Topic Summary

Some bear species have exceptionally large home ranges and complex foraging habits in the wild (Lindberg & Baragona, 2004; Vickery & Mason, 2003). Since space in captivity is much smaller than in the wild, and there is a deficit of natural stimulation, stereotypies can develop as a response to these deficits (Forthman et al., 1992, Law & Reid, 2010). Stereotypies come in many forms such as tongue-flicking or head-swaying, but pacing has been found as the most common (Vickery & Mason, 2004).

Stereotypic pacing is a widespread problem in captive bears (Perdue, 2016; Vickery & Mason, 2003; Wagman et al., 2018). This behavior consists of highly repetitive walking in predictable locations or patterns and can take place for hours at a time (Vickery & Mason, 2003). Observation of this behavior in scientific study is often done through analyzing video footage or direct observation from scientists, zookeepers, or volunteers. Data collection for most papers involves scans of a focal animal or group at fixed intervals, where behaviors are classified according to an ethogram.

Many articles about stereotypic pacing study natural instincts that have developed over millions of years but cannot be fulfilled in captivity. One of these instincts is foraging. Carlstead & Seidensticker (1991) were interested in seasonal differences in pacing and observed that pacing spiked at times during the year that wild bears forage most frequently. What's more, Clubb and Mason (2003) found a positive correlation between larger home ranges and frequency of stereotypic pacing, indicating further instinctual repression of captive bears in this category. Researchers found that conditions utilizing natural foraging instincts, such as using enrichment to make them work for their food (Carlstead et al., 1991) and unpredictable feeding schedules (Wagman et al., 2018), have lowered pacing severity. Forthman et. al (1992) studied the effects of feeding enrichment in several bear species and found that higher variation in the food provided led to lower stereotypy. This aligns with diverse diets of wild bears.

Sex and age differences have also been the subject of multiple studies on stereotypy. Carlstead & Seidensticker (1991) looked at the pacing male of a solitarily housed male during mating season and found increased stereotypy during that time. Similarly, Fischbacher & Schmid (1999) found that a male housed with females only paced after his mating attempts were rejected. The females in this study did not pace during mating season, but there was indication of pacing when weather negatively impacted access to preferred resting areas. Additionally, in a study by Vickery & Mason (2004) on demographics affecting stereotypies, older bears paced more frequently than their younger counterparts.

Social living may also have an impact on pacing frequency. Vickery and Mason (2004) found that when bear enclosures were side by side where bears were housed alone, they would pace on the side of the neighboring exhibit. When Shepardson et al. (2013)

studied trends involved in stereotypy, they found a negative correlation between number of co-housed bears and pacing frequency. Since bears are solitary, when housed alone pacing may be patrolling behavior, whereas if bears share an enclosure, it may be seen as shared territory (Sterling & Derocher 1990).

Another stereotypy-inducing factor could be hormonal responses to stress in captivity. Cortisol levels increase in response to stress, and this trend can be measured non-invasively through analyzing glucocorticoid metabolites in feces (Shepardson, et al., 2013). The Shepardson et al. (2013) study revealed a positive correlation between pacing frequency and fecal metabolites. This indicates that high levels of pacing in captivity is a sign of stress in bears.

There are still several unknowns about stereotypic pacing. For example, whether increased pacing with age is due to decreased levels of normal activity, or longer time spent in captivity (Vickery et al., 2004). Because of this, it would be useful to study young bears that have spent many years in captivity compared to older bears with less time in captivity. Additionally, American black bears tend to have high levels of orphaned cubs, yet little is known about the stereotypy development as a stress response in captive orphan cubs. Thus, one future study of interest would involve looking at orphaned cubs to see how prevalent stereotypy development is at an early age.

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