Teacher's Notes for a Collective movement workshop


**Group activity**
Performed in groups of 20 students. Define the limits of the experimental arena and mark four landmarks with coloured flagging tape.

Standard instructions for all trials:
- When told to begin, walk at a normal pace and do not stop until told.
- Remain on the lawn.
- Stay with the group.
- Do not communicate with each other (talk, gesture etc.).

**Experiment 1 – No rules / control - Torus formation**

STARTING FORMATION: Arrange all students in a circle in the middle of lawn, arm length apart, and facing out.

Start trial and let run for approx 3 mins using standard rules above. Students ‘should’ form a torus. After this time has elapsed, please bring the group back to the starting point.

Do TWO trials.

**Experiment 2 – Directional group movement without leaders**

Conduct as Experiment 1, but add an additional general rule:
- **Move same directions as nearest individual**

Start trial and let run for approx 3 mins. Students ‘should’ travel together in the same direction as a group. Group direction should be random across trials. After this time has elapsed, please bring the group back to the starting point.

Do TWO trials.
**Experiment 3 – Informed and Naïve individuals**

Give students slips of paper with rules for informed (10%; n = 2) and naïve (90%; n = 18) as below.

There are 4 possible targets (A, B, C, D) (trees on the lawn marked with coloured tape).

Conduct as Experiment 1, but provide each group member at random with an additional written instruction to be read and put in pocket before starting trial:

- Rule 1: **stay with group** (naïve individuals, 90%)
- OR
- Rule 2: **go to target A/B** (informed individuals, 10%)

Start trial and run for 3 mins or until the group reaches the target. After this time has elapsed, please bring the group back to the starting point.

Take the instruction paper from the previous experiment off each student, and give them the new instruction set. Vary the targets between each trial, so the students don’t bias direction by anticipating the target.

Groups should reach the target despite being dominated by naïve individuals.

**Discussion**

Encourage students to discuss what they noticed about their movement and the movement of the group. Ask students to predict how the movement of the group may have changed with different numbers of participants and different ratios of informed/uninformed. Challenge the students to think about where in nature and society these principals of collective motion may be observed and/or exploited. If possible, part of the discussion should include animal behaviour videos.
Student Instructions

Expt 1 – INSTRUCTIONS
- When told to begin, walk at a normal pace and do not stop until told.
- Remain on the lawn.
- Stay with the group.
- Do not communicate with each other (talk, gesture etc.).

Expt 2 – INSTRUCTIONS
- When told to begin, walk at a normal pace and do not stop until told.
- Remain on the lawn.
- Stay with the group.
- Do not communicate with each other (talk, gesture etc.).
- MOVE SAME DIRECTIONS AS NEAREST INDIVIDUAL

Uninformed Individuals 90%

Expt 3 – INSTRUCTIONS
- When told to begin, walk at a normal pace and do not stop until told.
- Remain on the lawn.
- Stay with the group.
- Do not communicate with each other (talk, gesture etc.).

OR Informed Individuals 10%

Expt 3 - INSTRUCTIONS
- go to tree with PINK flagging tape

Expt 3 - INSTRUCTIONS
- go to tree with GREEN flagging tape