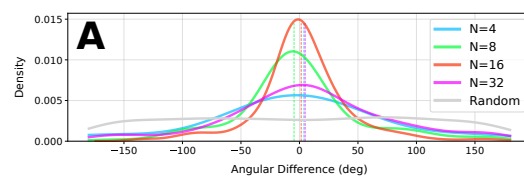


Figure 3: **A** Distributions of angular differences between consecutive jumps; **B** Distance covered during jumps

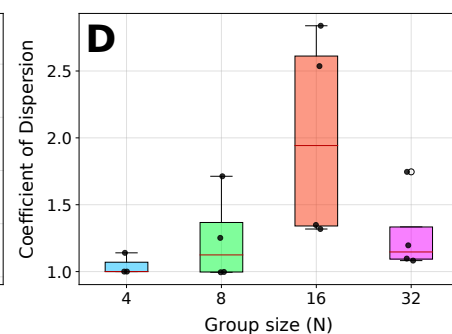
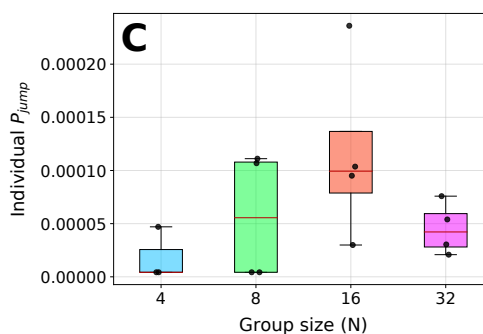


Figure 4: **C** Individual jump probability; **D** Index of temporal dispersion over group sizes. CD was calculated using a rolling window with a size of 15 s. Values above 1 indicate clustered distribution of jumps

Results:

- Familiar pairs jump less, compared to unfamiliar pairs
- Group size has little effect on jump probability
- Jumps are spatio-temporally correlated

Conclusion:

The jumping behaviour in the Amazon molly is affected by the social environment. In groups, social contagion mechanisms may influence the decisions on where and when to jump.