

SOP: Video Recording Animal Locomotion

A. What this SOP covers

Use this SOP if you need to video record some sort of animal movement using high-speed video. Although this SOP can be applied to the recording of any animal behavior that includes movement, the focus is on locomotion. This SOP is primarily intended as a checklist/reminder of all the things that should be done in order to obtain high quality, repeatable video recordings.

B. What you need before you start

- A high-speed video camera.
- A race track or other arena in which the animal will do its behavior.
- Tripod.
- Lighting & heating needed to maintain animal at proper temp and record at proper speed.
- Scale object.
- Incubator.
- Thermometer for recording body temperature.
- Animals.

C. Procedure

1. Preparing animals for trials

a. Ensure that animals are healthy

- i. Inspect for injuries.
- ii. Make sure they are eating.
- iii. Typically give them two weeks to acclimatize to lab conditions.
- iv. In the field, attempt to complete all trials within three days of capture.

b. Use non-toxic paint to mark any reference points that you will need to track to calculate velocities, accelerations, angles, etc.

- i. For lizards with limbs, we typically use nine points: 1 – occiput of the head, 2 – mid-dorsal at level of pectoral girdle, 3 – mid-dorsal and midway between pectoral and pelvic girdles, 4 – mid-dorsal at level of pelvic girdles, 5 – mid-dorsal at level of cloaca, 6 – right knee, 7 – left knee, 8 – right elbow, 9 – left elbow.
- ii. If you require fewer points, then use the points in the above order, but assign the points numbers without gaps.
- iii. In some cases, you will require additional or different points, depending on the animal and the project. For example, limbless animals may require more mid-dorsal points, or some lizards may require additional limb points, like the metatarsus-phalangeal joint. Discuss this with your mentor.
- iv. In some cases, the animal will not be paintable. This is the case with amphibians because of their skin. Discuss this with your mentor to either develop an alternative marking strategy, or decide on points that are identifiable on the animal.
- v. If calculating velocity and acceleration, ensure that one of your points approximates the Center of Mass (CoM).

- c. Get animals to correct body temperature
 - i. Place animals individually in inflated ziplock bags or cloth reptile bags.
 - ii. Place bags with animals in incubator set at the desired temperature.
 - iii. Let animals get to proper temperature for at least 30 minutes.
 - iv. Place animals back in incubator after every trial.
 - v. **Monitor the animals for signs of overheating/distress.** This can include not righting themselves, having their mouths open, or panting very deeply. Remove distressed animals from incubator immediately, and consider lower the temperature in the incubator. Different species have different temperature tolerances.

2. Preparing the apparatus for trials

- a. Set up the racetrack to required specifications (proper angle, substrate, etc.).
- b. Ensure that room and track temperature are sufficient to maintain animal temperature.
 - You may need to heat or cool substrates and take other appropriate actions.
- c. Ensure that lighting is adequate.
 - i. Use extra light fixtures/bulbs as needed.
 - ii. eliminate any transitions between light and shade on the track – need even light.
- d. Set up the camera as needed using the tripod.
 - i. Camera should be level and give a direct dorsal or lateral view, depending on what you are recording.
 - ii. If you are doing 3D recording, make sure that cameras are synced and at appropriate angles. Take a brief recording of the calibration object.
 - iii. Make sure your field of view is adequately large or small to record what you need in sufficient detail. Record the zoom level if using a zoom lens.
 - iv. Ensure that objects are not blocking the camera's picture. These include tripod legs!
 - v. Ensure that the camera settings are as needed. Typically, we use:
 - Frame rate: Fastec – 250 Hz, Casio – 240 Hz
 - Shutter speed: Must be at least 2x the frame rate, better to be 3x frame rate.
 - You may need more light to have a good quality video under these specifications.
- e. Ensure that there is a scale object in the field of view of the camera.
 - i. Scale object can be a ruler, a coin, or a paper grid – we need to know its dimensions.
 - ii. Scale object should be aligned with the video edge so that it is easy to measure distances in x and y directions.
 - iii. Scale object must be recorded in every single video.

3. Conducting animal movement trials

- a. Place animal in the arena/track.
 - i. Should be at edge of track, facing in, so that its behavior is recorded.
 - ii. Should start from a standstill if interested in acceleration.
 - iii. All points that will be digitized should be visible.
- b. Start recording video.
 - a. and b. can be switched as appropriate to enhance work efficiency.
- c. Stimulate animal to do behavior.
 - i. Depending the behavior, animal may need to be poked, touched, clapped at, etc.

- ii. Make sure that human hands, heads, and other objects don't obscure the view of the points in any of the frames. A pencil or thin stick can decrease chances of this happening.
 - iii. In some cases, the animal may need to be stimulated continuously.
 - iv. Work with the animal to get a good trial. Poor trials where the animal isn't performing well are not valid and will not be useful.
- d. Turn off recording once good trial is captured.
 - e. Immediately take the animal's body temperature and record. If the animal's body temperature is not close to the target temperature or its optimal temperature, the trial isn't valid. Some variation is fine, but not much.
 - f. Capture the animal and return it to its bag.
4. Crop the video
- a. Both Fastec and Casio cameras allow easy cropping of videos.
 - b. Cropping videos is important to save space on memory cards and hard drives. It also reduced work later.
 - c. Crop videos to include 10-20 frames where the animal is stationary until the animal just leaves the field of view.
 - d. Do not include multiple trials in a single video – pick the best one.
 - e. The shorter the video, the easier it will be to collect data from.
5. Record data in notebook
- a. Date, and time of day.
 - b. Trial information: conditions of treatment (substrate, angle, temp, etc.).
 - c. Specimen number and species.
 - d. Body temperature immediately after trial.
 - e. Video number.
 - f. Trial rating: Excellent, Very Good, Good, Fair, Poor, or something like that.
 - g. Comments: anything else worth noting about the animal or the trial.