Analysing individual specialisation and flexibility in predator hunting mode and its effect on hunting success using an online multiplayer videogame

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# Abstract

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# Introduction

Predator hunting mode plays a crucial role in structuring ecological communities and ecosystems (Huey & Pianka 1981; Preisser *et al.* 2007; Schmitz 2008; Romero & Koricheva 2011; Kersch‐Becker *et al.* 2018). Experimental studies in the field show that contrasting hunting modes, such as active hunting vs sit-and-wait, can cause opposing trophic cascades and act at different trophic levels (Schmitz 2008). For instance, predators may differ in the amount of individuals, species, or in the type of prey they capture relative to their hunting mode (Miller *et al.* 2014; Donihue 2016; Glaudas *et al.* 2019). Predator hunting modes are classified in three categories: 1) Active/patrolling hunters who usually search, follow, and chase prey in long distances, 2) sit-and-pursue hunters who remain motionless and pounce on prey that are within chasing distance, and 3) sit-and-wait (ambush) hunters who wait for prey to be within immediate capture distance (McLaughlin 1989). There has recently been a growing interest in investigating how ecological factors shape individual variation in hunting behaviour within populations, and its consequences for predator-prey interactions (Pettorelli *et al.* 2015; Toscano *et al.* 2016; Schmitz 2017). Experimental evidence show that individual predator behavioural type can mediate consumptive and nonconsumptive effects in trophic interactions (Preisser *et al.* 2007; Griffen *et al.* 2012; Toscano & Griffen 2014). However, empirical studies still tend to classify predator species either as active or sit-and-wait hunters based on their average behaviour (Bolnick *et al.* 2011; Pettorelli *et al.* 2015; Schmitz 2017). Thus, accounting for individual variation in hunting mode is a pressing need if we aim to understand the community consequences of predation.

Individual variation in hunting mode can be driven by specialisation when predators of a given population display consistent differences in their tactic use. Such differences are expected when individuals experience temporal and/or spatial fluctuations in the distribution, the availability, or the behaviour of their prey (Araújo *et al.* 2011; Carneiro *et al.* 2017; Phillips *et al.* 2017; Courbin *et al.* 2018). For example, prey activity/mobility level is an important mediator of encounter rates with predators (Gerritsen & Strickler 1977; Huey & Pianka 1981; Scharf *et al.* 2006). Hence, predators may specialise by using specific hunting modes to meet the energy/time required to successfully capture the type of prey they encounter. According to the locomotor-crossover hypothesis (Huey & Pianka 1981), ambush predators should be more sucessful when they hunt fast-moving prey, while active predators should have greater success with sedentary prey (Scharf *et al.* 2006; Belgrad & Griffen 2016; Donihue 2016). If the individuals’ tactics allows them to reach similar capture rates, then predators with contrasting hunting modes may coexist within the same population (Kobler *et al.* 2009; Michel & Adams 2009; Chang *et al.* 2017).

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paragraphe switching

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