Some Remarks on the Evening Departure during Winter of the Long-eared Owl *(Asio otus)*

By
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(Med et dansk resumé: Skovhornuglens (Asio otus) *udflyvning om vinteren.)*

INTRODUCTION

One of the most conspicuous facts of biology is that daily changes in activity tend to be synchronized with illumination, especially during twilight. In the following a field study of the daily commencement of activity of the Long-eared Owl *(Asio otus)* is described.

During the winter the Long-eared Owls tend to gather in small groups, rarely exceeding thirty individuals. The owls may roost in the same area for several winters (SPERLING 1941).

The studied roost was situated a few kilometers to the west of Århus, Jutland. The owls were concentrated in a nearly quadratic grove mainly of silver firs *(Abies alba)*, about thirty meters high and covering an area of 100 by 100 meters. The trees were closely spaced, and the crowns made a dense cover, where the owls hid.

In the winter 1964-65 the intervals between sunset and the departure for hunting were recorded (GLASS and NIELSEN 1967). The variation of the interval suggested a correlation between illumination and the onset of activity. TRAP-LIND (1965) has assumed a similar relation.

In parts of January and February 1968, the observations were combined with light measurements on 25 evenings. Attempts to continue in the following years failed. Several trees were cut late in 1968, and the owls left. A new roost closer to town was too often disturbed by traffic to permit regular observation.

In 1968 the number of owls was about twenty in most of January with a decrease in the last days of the month. Afterwards, in February, the number was about ten.

METHODS

Before sunset, weather conditions were observed, watches controlled, and the four or five observers placed at their fixed positions.

The time of a departure was the time read as quickly as possible after the moment the owl was seen flying, referred to the closest minute.

From sunset every evening the illumination was measured in the same way by means of a Lunasix CdS-meter. The meter has three divisions pr unit, each division corresponding to 0.1 log lux (common logarithm). The instrument was placed vertically (to measure the incident light from the sky) near the grove on a neighbouring

field with a fairly free horizon. Influence of changes in the albedo of the surroundings was thus avoided. The correct (but impossible) place to measure the illumination would of course have been exactly where the roosting places were. NIELSEN (1963a) has, however, shown that there is a simple relationship between the illumination in the open and under a canopy, but it should be borne in mind that the illumination at the roosting places is considerably lower than the illumination measured.

It should be observed that the firs shielded the roosting places considerably from the reflexion of the fields surrounding the grove. This might be important, because in some periods the field were covered with snow.

The following rules were adopted for indication of illumination at the time of a departure:

a) Readings were made at even-numbered minutes, until the minimum limit of the meter was reached.

b) Departure at odd-numbered minute. No marks on the scale between the values measured on the even-numbered minutes. Upper value chosen.

c) Departure at odd-numbered minute. A mark between the values measured. Value indicated by the mark chosen (linear interpol.).

For the calculation of the time of sunset and the end of civil twilight the Air Almanac was used. Calculations were made for the position of the grove: (10°6'30"E; 56°8'30"N).

The crep unit (T.TETENS NIELSEN 1963b) was used in the treatment of the results. It is defined as:

$$\frac{\text{time of day} - \text{time of sunset}}{\text{duration of twilight}}$$

A standard illumination as a function of crep has been tabulated for a "practically clear sky" by E. TETENS NIELSEN (1963b). The deviation of the actual graph found on any one day from the standard values expresses the influence of atmospheric conditions (i. e. primarily clouds).

SIMULTANEOUS DEPARTURE OF SEVERAL OWLS

Usually all the owls had left for hunting within twenty minutes after the first departure. Simultaneous departure of several owls was frequently noticed. The largest number of owls departing together as a closed group in one direction was six. Most frequently the owls departing at the same time split up and left as groups or individuals in several directions. When a departure was recorded the observer raised a hand as a sign to other observers. By means of this practice the observers soon got an impression of the tendency of the owls to leave at the same time. This was also a check on the simultaneousness of departures.

The following table, which illustrates this tendency, combines the records from 23 days. The last days with light measurements are excluded (few owls), and some preparatory days early in January included.

Table 1. Number of owls leaving at the same time.

Tabel 1. Antal ugler, der forlader granerne på samme tid.

Number of cases *Antal tilfælde*	127	45	26	12	4	2	4	0	2
Number of individuals leaving simultaneously *Antal individer der fløj ud samtidig*	1	2	3	4	5	6	7	8	9

LIGHT AND THE ONSET OF ACTIVITY

Of the 421 records of departures 294 or nearly 2/3 of the cases were simultaneous departures of two or more individuals. In some cases the cause of the simultaneousness may be that the owls' motivation to depart is independently the same. But it seems probable that such departures are more often due to imitation: the departure of one individual causes other owls to depart earlier than they would have done if the departure had not taken place. Consequently, to avoid errors when estimating the effect of illumination on the departure, only the first departure of the evening is considered.

Table 2 shows the relationship of the time of the first departure in M. E. T. and crep, and the actual illumination in that moment.

The distribution of the onset of activity in relation to illumination is illustrated separately in figure 1.

The time between the measurement of the values 0.98 log lux and 0.18 log lux was on the average 10 minutes. The maximum value was 13 minutes, the minimum 7 minutes. These figures are mentioned to increase the understanding of the distribution.

The latest first departure took place 50 minutes later than the earliest one. Thus the onset of activity seems to depend much more on light than on time of day. This dependence is demonstrated by the following considerations.

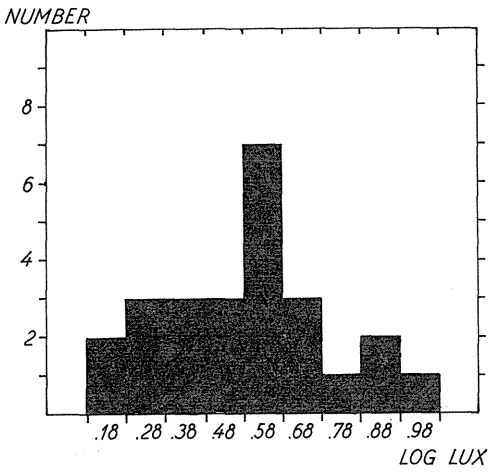

Fig. 1. The onset of activity of each day in relation to illumination.

Fig. 1. Belysning ved hver dags første udflyvning.

Table 2. The table gives the time of departure, crep and log lux for each day of observation.

Tabel 2. Tabellen viser for hver observationsdag tidspunktet, crep og log. lux for første udflyvning.

Date *Dato*	Time of departure *Tidspunkt for udflyvnnig*	Crep	Log. lux
Jan. 12	16.53	0.93	0.68
13	.52	0.89	0.48
14	.54	0.89	0.48
15	(Separate treatment. Strong wind)		
16	.54	0.82	0.38
17	.50	0.69	0.58
18	.46	0.56	0.58
19	.51	0.64	0.58
20	.51	0.59	0.98
21	.54	0.61	0.58
22	17.08	0.91	0.58
23	16.56	0.58	0.68
24	17.08	0.81	0.38
25	.14	0.91	0.28
26	.24	1.09	0.18
27	.04	0.58	0.78
28	.24	1.02	0.58
29	.15	0.76	0.48
30	.17	0.76	0.18
31	(No observations)		
Feb. 1	(No observations)		
2	(No observations)		
3	.29	0.85	0.88
4	.29	0.80	0.28
5	.30	0.78	0.38
6	.33	0.80	0.68
7	.32	0.73	0.28
8	(No observations)		
9	.29	0.54	0.58
10	.36	0.67	0.88
Average *Gennemsnit*		0.77	0.54

If light is measured at the same place, but on different days, and if variable surroundings do not disturb the measurement, the variation in the time of day at which a certain illumination is measured will depend on change in the orbit of the sun and on the variable effect of atmospheric conditions. By changing the times to crep the variation caused by atmospheric conditions is isolated. This is done for the times of day at which 0.58 log lux was measured. This value is the one that can be read on the meter closest to the average value of light at the first departure.

Now the crep values at 0.58 log lux and at the first departure can be correlated for each day to see whether or not they vary in the same way. The result is shown in fig. 2. The combination (0.84, 0.89) occurred on two days.

The result reveals that onset of activity is determined by illumination, and the influence of other variables, if any, is too small to be observed under normal conditions.

THE EFFECTS OF STRONG WIND

The influence of wind on the departure has been discussed earlier (GLASS and NIELSEN 1967). In 1968 no special efforts were made to study the subject. One day, however, the weather was quite unusual. On the 15th of January the wind velocity was WNW, 18-22 m/sec. The sky was completely covered with clouds.

Only four owls were seen that evening as compared to 15-20 in the evenings before and after. At 0.18 log lux an owl was seen to the east, sheltered by the grove. It returned. Another owl left, flying close to the ground. A third owl was seen high over the trees "thrown" NE, as expressed by the observer. The fourth owl flew east on a level with the trees of the grove and tried to turn north, where it would be sheltered by some high trees. It did not succed and disappeared NE.

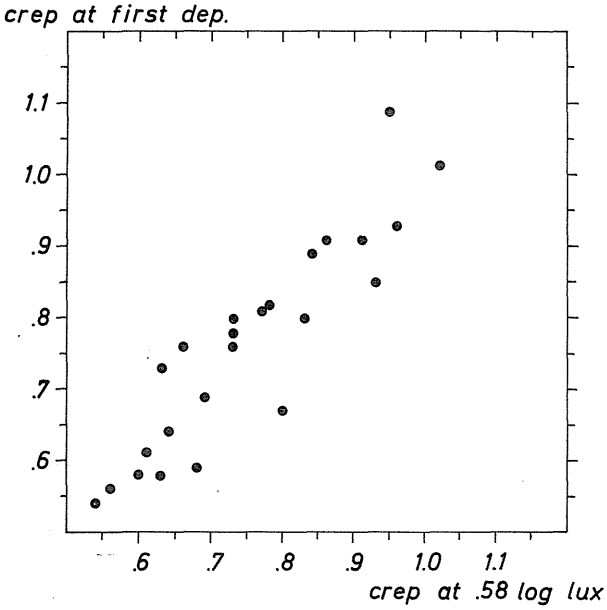

Fig. 2. Correlation between crep at 0.58 log lux and crep at the first departure at the evening.

Fig. 2. Korrelation mellem crep ved 0,58 log. lux (X-akse) og crep ved den første udflyvning (Y-akse).

BEHAVIOUR OF THE OWLS DURING FLIGHT FROM THE GROVE

The owls did not always fly straight to the hunting areas. Sometimes they would circle or ascend in a spiral over the grove, before flying away. In the last part of January the behaviour grew more complicated, perhaps indicating some pair formation. From the 20th of January it was sometimes recorded that two owls flew towards each other and passed one another closely, in some cases several times. On one occasion (20th of January) two owls even hit each other. Sometimes the movements of the wings seemed exaggerated, and occasionally small sudden dives were seen.

After the 10th of February and until 15th of March two observes continued to study the behaviour. On the 25th of February a courtship flight was seen, including clapping of the wings. It continued for some days, but no breeding was seen.

Example 1. 10th of February:
"... two owls over the field to the east of the grove. They fly towards each other, then turn and fly in opposite directions- turn again. One follows the other, ascending. They circle together, then separate again. One flies rather slowly. The other moves towards it and passes rapidly just below it. The owls circle until they turn directly towards each other. Then again one passes the other rapidly. They pass one another closely several more times, disappearing east." (From a report by CARSTEN LANGKILDE. A tape-recorder was used during the observation.)

Example 2. 16th of February:
Two owls start from a dense grove of conifers, immediately north of the higher grove. They fly directly south beside one another for about 150 meters. The height of flight is roughly 30 meters. Suddenly they fly towards each other and their paths cross. They fly apart, then towards each other again. Together their paths roughly describe an ellipse. They pass one another rapidly, this time diving. This pattern occurs one more time. Then they disappear south behind some trees. At that time they are about 200 meters from the position where their paths first crossed. (Observed by the author. Paths of flight were drawn on a map and described.)

SUMMARY

In January and February 1968 some individuals of the Long-eared Owl *(Asio otus)* were observed during 25 evenings. They roosted in a grove of silver firs close to Århus, Jutland. Light was measured from sunset and the times of departure for hunting of the owls were recorded. The results were:

1) Of the 421 records of departures, nearly two thirds of the cases were simultaneous departures of two or more individuals.

2) The first departure of the evening took place at an illumination varying between 0.98 log lux and 0.18 log lux, both values included. A further analysis shows that onset of activity is determined by illumination.

3) A strong wind completely disturbed the pattern of departure.

4) During flight from the grove two owls would sometimes fly towards each other and pass closely, eventually several times. This was seen from 20th January. The observations might indicate that pair formation was taking place.

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It would not have been possible to carry out the study without the ready assistance of those who took part in the observations. The following observers recorded the departures on several evenings: FLEMMING CHRISTENSEN, PETER CHRISTENSEN, HELGE DETHLEFSEN, JØRN ESKILDSEN, JENS GREGERSEN, KAJ HALBERG, CARSTEN LANGKILDE, SØREN HØJAGER, TORBEN SØRENSEN.

CARSTEN LANGKILDE and the author observed together on many evenings after the 10th February. The author is indebted to LANGKILDE for working out a report on his observations.

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Finally the author wants to express his gratitude to everyone who has taken part in helpful discussions on the observations.

DANSK RESUMÉ

Skovhornuglens (Asio otus) *udflyvning om vinteren.*

Denne undersøgelse behandler nogle Skovhornuglers udflyvning gennem 25 aftener i jan.-febr. 1968. Den er en fortsættelse af et tidligere arbejde (GLASS og NIELSEN 1967). Observationerne fandt sted ved en ca. 30 m høj granbevoksning, som er en del af Søskoven, vest for Århus. Granernes kroner danner et tæt dække, hvor 10-25 ugler sad om dagen.

Tiden for hver udflyvning blev noteret, og fra solnedgang blev lyset målt på lige minutter med en »Lunasix« CdS-måler.

Resultaterne:

1) Ofte forlod flere ugler granerne på samme tid. Tabel 1 viser samlet for 23 dage, hvor ofte forskellige antal forlod granerne samtidigt.

2) I fig. 1 er hver enkelt dags første udflyvning indtegnet i forhold til den lysstyrke, som blev målt, da den indtraf. Tiden, fra 0.98 log lux blev målt til 0.18 log lux måltes, var i gennmsnit 10 min., mindst 7 min. og højest 13 min.

For samme sted og i omgivelser, som ikke forstyrrer målingen, afhænger variationen i det klokkeslet, en bestemt lysstyrke måles, af solens gang og skydækkets (helt præcist: atmosfærens) indflydelse på belysningen. Ved at ændre klokkeslæt til crep kan den variation, som skyldes forskelle i skydække, isoleres.

Crep er defineret:

$$\frac{\text{tid på dagen} \div \text{tid for solnedgang}}{\text{tusmørkets varighed}}$$

Angående crep og belysning se: E. TETENS NIELSEN 1963b.

Den værdi på målerskalaen, som er nærmest middelværdien for lys ved første udflyvning, er 0,58 log lux.

I Fig. 2 er crep variationen for denne lysstyrke indtegnet i forhold til crep-variationen for aftenens første udflyvning. Med andre ord: I figuren afsættes crep for den første udflyvning på en dag i forhold til crep for 0,58 log lux på samme dag. Talsættet (0,84, 0,89) forekom to gange. Den korrelation, som fremtræder, må betyde, at tidspunktet for udflyvning bestemmes af belysningen alene – eller, at andre faktorer under normale omstændigheder har meget ringe betydning.

3) En stærk storm den 15. jan. ændrede helt udflyvningens forløb. To ugler blev ført med vinden, en fløj ganske lavt, og en fjerde vendte tilbage til granerne. Resten viste sig ikke.

4) I den sidste tredjedel af jan. og i febr. sås ofte et samspil mellem to ugler, når to eller flere forlod granerne på samme tid. To ugler kunne flyve mod hinanden og passere tæt, oftest i dyk. Undertiden kunne flugtbanerne krydses gentagne gange. Andre samspil blev også set, og sidst i febr. blev der konstateret tydelig pardannelse.

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Iagttagelser over Gulspurvens *(Emberiza citrinella)* sangaktivitet

Af

JENS PETER LOMHOLT

(With a Summary in English: Observations on the Singing Activity of the Yellowhammer (Emberiza citrinella).)

INDLEDNING OG METODE

De vigtigste observationer, der ligger til grund for dette arbejde, er foretaget i perioderne 7.-19. maj og 3.-16. juni 1965 samt 21. maj - 26. juli 1966 på Molslaboratoriet, Femmøller. Enkelte observationer blev foretaget 8.-12. april 1966 i samme område. Mere spredte observationer blev foretaget 1. juli - 25. august 1968 på Helgenæs og 1. februar - 15. juni 1969 på Molslaboratoriet og i området omkring Feldballe, sydl. Djursland.

I 1965 og 1966 blev fire hanner holdt under observation, og tidspunktet for sangbegyndelse og -afslutning noteredes samtidig med måling af lysstyrke, temperatur, vindstyrke, skydække samt evt. supplerende oplysninger om vejret. For en enkelt han blev der foretaget optællinger til belysning af sangintensiteten dagen igennem. Der blev lavet båndoptagelser og gjort iagttagelser for at undersøge sangens variation.

Det vigtigste grundlag for adskillelsen af de forskellige hanner var kendskab til beliggenheden af sangposter og territoriegrænser, men enkelte hanner kunne tillige kendes på ejendommeligheder ved sangen.

Lysmålingerne blev foretaget med en fotomodstand og et ohmmeter. Fotocellen anbragtes på en høj stage så frit som muligt, navnlig til den side, hvor solen stod op og gik ned. Fotocellen er justeret ved at optage en serie målinger på en fuldstændig skyfri aften med cellen placeret på en bakke, hvor horisonten er fri hele vejen rundt.