

2.3. THE USE OF DISTRESS CALLS FOR SCARING OF BIRDS ON AIRFIELDS IN NORWAY
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The Utilization of the Distress Call for Scaring

Birds from Airfields.

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INTRODUCTION

During the period July-November 1970, I was commissioned by The Royal Norwegian Air Force to carry-out research on the use of the distress call to scare birds, potentially dangerous to air traffic, away from the airfield. Vocal communication of birds and mammals is a relatively new branch of science, but since the mid 1950's interesting articles concerning vocal communication have been published.

Konrad Lorenz pointed-out that the language of birds contained many more elements than was originally believed. He found that Grey Lag Geese had no less than 14 different vocal elements, each of which had its special meaning.

The first attempt at using distress calls for chasing undesirable birds was published by Frings and Jumber(1954). In several American cities they were able to chase 10.000-20.000 Starlings (Sturnus vulgaris) away from their overnighiting roosts. Frings (1955) demonstrated that these methods were very effective against gulls (Laridae). One or two distress calls, lasting for five minutes, played through a public address system resulted in the gulls taking wing and circling the loud speakers, where they flew higher and higher, until they finally flew away. A series of studies using the distress cry of the Starling for scaring the birds from orchards and berry patches have proved successful.

Because of these encouraging results, people from many countries who were concerned with air safety became interested in these methods. Public Adress system playing distress calls have been in use in many countries, including: Germany, The Netherlands, Great Britain, France, U.S.A. and Canada (Pfeifer, 1965). Hardenberg (1963) began an investigation in The Netherlands and reported, "The response of the mixed flock was very encouraging in clearing the runway".

Describing the English experiments, Brown (1962) wrote, "Ideally the gull's reaction to the broadcast call was spectacular. They would fly up as soon as the broadcast began, and fly low and silently towards the hide. They would then circle, calling over the speaker. They would gradually

circle higher, and would eventually drift away and disperse".

The gulls were the most dominant group of birds at the Bodö Airfield. The Common Gull (Larus canus) was the most numerous and during rainy weather when thousands of gulls invaded the grassy fields of the airport, it was also this species which was most abundant.

The Herring Gull (L. argentatus) was next in abundance. These birds normally remained close to the ocean together with the Great Black-Backed Gull (L. marinus) and the Lesser Black-Backed Gull (L. fuscus).

The Starling (Sturnus vulgaris) usually nests in populated areas. They were frequently encountered on the fields of the airfield where they found good food supply. Starlings became a big problem when the recently fledged birds began to fly in large flocks.

During migration time these fields often contains flocks of Ruffs (Philomachus pugnax) and Golden Plovers (Pluvialis apricaria). Ruffs are common from August to September, whereas the majority of the Golden Plovers arrive in September. Many Ringed Plovers (Charadrius hiaticula) and Weatears (Oenanthe oenanthe) were seen around the airfield during the last days of September, often walking around on the runways. A few Oystercatchers (Haematopus ostralegus) were seen out on the runway, especially during the early morning hours. Hooded Crows (Corvus corone) and Raven (C. corax) were quite common within the borders of the airfield.

The reason that so many birds were found on the airfield is that when the grass was cut, earthworms became readily available to the birds. During rainy weather the density of the birds on the airfield increased. Also there are several fish freezing factories in Bodö, two of them located close to the airfield. Because of the garbage from these factories there are always large congregations of gulls.

METHODS AND MATERIALS

The distress call setup in this study consisted of a taperecorder (Tandberg 11, 40-16 000 Hz), and amplifier (Noboru VA-220, 30 watt, DC 12 volt, 250-10 000 HZ), and two speakers, one of which was high frequency (Atlas horn, HR 3) and the other low frequency (Gelosa 2537/2522). The apparatus was mounted on an automobile. The distress calls were prerecorded in England. I used the calls of the Herring Gull, Common Gull, Starling, Rook (Corvus frugileus) and Lapwing.

Prior to the use of the distress call I noted the position of the different flocks of birds in relation to the loudspeakers. I also noted the weather conditions, time of day, duration and strength of playback, the particular distress call used, and whether or not a shotgun or other pyroacoustical devices were used. During the actual scaring I observed the reaction of the different flocks.

When the distress call was played, all the gulls within a certain distance took wing and flew in the direction of the loudspeaker. The nearer the birds were to the source of sound the greater was the urge to investigate the region from where the distress call originated. Perhaps this is because the birds further away have difficulty in localizing the source of the sound. Because the birds fly toward the source of sound they receive an even stronger stimulus, and this is perhaps why they fly further away and remain there for longer durations. After having circled higher and higher, smaller or larger flocks began to fly away from the source of the distress call. On the basis of the birds attraction to the sound source, they are placed into one of five response categories (modified after Bremond et al. 1968), category A being considered the best response.

- A. Birds which come right up to the speaker before flying away.
- B. Those which remain circling at a slight distance from the sound source before leaving the area.
- C. Those birds taking off, but are cautious, and approach the loudspeaker only slightly before flying away.
- D. Those birds which take off and fly away immediately.
- E. No reaction, or they may take off, but land in the same vicinity again.

In order to determine the significance of the distance from the loudspeaker on the success of the distress call the material was divided into four groups. 1) Distances from 0 to 500 m, 2) from 500 to 1000 m, 3) from 1000 to 1500 m and 4) distances greater than 1500 m. The five categories above (A-E) can then be placed within the appropriate distance class. Several flocks could be present each time an attempt was made to scare the birds, and the reaction of each of these flocks is considered an observation. The tables below give the result of sorting the observations using these dual were located within two distance classes, the observations were placed into both categories.

107 trials were carried out, of these 77 with the distress call of the Herring Gull, 9 with the call of the Common Gull, 11 using the Starling distress call, 7 using Rook and 3 using the distress call of the Lapwing.

RESULTS AND DISCUSSION

a) Gull research.

Range of the distress call.

Table 1 shows the results using the distress call of the Herring Gull. All the observations were treated without taking into consideration such variables as size of flock, weather conditions, wind direction (however, in over 90% of the tests the gulls were downwind from the speakers), and the species composition of the flock. Groups A, B, C, D were placed together as being successful responses of the birds to the distress call.

Figure 1 illustrates the percentage of successful responses of the Herring Gull (A + B + C + D) compared to the total observations (A + B + C + D + E). The distribution of the successful responses into the individual categories (A B C D) is shown by the different shaded bars.

Table 1. The results of the tests using the distress call of the Herring Gull. The material is divided into response categories and the distance between the birds to the speaker.

Response categories	Distance			
	0-500	501-1000	1001-1500	1501
A	44	13	2	0
B	13	7	3	0
C	6	5	3	0
D	1	9	5	1
E	1	6	10	3
Successful responses	64	34	13	1
Total responses	65	40	23	4

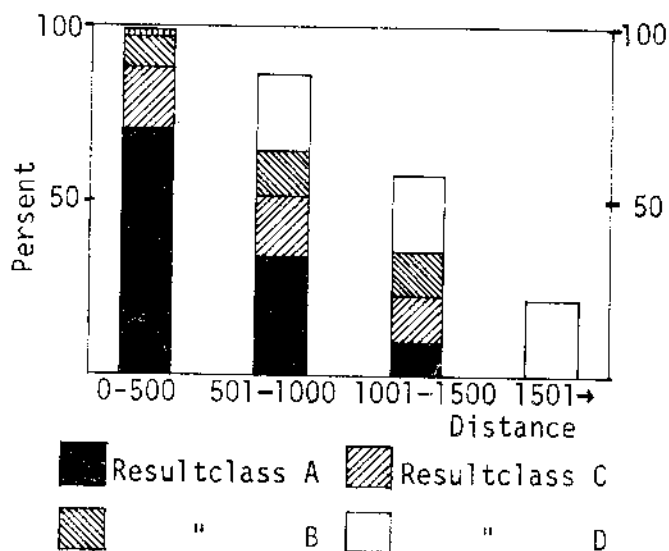


Fig. 1. The percentage-wise distribution of the successful responses of the Herring Gull.

The results from both Table 1 and Fig. 1 show that the distress call was very effective in scaring gulls from the airfield. Within a 500 m distance only one of 65 tests was not successful, with this single exception occurring on a very windy day. Wind was the most important variable in these tests. The efficiency of the distress call decreases for birds located 500-1,000 m from the loudspeaker but was still fine with 86% successful responses. Between 1,000 and 1,500 m over half of the tests proved successful (13 of 23). If the flocks are located more than 1,500 m from the loudspeaker than only under ideal operation conditions can the birds be scared away.

Only a few exact measurements on the range of effectiveness of distress calls is found in the literature. Naturally, there will be variations between the different experiments resulting from differences of the technical equipment and the quality of the recordings. The results from the present study correspond closely to the information in the literature. Frings and Frings (1959) write that the distress call of the Herring Gull scared gulls located at least a half mile away. Frings *et al.* (1958) reported that they scared gulls located two miles away. Greutz (1956) succeeded in scaring Starlings nearly one kilometer away. Ryl'skii and Yakobi (1967) scared off Jackdaws and Rooks

within a radius of 500 m.

In both Table 1 and Fig. 1. it can be seen that the distance increases a greater amount of the observations fall into the response categories C and D. This indicates that when the distress call is played from the shorter distances the birds have the greatest urge to seek out the source of sound. It should therefore be evident that for each broadcast one should drive as near as possible to the flock before the distress call is played. When the birds approach the loudspeaker, they hear the distress call from close range and this in turn increases their drive to flee, leading to the best results. Equally important is that when the birds seek out the loudspeaker, supplemental scaring devices can be utilized.

The distress call should be played with short pauses until the birds come as close to the loudspeaker as they dare. Supplemental scaring devices should not be used as long as the birds are approaching, because the use of these devices will cause a conflict between the drive to seek out the distress call and the drive to flee, yielding confusion.

When the scaring of the birds was very successful they flew beyond the range of the naked eye.

Strong winds can diminish the scaring effect. One must therefore be careful to make sure that the wind is blowing from the loudspeaker toward the birds. Nevertheless, on windy days the birds have a tendency to glide in the wind for a long time after having heard the distress call.

Precipitation did not appear to influence the tests. The gulls were scared just as easily during rainy weather as they were on clear days.

The time of day at which the distress call was played did not seem to have any effect on the response of the gulls. The equipment was not used very much during darkness because at night there are generally very few gulls on the airfield and it is also difficult to ascertain the results.

b) A comparison of the distress calls of the Herring Gull and Common Gull.

Table 2. The use of the distress calls of the Herring Gull, and the Common Gull () in scaring flocks consisting of Common Gulls only.

Response Categories	Distance			
	0-500	501-1000	1001-1500	1501
A	31 (6)	8 (0)	0 (0)	0 (0)
B	3 (1)	3 (1)	2 (0)	0 (0)
C	2 (0)	3 (0)	2 (0)	0 (0)
E	0 (0)	4 (0)	3 (0)	1 (1)
E	1 (1)	3 (2)	5 (2)	3 (1)
Successful responses	41 (7)	18 (1)	7 (0)	1 (1)
Total responses	42 (8)	21 (3)	12 (2)	4 (2)

The material for the Common Gull is rather small, but seems to indicate that the Herring Gull distress call was more effective in scaring the Common Gull than the latter's own call. Trevor Brough (Ministry of Agriculture, Fisheries and Food, Tangley Place, Worplesdon, Guildford, Surrey, England), who provided us with the recording, was not completely satisfied with the quality of the Common Gull's distress cry. Bremond et al. (1968) tested two pieces of equipment, one "high fidelity" and one "low fidelity" on gulls and crows. The "high fidelity" apparatus was markedly more effective, especially in wind. This had a wide range of frequency (tape recorder: 20-1500Hz, speaker: 800-1100Hz). For "low fidelity" equipment the frequency range was 200-1300Hz for the tape recorder and 500-6000Hz for the speaker. This implies that one should be particularly careful to obtain a recording and amplifying unit of the best quality.

The results obtained in this study show that the different species of gulls react collectively when they heard the distress call of either the Common Gull or the Herring Gull. This is in complete agreement with the corresponding experiments

from other countries. Brown (1962) reported that the Black-Headed Gull responded well to the distress calls of both the Common and the Herring Gull. Similiar results have been reported by Bremond et al. (1968), Brough (1968) and Burns (1961). Within the crow family, equivalent results have been obtained. Frings et al. (1958) scared mixed flocks of Hooded Crows, Rooks and Jackdaws (Corvus monodule) using the distress call of the Jackdaw. Therefore, it is likely that this is a normal reaction among closely related birds living in close contact.

c) The duration of the effectiveness of the distress cry.

The time that the birds remain away from the area is quite variable, depending on the attractiveness of the area to the birds, their activity and reasons for occupying this area. During nice weather there were usually only a few birds because of the slight opportunity for obtaining food. But once in a while a flock of gulls would land on the runway and rest for a while. When these birds were scared, they remained removed from the area for several hours and sometimes the entire day. As soon as the rainy weather arrived, the gulls invaded the airfield most being in the grassy fields, but some sat on the runway. These came to eat earthworms and other small animals which migrated to the surface during such weather. Some of the more active invertebrates proceeded onto the runway. These large flocks of gulls were easy to scare. It appeared that the larger the flock, the easier the gulls were to scare using this method. But in areas where the gulls could easily obtain food it often occurred that the birds returned within an hour. However, when this occurred, the distress call was repeated several times resulting in the birds remaining away from the area for several hours or even the remainder of the day. Frings et al. (1955) found with their experiments on scaring gulls from garbage dumps, that the birds remained removed from the area for 30-45 minutes. Hardenberg's experiments (1962) on Dutch airfields resulted in the gulls remaining away from the area during the day but returned again in the evening.

The gulls had the greatest activity from dawn continuing throughout the morning hours and it is during this time that

it was most likely that other flocks wandered in on the airfield.

d) Habituation to the distress call.

One of the central questions concerning the use of such distress call apparatus is whether or not the birds "see through" this method after being exposed to it for some time and hence fail to respond positively. In the USA the same positive results with gulls continue, and appear to be just as effective as when the tests first began in 1954. Hardenberg (1962, 1963) writes after four years of experience in Holland: "Man glaubt allgemein, die Möwen würden sich schon daran gewöhnen. Bis jetzt hat sich diese Voraussage nicht bewarheitet. Ganz im Gegenteil, es hat jetzt sogar den Anschein, dass die Vögel die Startbahn meiden". "The broadcasting system was in operation since the winter of 1958/59, and, as time went on, no evidence of becoming accustomed to the distress call was found". Concerning the research in Canada it was reported (Anonymus, - 1964) "It would appear that the results obtained by use of the bird distress cry equipment at Toronto International Airport has been effective if not overused. However, it has had to be supplemented by use of shotgun scaring". Greutz (1956) found that Starlings did not become habituated to the method after three months. Ryl'skii and Yakobi (1967) report about their tests with Magpie and Rook calls: "During the time of our experiments we did not notice that the birds became accustomed to the combination of accustic and pyrotechnic means, because the experiments were carried out in the fall over a relative short period of time". These successful results indicate that the distress cry is genetic and functions mechanically. In other words, the birds haven't learned that the distress call signifies danger, but react instinctively.

Not all researchers have obtained such good results, especially when the problems of habituation are accompanied by a decrease in the effectiveness of these methods. Brown (1962) found the technique to work especially well with gulls and Lapwings. When he began his experiments in May the Lapwing responded positively in 80% of the tests, but by January the effectiveness had decreased to a mere 6%.

Habituation could be delayed by using other scaring methods simultaneously. Eva Hartby (1967) found with her experiments in a cherry orchard that the Starlings quickly lost their fleeing reaction after being exposed to the distress call method for a period of time. It is impossible at this time to say anything for certain about the conflicting results from the different experiments on the various species of birds studied.

In Table 3 the results on the Herring Gull are divided into two groups: Experiments carried out from July 22nd through August 17th, and those conducted from August 26th through October 25th. In order to determine whether or not habituation had taken place during these studies at Bodø the successful attempts (A + B + C + D) in each of the distance groups were determined and compared for the two periods.

Table 3. The percentages of successful observations within the periods July 22nd - August 17th and August 26th - October 25th. The number of observations are in parentheses.

Period	Distance			
	0-500	501-1000	1001-1500	1501
22/7-17/8	100 (27)	79 (24)	62 (13)	0 (2)
26/8-25/10	97 (35)	94 (18)	50 (10)	50 (2)

It appears from Table 3 that the distress call experiments at Bodø Airfield have not decreased in effectiveness after three months. But due to the variety of results obtained from different countries, one should closely examine the question of habituation. In my opinion the decrease in the effectiveness of some of the other works is probably due to methodology, and not the biological response. So as to prevent a possible habituation, one should use the best technical equipment available and should vary the methods of scaring by alternation the different distress cries, for example. In addition, pyrotechnical means should be initiated as often as possible.

e) Starling, Hooded Crow, and Lapwing Experiments.

Big flocks of Starlings and Hooded Crows have the habit of roosting overnight in trees. Such a roosting place is found near the main entrance of the Bodø Airfield. In the late afternoon and evening approximately 200-300 Hooded Crows and 2,000-3,000 Starlings gathered at this roosting spot. The majority of the research with Hooded Crows and Starlings at Bodø have been directed against these flocks.

Six attempts were made at scaring these birds. Both the Starlings and Hooded Crows reacted positively to both of their distress calls. The pattern of their reactions was reminiscent to that of the gulls, but with a weaker tendency to search out the source of sound. The distress cry of the Rook appeared to be more effective over a greater distance than the Starling's call. On one occasion both the Starlings and Rooks were scared at a distance of 2400 m from the source of the Rook distress call. The maximum distance over which a Starling distress call is effective is 1000 m. During the experiments, however, there was no reduction in the number of Hooded Crows and Starlings which spent the night near the airfield's main entrance. Brough (1968) managed to scare Starlings from 33 overnighting roosts for the rest of the year, usually after playing the distress call for three consecutive nights. Similar results were also obtained by Greutz (1956) and Pearson et al. (1967).

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SUMMARY

1. Studies using the distress call for scaring birds from the Bodø Airfield were carried out during July-October 1970.
2. Bodø Airfiels contains many fields which attract gulls, especially the Herring Gull (Larus argentatus) and the Common Gull (L. canus). Starlings (Sturnus vulgaris) are abundant, as are both the Ruff (Philomachus pugnax) and the Golden Plover (Pluvialis apricaria) during migration time.
3. The playback equipment, comprising a magnetophone, an amplifier (30 watt) and two loudspeakers (one of high frequency, the other of low frequency), was mounted on an automobile. The distress call were prerecorded in England, and cries of the Herring Gull, Common Gull, Starling, Rook (C. frugileus), and Lapwing (Vanelus vanellus) were used. The different cries were used with the following frequencies: Herring Gull = 77 trials, Common Gull = 9 trials, Starling = 11 trials, Rook = 7 trials, and Lapwing = 3 trials.
4. Fig. 1 and Table 1 show that within 500 m distance nearly 100% of the trials were successful. From 500 to 1000 m 86% were successful, and from 1000 to 1500 m 57% success was achieved. At distances greater than 1500 m the birds were only scared away under ideal conditions.
5. Rainy weather and time of day did not seem to influence the scaring effect, but strong wind was very unfavourable.
6. The different gull species reacted positively to the distress calls of both the Herring Gull and the Common Gull, but the cry of the Herring Gull seemed to give the best result, apparently because the recording was of a higher quality.
7. During meal periods the gulls returned to (or others invaded) the scaring area often after only half an hour to an hour. After repeated scaring trials they stayed away for longer and longer periods. When the gulls had only visited the airfield to rest, they stayed away for a longer time after scaring.

8. No habituation to the distress call was recorded during the four month the trials lasted.
9. The cry of the Rook was effective against the Starling and the Hooded Crow (C.cornix), and the same is true for the cry of the Starling, The Lapwing soon left when its own cry was played.

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