Results – Abridged

**Sentinel presence:** 25 vids, 13 obs in comm, 20 in green (small af sample size)

19 obs w/ sent 14 obs w/ no sent

G.Env did not affect sent pres

* makes sense since all still in urb env. So potentially higher energetic levels. Further research required across gradient of urbanization from natural to urban.
* Could be small sample size, making effect impossible to see. Needs more data

Group size did not affect sent pres

* Contrary to literature
* More inds in group = less ind contribution to sent BUT more overall sent
* Small sample size and gaps in the distribution of data (many at zero, some in the middle, few were high)

Dist freq did not affect sent pres

* Contrary to literature, risk did not increase the likelihood of a sentinel being present.
* Small sample size
* When dist too high, all group members left

Overall point to make: Cannot make any inferences about sentinel likelihood based on our results due to small sample size.

**Allocation of time to each behav:**

Similar proportion of time allocated to each behaviour

* Could be that the proportion of time remains largely fixed, and variations in the behaviours occur at the bout level (how often and for how long).
* Makes sense to remain constant since the needs remain relatively constant
* Would be interesting if these proportions change if comparing with “natural” populations outside of urban areas (less energy, more need for foraging)

No effect of sentinel presence

* Contrary to literature
* Sent. Pres should decrease prop time spent being alert.
* Decrease in alert behav or increase in foraging could be observed at the bout level

No effect of g.Env

* Could be that the env. Is perceived similarly, no extra threat associated with the env. Could also be that the proportion remains the same regardless of env, with variations occurring at a the bout level

**Duration of bouts**

Average duration of all bouts 1.75s

* Bouts of alert behav shorter than bouts of foraging
  + Less time required to be alert than to forage
  + More time required to manipulate and eat while foraging
  + Time required to look around much shorter

Sentinel presence increased the duration of all bouts, yet separately had no significant effect on either alert or foraging behaviour.

* Unsure why not significant when separate but significant together.

Generalized environment had a significant effect

* Longer bouts in green areas
* Could be driven by increase in duration of bouts of foraging behaviour
* Green areas perceived as safer?

Disturbance freq decreased duration of all bouts

* In line with literature
* Urgency! Could be a decrease in the duration of bouts of foraging as a result of needing to be alert more frequently

Interaction between sentinel presence and generalized environment

Discussion organization:

Subheadings to separate topics

First paragraph should be main points of interest (big findings, if present)

Have a separate section for “limitations” where you can put all the (repeated) limitations of the study design

Here’s how I see the discussion going:

1st Par. Main findings! Outline exactly what the reader should know.

2nd + Par. Go measurement by measurement and explain “at a smaller scale”

ONCE DONE, group effects (e.g. how does dist. Freq. affect forager behaviour), discuss while linking to literature

After, outline and discuss the limitations of the experiment. Mainly talk about small sample size, impossibility to distinguish anti-predator vigilance from looking for patches/at other foragers, etc

Last par. Repeat main findings and conclude discussion

EZ PZ, probably…

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Sentinel Presence | Proportion | Duration AB | Duration HD | Duration HU | Peck Rate | PTWY |
| Behaviour | X | NS | ↑ HD | X | X | X | X |
| Sentinel Presence | X | NS | ↑ Pres | NS | NS | NS | NS |
| Generalized Environment | NS | NS | ↑ Green | ↑ Green | NS | NS | ↑ F to A  Green |
| Disturbance Frequency | NS | X | ↓ as DF ↑ | ↓ as DF ↑ | NS | ↑ as DF ↑ | ↑ as DF ↑  F to A |
| Group Size | NS | X | NS | ↓ as GS ↑ | NS | NS | X |
| Bait Presence | X | X | NS | ↓ Pres | NS | ↑ Pres | Below |

Foraging to alert -> NS

Foraging to peck -> ↑

Alert to foraging -> Marginal ↑

Peck to alert -> ↑

MAIN FACTORS:

Neither the generalized environment, disturbance frequency, or group size affected the presence of a sentinel in the videos. We expected sentinel behaviour to be more present in green areas due to the assumed decreased ambient noise and longer lines of sight, yet these factors appear to not have played a part in sentinel decision-making, consistent with Bedneckoff’s state-dependent model. Sentinel crows could be deciding whether to perform sentinel behaviour primarily based off their energetic reserves, rather than the effectiveness of the behaviour in the environment. Disturbance frequency also did not affect the propensity of individuals to perform sentinel behaviour. Previous studies identified perceived risk as a factor in sentinel decision-making, with higher risk resulting in an increase in group sentinel effort.

Sentinel presence did not appear to affect the behaviour of foraging crows, with the only detected effect being the increase in duration of all behaviours.

Crows could be electing to not modify their behaviour, foraging in the most optimal manner for the individuals, and then receiving the benefits of additional vigilance offered by the sentinel when present. These benefits could differ among the two environments tested, resulting in the observed significant interaction between the generalized environment and the presence of a sentinel.

This is does not support my hypothesis and does not match the findings of other studies.

As for generalized environment, green areas increased the duration of all bouts, and bouts of foraging behaviour. In other words, crows spent a longer time being vulnerable in green areas than in commercial areas. This could be that the crows perceive their environment as safer, though it could also be that they require additional time to look for, manipulate, and consume food items in greener, grassier areas. The increased impermeable areas in commercial areas permit easier location and consumption of food. This is reinforced by the effects of bait presence, which decreases the duration of bouts of foraging behaviour, yet increases the peck rate of foragers. Conversely, peck rate was not affected by the generalized environment in which the individual forages in.

INTRO

There are environmental conditions that make sentinel behaviour less effective. For example, high noise levels in commercial areas would affect the communication between the sentinel and foragers. Ambient noise levels can muffle or disrupt sentinel vocalizations, forcing the sentinel to either make louder calls, thereby increasing its own exposure to predation risk, or to sentinel from locations closer to the foraging group, potentially increasing predator detection time. The inability of foragers to receive accurate information from the sentinel can also result in the foragers being more vigilant to compensate. This has been observed in sentinel species such as the dwarf mongoose

Behavioural adaptations could also reduce the need for the added protection of a sentinel. Urbanized individuals are less neophobic and are typically more tolerant of non-predator disturbances. While disturbance frequency could be higher in commercial areas, most of the disturbances are either anthropogenic or competition with other species for resources, rather than predation. As such, the perceived risk of urban commercial areas could be lower than in green areas where more predators could be present.

As a result, I would expect sentinels to be less present in commercial areas. Green areas will have longer lines of sight, less noise, and more predation risk than in commercial areas.

DISCUSSION