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Detecting behaviour in Canada geese (Branta canadensis) using high-accuracy GPS and accelerometers

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Many ecological studies are based on a quantitative understanding of what an animal is doing when. Their aim is to understand processes as varied as disease detection, migration timing and anthropogenic effects on fitness and evolution. Visual observations in the field are up to now still the standard way of classifying behaviour of wild animals. In this study we examine how far behavioural types can be detected remotely from data collected with a novel GPS and accelerometer tag. The tag is developed within the EU FP7 project E-Track (www.etrack-project.eu), records EGNOS corrected positions up to once per second and provides raw acceleration data at very high frequency. It was tested on ten captive Canada geese (*Branta canadensis*), with behavioural observations performed at the same time. The very high data resolution was expected to allow for the detection of small scale behavioural types like preening or feeding. Several algorithms were tested for behavioural detection; they were based on track and accelerometer characteristics and methods previously developed for video analysis. A first stage of ground-truthing behavioural types from accelerometer data revealed clear distinctions of, for example, sitting, walking, feeding and flapping the wings. Those first results point out which behavioural types can be remotely classified for Canada geese using beyond state-of-the-art tracking techniques. A follow-up study of tagging geese in the wild can then use the developed behavioural classifiers to explore time budgets during different times of the birds' annual cycle. This can include migration and stopover in remote areas, leading to new insights of migration timing, energetics and behaviour.

E-Track is carried out in the context of the Galileo FP7 R&D programme supervised by the GSA. (nr. 277679-2). For more information, please check www.etrack-project.eu