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Sentinel behaviour and the watchman's call in the Chukar at St Katherine Protectorate, Sinai, Egypt

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Abstract

Foraging in a group potentially allows individuals to reduce anti-predator vigilance without increasing predation risk. Individual vigilance may be further reduced if group members take turns at watching for predators, acting as sentinels or guards. Because the presence or absence of sentinels must be monitored to ensure that the group is guarded at all times, the conditions favouring the evolution of coordinated vigilance are probably very specific. We studied groups of chukars, *Alectoris chukar* (Gray, 1830) (Phasianidae), a desert species reported to adopt a sentinel system, to see whether this was the case. Individuals identified as sentinels behaved significantly differently from other group members, occupying prominent positions and being vigilant significantly more than foraging group members. The largest individuals became sentinels most frequently, yet were not more vigilant than smaller individuals while they were on guard. Sentinels that ended a bout of vigilance were usually replaced quickly; a soft call was heard during a significant number of exchanges. We conclude that chukars do have a sentinel system of vigilance. A vocalisation, similar to the watchman's call seen in other species, seems to play a role in coordinating vigilance behaviour.

Keywords: anti-predator vigilance, flocking,

Introduction

Foraging animals may be vigilant for a number of reasons including finding food, avoiding competition, seeking mating opportunities and importantly, detecting predators (Beauchamp 2001). Evidence suggests that certain species (especially birds) may have some ability to detect predators without interrupting feeding (Lima & Bednekoff 1999). Nevertheless, most animals spend a significant proportion of their time engaged in vigilance behaviour. Foraging in a group can decrease an individual's risk of being predated in three ways. Firstly, the probability that an individual will suffer predation during an attack is inversely related to the size of the group – the dilution effect (Hamilton 1971). Secondly, as group size increases there is a higher probability that a predator will be detected before it can make an attack – the many-eyes hypothesis (Pulliam 1973). Finally, larger groups may be able to confuse a predator reducing the chance that it will make a successful attack – the confusion effect (Pitcher 1986). Increased predator detection has received the most attention, both theoretically and empirically. Pulliam (1973) produced a model which showed that with increasing group size, individuals can reduce their own vigilance without decreasing group detection ability. Many empirical studies have demonstrated a negative correlation between group size and individual vigilance (the 'group size effect'), in a number of bird and mammal species (reviewed in Elgar 1989).

Group members could reduce their contribution to vigilance even further by coordinating vigilance, such that only a few are alert at any one time. Co-ordinated vigilance has been observed in a number of species (Table 1). However, it requires

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individuals to monitor the behaviour of other group members, which may represent a significant time cost. It has been suggested that coordination of vigilance will only be evolutionarily stable when group size is small, or predation risk is very high (Ward 1985; Rodriguez-Girones & Vasquez 2002). This is consistent with the species that are known to show sentinel behaviour. Sentinelling is generally found in species living in moderately open habitats. In very open habitats, foragers may have a sufficient view themselves, whereas in dense vegetation spread of information from sentinels to foragers may be hindered, and remaining concealed may be the most effective way to avoid predation (Bednekoff 1997).

Table 1 - Species for which a sentinel system of vigilance has been reported

***Mammals*:**		
Meerkat	*Suricata suricatta*	Moran (1984)
Dwarf mongoose	*Helogale undulata rufula*	Rasa (1977)
Vervet monkey	*Cercopithecus aethiops*	Horrocks & Hunte (1986)
Chacma baboon	*Papio ursinus*	Hall (1960)
Rock hyrax	*Procavia capensis*	Kotler *et al*. (1999)
Rock-haunting possum	*Petropseudes dahli*	Runcie (2000)
Klipspringer	*Oreotragus oreotragus*	Tilson (1980)
Birds:		
Jungle babbler	*Turdoides striatus*	Andrews & Naik (1970)
Arabian babbler	*Turdoides squamiceps*	Zahavi & Zahavi (1997)
Black-lored babbler	*Turdoides sharpei*	Wickler (1985)
Florida scrub jay	*Aphelocoma coerulescens*	McGowan & Woolfenden (1989)
Piñon jay	*Gymnorhinus cyanocephalus*	Balda & Bateman (1971)
Northwestern crow	*Corvus caurinus*	Verbeek & Butler (1981)
White-browed sparrow-weaver	*Plocepasser mahali*	Ferguson (1987)
White-banded tanager	*Neothraupis fasciata*	Alves (1990)
Black-throated saltator	*Saltator atricollis*	Ragusa-Netto (2002)
Smooth-billed ani	*Crotophaga ani*	Bednekoff (2001)

Sentinel behaviour is characterised by one or more individuals maintaining prolonged vigilance, while conspecifics perform other activities such as feeding. Sentinels usually occupy prominent positions where they have a good view of the surroundings. Vigilance bouts are coordinated, such that while there is a constant turnover of sentinels, the number guarding at any one time changes very little (Bednekoff 1997). Sentinels are usually replaced quickly, sometimes before the first individual has left its post, and groups are never left for long without a guard.

A number of evolutionary theories have been used to explain the existence of sentinel behaviour. Until recently, kin selection was the most frequently cited. This is given some support by the observation that most species with sentinels live in closely related groups (McGowan & Woolfenden 1989). However, relatedness to other group members does not appear to affect an individual's contribution to sentinel behaviour (Wright *et al.* 2001b). Several studies have suggested that reciprocal altruism may also be important. This does not require individuals to be related but depends on repeated interactions between them, and so, like kin selection, is more likely to occur in small groups. Sentinelling may also benefit individuals by maintaining the size of their group (Wright *et al*. 2001b), reducing the risk of predation and allowing a better territory to be held. Zahavi & Zahavi (1997) interpreted sentinel behaviour as a display of within-group status, based on the observation that more dominant individuals make a greater contribution to sentinel behaviour. They suggested that group members compete for the best sentinel positions, although this has not been reported in other studies.

All of the above explanations assume that sentinelling is costly. However, Bednekoff (1997) suggested that sentinels may actually be safer than other individuals, because their position gives them a better view of approaching predators. If this is the case, then sentinelling may be the optimal behaviour for satiated individuals (Bednekoff 1997). The greatest fitness outcome is achieved by being a sentinel when no others are, provided that the sentinel alerts the group when a potential threat is detected (Bednekoff 2001). Thus while prolonged vigilance bouts are beneficial to the individual, apparently cooperative coordination of these bouts can occur by by-product mutualism (Mesterton-Gibbons & Dugatkin 1992; Clements & Stephens, 1995).

Several studies have since provided empirical support for these models. Clutton-Brock *et al*. (1999) found that sentinels occupied positions closer to safety than foragers, and were usually the first to detect predators. Supplementary feeding of Arabian babblers (Wright *et al*. 2001a), Florida scrub jays (Bednekoff & Woolfenden 2003) and meerkats (Clutton-Brock *et al.* 1999) resulted in an increase in sentinel effort. Other group members reduced their contribution, but not enough to completely compensate, resulting in an increase in total group effort. Not all studies have unequivocally supported the idea of sentinel safety, however. Rasa (1986) found that 67% of dwarf mongoose adults taken by predators were acting as sentinels at the time, despite sentinels being the closest individuals to the burrow (Rasa 1989). It is likely that kin selection and reciprocity have also played a role in its evolution (Bednekoff 1997).

Patterns of individual contribution to sentinel behaviour vary from species to species, although there are two general trends worth noting. Firstly, sentinel effort usually increases with age and dominance rank; and secondly, where a sex difference has been found, it has always been males that sentinel the most (e.g. Bednekoff, 1997). Wright *et al.* (2001b) found that almost all variation in effort with sex and dominance could be explained by differences in body mass, agreeing with Bednekoff's (1997, 2001) models of selfish, state-dependent sentinel behaviour.

Table 2 Description and timing of the call used in species known to coordinate sentinel bouts acoustically

Species	**Description of Call**	**Timing of Call**	**References**
Florida scrub jay	soft	start and end	McGowan & Woolfenden (1989)
Meerkat	soft	throughout	Manser (1999); Clutton-Brock et al. (1999)
White-browed sparrow-weaver	not described	start and end	Ferguson (1987)
Dwarf mongoose	loud	start and end	Rasa (1986)
Jungle babbler	soft	end	Gaston (1977), Wickler (1985)

It has been suggested that visually monitoring conspecifics in order to coordinate vigilance represents a significant time cost (Ward 1985). This problem appears to have been solved in many sentinelling species by the use of acoustic calls, removing the need for individuals to interrupt feeding (Wickler 1985). Several studies have noted calls associated with sentinel exchanges (Table 2). Manser (1999) found that playing sentinel calls to foraging meerkats caused them to decrease their level of vigilance. In dwarf mongooses (Rasa 1986) and meerkats (Manser 1999) sentinel vocalisations are thought to convey the identity of the caller, which may facilitate coordination.

In this study, we confirmed that groups of chukars show coordinated vigilance behaviour and examined how individuals differ in their contribution to sentinel effort. We also investigated the nature of sentinel changeovers, with particular attention given to the potential use of a ‘watchman’s call’ (Wickler 1985) in mediating vigilance coordination.

Materials & Methods

The chukars (*Alectoris chukar* (Gray 1830): Phasianidae) found in the Sinai peninsula of Egypt form an isolated population at the western edge of their natural range, which extends through the Middle East into Asia and south-east Europe. The mountain desert terrain is typical of the rocky, sparsely vegetated habitats in which the chukar is generally found (Hollom *et al.* 1988). The sexes are virtually indistinguishable on the basis of plumage. Males can be identified by possession of a leg spur (Hollom *et al.* 1988), although making this distinction would require handling the birds and was not attempted in this study. Evidence suggests that there may be some sexual dimorphism in size (males: 504-595 g, females: 462-545 g; Cramp & Simmons 1980). The juveniles are duller than adult birds, predominantly brown with some barring on the flanks (Christensen 1996). Chukars are territorial and live in small groups, or coveys, usually consisting of one or more adult pairs and their offspring. Preliminary work over the preceding two years indicated that while coveys were foraging, certain individuals positioned themselves a distance apart from the group and appeared to be more vigilant than other flock members. The aim of this study was to compare the time budgets of these individuals with those of foragers, and also to examine the characteristics of ‘sentinel’ exchanges, to test the hypothesis that chukars coordinate vigilance. We also compared the positions and postures of ‘sentinels’ and foragers and investigated the effect of group size on individual vigilance and on the number of individuals acting as ‘sentinel’.

We conducted this study over four weeks in August and September 2004, following preliminary work in the previous two summers. We observed chukar coveys in the wadis around the town of St. Katherine (28.56º N 33.94º E) in South Sinai, Egypt. The extremely shy nature of the chukars made it necessary to arrive at the sites at least half an hour before the birds and to observe them with binoculars from a concealed location, a suitable distance from the flock. Coveys were sporadically active between dawn (0600) and dusk (1900) every day; peak feeding times were 0600 – 1030 and 1500 – 1800.

All the data that we analysed were collected in Wadi Arbaein, a dry valley running in a NW/SE direction immediately adjacent to the Suez Canal University Field Station at St Katherine, the base for the study. A group was seen briefly in Wadi Itlah but foraging sessions were interrupted by long-legged buzzards (*Buteo rufinus*) on all the days when we were there. We divided Wadi Arbaein into separate study sites, almost certainly reflecting two distinct territories. A third site was also identified at the bottom of the valley, where a small group of chukars (possibly a separate group) was occasionally seen feeding. For each individual, we timed the complete sentinelling or foraging bout, and also individual periods of a single behaviour type – vigilance, feeding, walking, preening and calling. From these data, we calculated the proportion of the total bout that each behaviour represented. We separated calls into loud and soft vocalisations, to distinguish between different types of call. We also recorded bird location (high rocks, low rocks or ground), posture (upright or horizontal), body size (on an arbitrary scale of 1-3; sentinels only), distance to the main group (sentinels only), time of day (hour), group size and number of sentinels on guard at the time. Individuals of the smallest size class were almost certainly juveniles on account of their immature plumage. Intermediate-sized (Class 2) birds may have been first-brood offspring, young adults or possibly females, given the sexual dimorphism in body size. The largest individuals may have been adult males, or adults of both sexes. When a bird ceased sentinelling before the group had finished foraging, information relating to the change-over of sentinels was recorded separately: specifically, whether the sentinel was replaced, how long the overlap or gap between sentinels was and whether a call was associated with the change-over. To analyse the relative use of sentinel positions, we estimated the proportions of the upper wadi site covered by high rocks, low rocks and open ground by taking 100 random coordinates and recording which type of position was found at each. To perform a chi-squared test of the size of individuals undertaking sentinel behaviour, we also recorded the numbers of individuals of each size class in the group at this site.

We used non-parametric tests for all analyses, because none of the data conformed to a normal distribution. Behavioural differences, both between sentinels and foragers and within the sentinel category, were compared using the Kruskal-Wallis test (test statistic = H). We tested using chi-squared whether the sentinel-forager distinction affected the frequency of periods of each behaviour type among all those recorded. We also used chi-squared tests to analyse the size and preferred positions of sentinels, and for comparing the postures adopted by sentinels and foragers. We investigated group-size effects with Spearman's rank correlations. Finally, the results concerning sentinel change-overs were analysed using logistic regression (probability of replacement and probability of a watchman's call being given) and Spearman's rank correlations (durations of gaps between sentinels). All tests took two-tailed significance values with the exception of the group size-sentinel number correlation, where sentinel number was predicted to increase with flock size, and so a one-tailed test was used.

Results

The results confirmed that the two categories of birds were adopting significantly different behaviour patterns. Sentinels spent a greater proportion of time vigilant (Fig. 1) and scanned both more frequently ($\chi^2_1 = 135.5$, $p < 0.001$) and for longer ($H_1 = 1030.2$, $p < 0.001$) than foragers. They were never seen to feed whilst on guard, and were responsible for all calls heard. Foragers spent a greater proportion of time walking ($H_1 = 7.7$, $p = 0.005$), but when sentinels walked they did so for longer ($H_1 = 27.8$, $p < 0.001$). On 60% of behaviour periods, sentinel-like individuals occupied high rocks, 36% on low rocks and 4% on the ground; a chi-squared test showed this to be a significant preference for high positions given the proportion of the site that they represented (Fig. 2). Sentinels spent 86% of behaviour periods in an upright posture, a posture never adopted by foragers ($\chi^2_1 = 486.8$, $p = 0.001$). 59.6% of sentinels seen at site 3 were of the largest class, 38.6% were medium-sized birds and only 1.8% were of the smallest grouping; a significant tendency for larger individuals to sentinel more often, given the relative proportions of each size class in this group ($\chi^2_2 = 40.3$, $p < 0.001$). Sentinels of the largest size class spent a significantly greater proportion of behaviour periods on high rocks ($\chi^2_1 = 15.4$, $p < 0.001$), and at a greater mean distance from the foraging group ($H_2 = 23.8$, $p < 0.001$) than the other two classes. Nevertheless, sentinels of the different size categories did not differ in the length of their scans ($H_2 = 2.6$, NS), or in the proportion of time that they spent vigilant while on guard ($H_2 = 0.65$, NS).

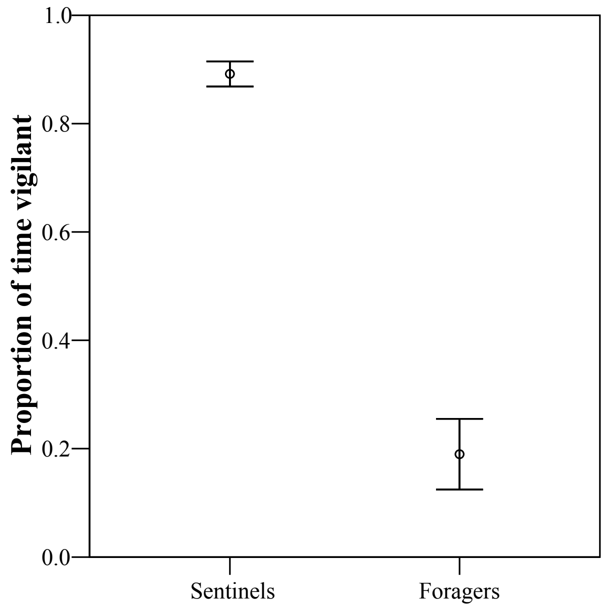

Figure 1 Comparison between sentinels and foragers in the proportion of time spent vigilant (mean ± SE; $H_1 = 27.9$, $p < 0.001$)

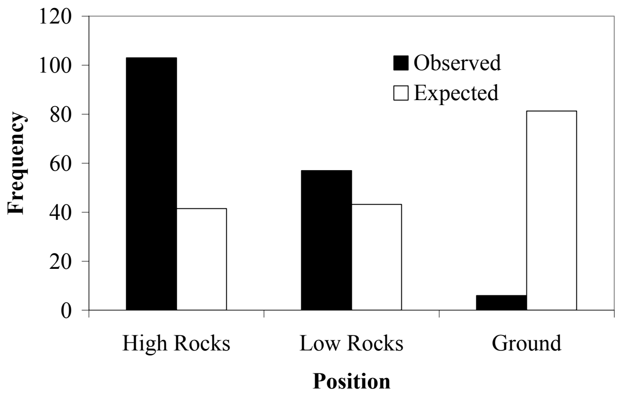

Figure 2 Frequency of behaviour periods that sentinels at the upper wadi site spent on high rocks, low rocks and the ground. Expected values were calculated from the relative abundance of these positions at the site ($\chi^2_2 = 103.3$, $p < 0.001$)

We found a significant positive relationship between group size and number of sentinels (one-tailed Spearman's rank correlation: $r_s = 0.252$, $N = 52$, $p = 0.036$). No correlation was found between group size and either scan duration ($r_s = 0.10$, $N = 153$, NS) or proportion of time vigilant ($r_s = 0.04$, $N = 75$, NS) for sentinels. There was a positive correlation between group size and scan duration for foragers (Fig. 3). Although there was an outlier in this relationship, the result remained significant when this data point was excluded from the analysis. The proportion of time that both sentinels and foragers spent vigilant, and the durations of their scans were unaffected by the number of sentinels (Table 3). However when no sentinel was present, foragers scanned more frequently (Fig. 4).

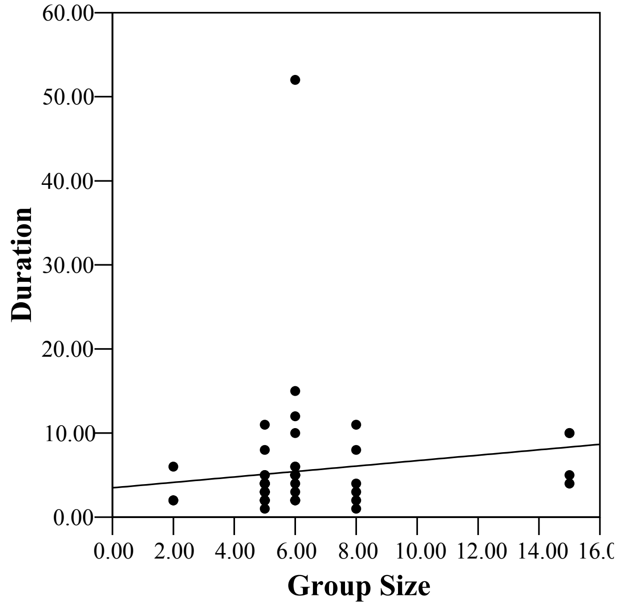

Figure 3 Relationship between group size and duration of forager vigilance periods (r_s = 0.36, N = 56, p = 0.007)

Table 3 Effect of sentinel number on aspects of the vigilance behaviour of sentinels and foragers

Effect of sentinel number on:	Result
Sentinel vigilance bout duration	H_2 = 3.649, NS
Proportion of time spent vigilant for sentinels	H_2 = 1.469, NS
Forager vigilance bout duration	H_2 = 3.128, NS
Proportion of time spent vigilant for foragers	Insufficient data

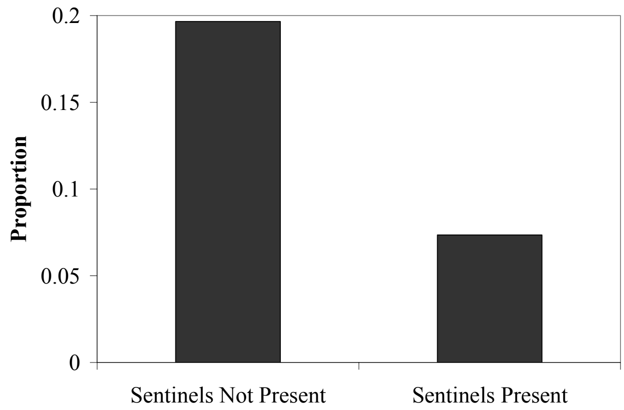

Figure 4 Proportion of total forager behaviour periods that were vigilance periods, when sentinels were present and when not present (χ^2_1 = 10.1, p = 0.001).

On 81.5% of occasions when a sentinel left its position before the end of a foraging session, it was replaced by a new individual. Relieving birds almost always (91 %) arrived after the first had left, with a mean time of 49.2 (±41.6 SD) seconds elapsing before replacement. None of the variables tested – group size, number of sentinels, distance to the foraging group or time of day – predicted either whether replacement occurred, or the duration of the gap (Table 4). We heard a quiet call during 41% of observed change-overs, either by the sentinel ending its bout (73%), or by the replacing bird (27%). The same variables were tested for their effect on the pattern of calling; none were significant (Table 4).

Table 4 Results of logistic regressions (LR), Spearman's rank correlations (SR) and a Mann-Whitney test (MW), analyzing the effect of a number of variables on the probability that a sentinel was replaced, the time that passed before replacement and the probability that a Watchman's call was heard during the change-over.

Variable	**Replacement (LR)**	**Gap Duration (SR; MW)**	**Watchman's Call (LR)**
Group Size	B = 0.50 ±0.86, $Wald_1$ = 0.33, NS	r_s = -0.241, N = 22, NS	B = 17.65 ± 5200, $Wald_1$ = 0.00, NS
Number of Sentinels	B = -0.29 ±7.4, $Wald_1$ = 0.002, NS	U = 52.5, N_1 = 13, N_2 = 9, NS	B = 305.51 ± 78000, $Wald_1$ = 0.00, NS
Distance to Foragers	B = 0.07 ±0.62, $Wald_1$ = 0.31, NS	r_s = -0.208, N = 21, NS	B = -0.98 ± 0.90, $Wald_1$ = 1.18, NS
Time	B = -0.16 ±0.20, $Wald_1$ = 0.64, NS	r_s = 0.007, N = 22, NS	B = 5.71 ± 22, $Wald_1$ = 0.065, NS

Discussion

Our results provide strong evidence that the chukar has a co-ordinated, sentinel system of anti-predator vigilance. Periods of vigilance by sentinels were longer, more frequent and represented a greater proportion of the total time budget than foragers. If sentinels detected all potential threats and alerted the whole group to them, then it may be expected that foragers would never look up from feeding. However, it has been shown that spread of information in bird flocks is rarely perfect (Lima 1995), and besides, foragers may be vigilant for reasons other than predator avoidance (Beauchamp 2001); for example, it may be necessary to monitor the movements of sentinels, to ensure that an individual is on guard at all times (Ward 1985), or to watch for feeding opportunities.

Calls were only ever heard to be given by sentinels, although preliminary work suggested that foragers made quiet contact calls while feeding, calls that have been associated with maintaining group cohesion (Stokes 1961). The absence of the loud alarm call in foragers suggests that sentinels were the first to detect approaching threats. Sentinel calls included a loud alarm call, given when a potential threat was detected, and a soft call associated with sentinel change-overs. Preliminary recording and analysis of chukar vocalisations suggested variation among individuals and wadis in call structure (S. Collins, B. Woodward & J. Eales unpublished data). The quiet sentinel change-over call was only heard during 40% of exchanges, suggesting that visual monitoring plays a role in coordination of vigilance. Rasa (1987) noted that acoustic coordination is more prevalent in species living in dense vegetation, where visual contact between sentinels and foragers is limited. In the more open habitat of the wadis, visual coordination should be more effective. Evidence suggests that feeding and vigilance may not be as mutually exclusive as once thought (Lima &

Bednekoff 1999), and so visual monitoring of sentinel exchange may not be as costly as Ward (1985) suggested.

All individuals spent a significant proportion of their time walking, foragers more so than sentinels. This is unusual in sentinelling species, where guards usually occupy a single position throughout their vigilance bout. Food was highly dispersed in the wadis, and foragers travelled over a large area during feeding sessions. When particularly long movements were made, the sentinels left their positions and followed, taking up new posts when the group began feeding again.

In common with other species, chukar sentinels adopted a distinct upright posture, which gave them a good view of their surroundings and of any potential threats. Sentinels also tended to occupy more prominent positions, though never the highest places at any site, perhaps to reduce the risk of predation. Sentinel behaviour was undertaken most frequently by individuals of the largest size class, less so by the middle class, and rarely by the smallest individuals. If our two largest classes were, respectively, males and females, then this result may equate to a sex difference in sentinel behaviour. On the other hand, if the difference in size was due to the age of the individuals, then an increase in sentinel effort with age would be implied. Whether the difference in effort was due to sex, age, or indeed an interaction between them, the result is consistent with Wright *et al.*'s (2001b) conclusion, that sentinel effort is related to body mass.

The number of sentinels on guard at any one time was positively correlated with group size. Some studies have suggested that one sentinel should be sufficient for all groups (Clutton-Brock *et al.* 1999). On the other hand, foraging chukar coveys were usually spread over a wide area and one individual may have been insufficient, in larger groups, to detect all potential dangers and alert the flock to them. Therefore the individual benefits of becoming a sentinel when satiated would outweigh the advantages of other activities, even when a sentinel was already on guard. Sentinels did not adjust their vigilance behaviour with either group size or sentinel number, supporting the idea that increased sentinel number in larger groups was an adaptive response to increased predation risk. Interestingly, vigilance behaviour by foragers actually increased with group size. With no effect of group size on individual predation risk, since this was compensated for by an increase in sentinel number, trends which are normally hidden may have become apparent, such as vigilance directed at conspecifics (for competition, mate-seeking or food acquisition), which may be expected to increase with group size (Beauchamp 2001). When no sentinels were present, vigilance periods were undertaken more frequently by foragers. Sessions without a guard probably occurred when no group members were in a sufficient energetic state for sentinelling to be the favoured activity. With no individuals dedicated to predator detection, foragers would need to be more vigilant to ensure that they did not become the target of predation.

A coordinated sentinel system is characterised by a continuous turnover of guards, but little fluctuation in their number (McGowan & Woolfenden 1989). One or two sentinels were present during most sessions, and there were never more than three simultaneously. Individuals that finished their vigilance bout while the group was still foraging were almost always very quickly replaced. Neither the probability that a sentinel was replaced, nor the length of time that passed before replacement were significantly affected by any of the variables tested. It has already been suggested that sentinel number is adjusted to compensate for group size. Given this result, it is perhaps unsurprising that both group size and sentinel number do not affect sentinel replacement. Individual energy demands probably vary in a complex fashion throughout the day, and so time may be expected to have a non-linear effect on sentinel replacement. Unfortunately the small number of change-overs that were observed in the current study did not allow analysis of more complex relationships. The same variables were tested for a pattern in watchman's call use; again no significant effects were found. Habitat visibility has been shown to affect the use of a watchman's call between species. It would be interesting, with more extensive data on sentinel change-overs, to look for a difference in watchman call use between sites.

To conclude, the results of this study provide strong evidence that the chukar has a coordinated system of vigilance. Sentinels were shown to have significantly different behavioural time budgets to foragers. While vigilant, they occupied prominent positions and maintained an upright posture. Larger birds sentinelled more frequently and occupied the most prominent positions, although sentinel size did not affect short-term vigilance behaviour while on guard. When a sentinel finished a bout of vigilance and left its position, it was almost always replaced within a short period of time. However, a pattern of sentinel replacement has not yet been found. It appears that coordination of sentinels is, to some extent, mediated by a watchman's call. Given the relatively small proportion of changeovers during which such a call was heard, it is likely that individuals also monitor sentinel presence visually.

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الملخص العربى

سلوك المشاهدة والحماية ونداء التنبيه فى طائر الشنار "فراخ الجبل" بمحمية سانت كاترين – شبه جزيرة سيناء - مصر

تيم نيوبولد١ – سارة كولين١ – جيرسى بيانكى١ – جاكلين الياس١ – عمرو الغزناوى٢ – تامر التهامى٢ – رويدا عزت٢ – دعاء فرج٢ – فرانسيس جلبرت١ – ستيفنى جوبلنج١ – ديبورا مارشانت١ – دعاء مدنى٢ – إبتسام محمد٢ - هيثم سامى زلط٢ – جيلان تايلور١ – بيث وودورد١ – سامى زلط٢

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إن الحركة المستمرة للطيور والحيوانات تسمح بحماية الافراد من خطر الافتراس، وتقل خطورة التعرض للافتراس كلما كانت الكائنات تتناوب الدور فى مشاهدة ومتابعة المفترسات من خلال وجود سلوك نوبات الحراسة الدروية بين أفراد العشيرة الواحدة ويعتبر هذا السلوك نادراً فى الحيوانات بشكل عام ولم يرصد الا فى عدد قليل جدا من الثدييات والطيور "قيام احد الافراد بسلوك المشاهدة والتنبيه حين ظهور احد المفترسات حول العشيرة".
تم دراسة هذا السلوك فى طائر الشنار او ما يسمى "فراخ الجبل" فى محمية سانت كاترين حيث ان الطائر لا ينتشر الا فى الاماكن الصحراوية ولم يكن معروفاً من قبل هل طائر الشنار يقوم بهذا السلوك من عدمه.
أثبت الدراسة أن طيور الشنار تتميز افرادها باستخدام سلوك المشاهدة والتنبيه لحماية باقى الافراد حيث شوهدت بعض الافراد تقوم بعمليات الحماية الدورية والمشاهدة الدائمة من أماكن ثابتة ومحددة وتقوم باطلاق نوبات التنبيه عند ظهور الاعداء الطبيعية بالمكان وكان سلوك هذه الافراد مختلفاً بصورة كبيرة عن سلوك باقى الافراد والتى كانت منشغلة فى البحث عن الغذاء. كانت الافراد ذات الحجم والسن الاكبر هى التى تقوم بنوبات الحراسة بصورة اكبر من الافراد الصغيرة وتم تسجيل عدد من الاصوات المنخفضة كوسيلة للتواصل بين الافراد وبعضهم البعض. وقد خلصت الدراسة أن طائر الشنار يتميز بظاهرة سلوك المشاهدة والتنبيه لحماية أفراده من الاعداء الطبيعية وبذا فإن هذا النوع يشارك عدد قليل من الحيوانات فى القيام بهذا السلوك للحماية من الاعداء الطبيعية فى منطقة الجبال العالية بمحمية سانت كاترين.