

Revised Literature Review Part 3: Topic Summary

Introduction

Lynxes are solitary carnivores with few social behaviours (López-Bao et al. 2008). When social interactions occur, it often serves an important evolutionary function (Kleiman & Eisenberg 1973, Schmidt et al. 1997). This review examines the current knowledge on the social behaviours of lynx (*Lynx rufus*, *Lynx pardinus*, *Lynx lynx*, and *Lynx canadensis*). Social behaviour in lynx can include; conflict, reproduction, parent-offspring or sibling-sibling interactions, scent-marking (urine spraying, scratching, rubbing, and licking), and vocalizations (Vogt et al. 2014). Solitary behaviour in lynx evolved due to felids specialization for hunting live prey and has persisted in most species with some exceptions (Kleiman & Eisenberg 1973). There are two main reasons for social behaviour in lynx. The first is pre-mating behaviour. These are social behaviours used before copulation to maintain a territory and attract a mate. The second is post-mating behaviour. These are behaviours between mothers and offspring or between siblings.

Pre-mating behaviour

Before mating, social behaviours revolve around establishing a territory and finding a mate, mostly through scent-marking. A question of interest is what function does scent-marking serve in lynx social behaviour and what influences different patterns in scent-marking? Researchers interested in understanding scent-marking use motion-triggered camera traps at locations identified as a common marking site. These sites are determined by observing track patterns and visual evidence of marking (Allen et al. 2015, Vogt et al. 2014). Researchers found that one function of scent-marking was as a 'chemical bulletin board' where lynxes both leave and acquire information (Vogt et al., 2014). This included information on presence and advertising reproductive state (Vogt et al., 2014). Females were found to maintain more territory than males (Vogt et al., 2014, Schmidt et al. 1997). Another study observed increased frequency of lynx visiting marking sites during the mating season and the use of olfactory investigation most often (Allen et al. 2015). Researchers also observed a trade-off between the frequency of scent-marking and alerting prey or competitors of their presence after comparing scent-marking and hunting patterns (Vogt et al., 2016). These findings suggest reproduction is the major function and influencer of scent-marking, while territory was more important to females, who require sufficient resources before mating (Vogt et al., 2014, Allen et al. 2015). It also suggests eavesdropping as a secondary influence on patterns of scent-marking for which lynx must consider the trade-offs (Vogt et al., 2016).

Post-mating behaviour

Social behaviour after mating is related to raising offspring. This includes interactions between parent and offspring and between siblings. Questions of interest include what social behaviours occur in the maternal family group (mother plus offspring), and how do these behaviours change as kittens age. Researchers use GPS, radio-collars, and direct observations to study these behaviours. Two articles found that social behaviours change as kittens age, with frequent interactions when kittens are young, followed by less frequent interactions when the mother leaves the den to hunt, and increases again when kittens are old enough to accompany the mother to kills (Schmidt 1998, Molinari & Molinari-Jobin 2001). Another study found the types of social behaviours within the group change from friendly (playing, 'butting') to neutral (identifying contacts, grooming) behaviours (Naidenko 2001). One researcher observed a dominance hierarchy among kittens feeding at a kill (Molinari & Molinari-Jobin 2001). A subsequent study found that mothers tolerated overlap in territory with their adult daughters (Janečka et al. 2006). The results of these studies suggest age, sex, and resource availability are important influences on post-mating social behaviours. It's also suggested that friendly behaviours dominate the types of social behaviours within family groups and that kinship is stronger between mothers and female offspring compared to male offspring.

Summary

Through reviewing these ten studies, a gap in knowledge on sex-specific differences in the function of scent-marking, hormonal cues that influence social behaviours, and social signals difficult for humans to perceive can be identified. There is a lack of hypothesis-driven research in this field. The applications of this research include conservation, limiting human disturbance, enrichment in captivity, and considerations for reintroduction. Some suggested areas for future research include the use and function of cryptic behaviours and studies following marked individuals to distinguish differences in behaviours between males and females and different age groups (Allen et al. 2015).

(Word count: 700)

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