Trackmate (V. 1.0): A Versatile Program for Automated Tracking of Behaviour in Laboratory Rodents

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ABSTRACT

An increasing array of commercial software packages allow video tracking and automated analysis of rodent behaviour in standard models such as the elevated plus maze, radial arm maze and conditioned place preference paradigms. *Trackmate* is a new program developed as a collaboration between Motion Mensura Ltd and the University of Sydney Psychopharmacology Laboratory and can be used to automate data gathering in a wide variety of behavioural paradigms involving rodents. *Trackmate* is written in the *Labview*™ programming environment and can be run on any adequately powered PC. Users are required to install *Labview RunTIme* software and Apple *Quicktime*, both of which are free downloads. The only other requirement is an appropriate USB video grabbing device, many of which are available at very low cost. We typically run the software on *MacMini*™ computers (2.8 MHz, 4GB RAM, 320 GB hard disk) with KWorld *DVD Maker 2*™ USB interfaces. *Trackmate* allows data to be gathered in real time from up to 4 camera inputs, via an appropriate quad splitter box, allowing 4 individual animals in different apparatus to be tracked simultaneously (see Figure 1). For each animal, a blob (corresponding to the body of the animal) is detected as well as the centre of mass and head direction of the rodent. Up to 4 different regions of interest (ROIs) can be defined for each animal in the apparatus in which they are located. Location and distance travelled by the blob and centre of mass of each animal within each of these ROIs can be measured and logged. "Blob Logic" functions allows sophisticated measures to be made at the intersection of ROIs: for example "head out" behaviour in the emergence test and object investigation in novel object recognition test.

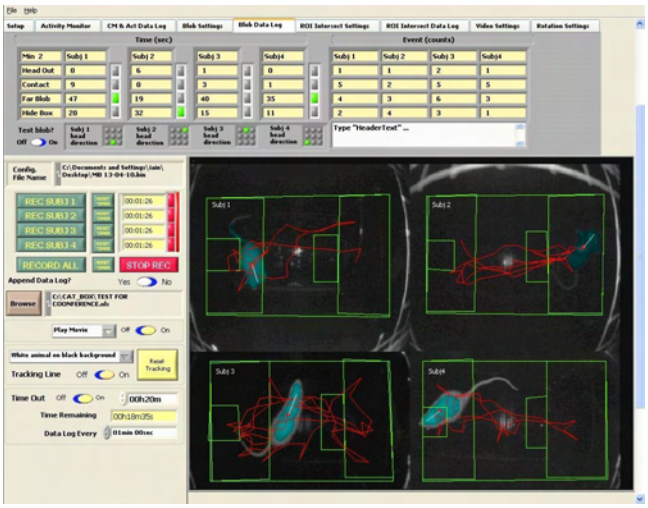

Figure 1. Screenshot of Trackmate while simultaneously tracking 4 rats in separate cat odour boxes.

Trackmate logs an exhaustive array of test results to Excel compatible spreadsheets and also allows hard disk recording of raw video footage to be made in real time for archival purposes. Travel paths of animals can also be recorded. *Trackmate* is easy to set up and has been successfully used in various Australian universities to acquire data in a variety of paradigms including: locomotor activity and drug-induced behavioural sensitization, home cage activity, elevated plus maze, open field test, conditioned place preference, novel object recognition, Morris water maze, forced swim test, and predator odour avoidance.