

## Executive control and investment decisions: an ecological perspective on planning for the future

### Supervisory team:

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### Project description:

An individual's ability to inhibit a pre-potent response or "executive control", often conceptualised as self-control, is an important aspect of cognitive flexibility and has been used as an assay of cognitive performance in a number of studies. Psychological studies of executive control often involve abstract tests in the laboratory to measure specific inhibition-of-response times across individuals. Executive control has been identified as an important factor in gambling and drug addiction, but the importance of executive control in less extreme behaviours has been largely overlooked. One such behaviour that is crucial for wellbeing and ensuring future security is investment behaviour, which necessarily entails planning for the future. Investment in the future can take many forms across species, and requires some degree of executive control because an individual needs to inhibit current use of an asset to store it away for a future which is, inevitably, uncertain. Grey squirrels are an ideal model species for studying the link between executive control and investment because they are natural and prolific investors. Grey squirrels are well known to cache food widely for later use, a risk-averse behavioural strategy that involves storing nuts during times of plenty in order to provide a reliable source of food when resources are scarce. Squirrels not only decide whether to cache a food item, eat it, or reject it, but caching itself involves a series of predation and pilferage risk trade-offs, which reliably co-vary with food value. As such, investment decisions and effort directly reflect future discounting and ought to be linked to executive control. This PhD project will provide a unique opportunity to engage in cross-disciplinary research that incorporates ecological relevance and economic decision making. The project will investigate the role of executive control in investment decisions by wild grey squirrels. The student will begin by reviewing economic models of saving (standard and behavioural) and identify how these models might apply to squirrels. The student will then construct a mathematical model of adaptive investment behaviour based on executive control and future discounting, to generate predictions that can be tested in both squirrels and people. He/she will test the model by collecting experimental data on squirrels and use panel data on humans for a comparative study. By devising field experiments to verify abstract laboratory tests of executive control, he/she will generate reliable measures of executive control in squirrels and measure their investment outcomes, a real-life measure of delaying gratification.

