Behavioral diversity and decision-making of an amoeboid cell

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A diversity of behavioral types is apparent in each of animal species. But what is known about how it emerges is still limited. As decision-making is choice of an action from multiple possible options of behaviors, it is meaningful if the option shows a wide variety. In this report, an amoeboid organism of *Physarum* plasmodium (true slime mold) can show three major types and almost twenty subtypes of behaviors when encountering a weakly toxic zone. We propose a dynamical mechanism for emergence of such behavioral diversity, according to already proposed equations of rheological motion for the amoeboid movement. The dynamical mechanism is expected to be robust against still-on-going discussion on model justification for the real *Physarum* since the mathematical essence is common and generic. We conclude that behavioral diversity and decision-making are two sides of one thing. The results obtained here are on a unicellular organism but the similar mechanism might be shared by higher animals.

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