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EVIDENCE FOR THE EXISTENCE OF A LEADING LINE EFFECT IN HONEY BUZZARD MIGRATION THROUGH MALTA

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The effect of leading lines in raptor migration is well known, and is thought to be one reason for the large concentrations of raptors which occur at the narrows at both seasons. Recent analyses of the extensive observations carried out at Falsterbo has led to the elaboration of a model which relates the leading line effect to weather phenomena, especially wind (Alerstam 1978). Honey Buzzard *Pernis apivorus* migration through Malta in autumn is thought to be subject to similar leading line effects, albeit on a much smaller scale (Thake 1981). The effect is thought to increase in strength as the afternoon progresses. Increasing strength of the southerly (contrary) component of surface wind strength is also thought to induce more birds to follow the coast rather than commence migration over the sea immediately. Some evidence for the existence of a leading line effect in Malta is presented below.

Methods

Data obtained in 1976 provide the material on which this paper is based. The observation methods were described elsewhere (Thake 1977,1980). The observations were made several years before the present hypothesis was conceived and could not have been in any way influenced by expectation.

Results and discussion

If Honey Buzzards choose between migrating over the sea immediately and following the coast, the scatter of headings is expected to be bimodal. Figure 1 shows some birds head-out to sea due SW - S, and others following the coast by heading SE. The scatter diagram of headings of single birds shows the expected bimodality, but no satisfactory statistical test of this could be devised.

A coasting movement due SE should increase the rate at which flocks of Honey Buzzards are encountered, as the birds in question are flying obliquely to the stream of migrants, and flocking is expected to occur more frequently. Hence, larger flocks are expected to show a more pronounced tendency to fly SE. This is depicted in Figure 2.

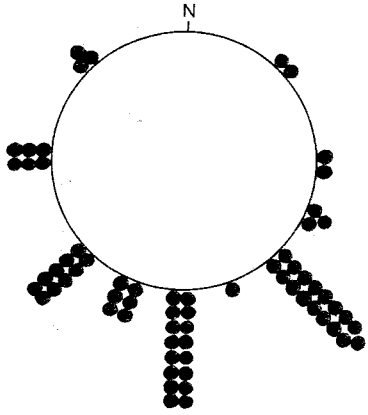

Fig.1. Scatter diagram of headings of single Honey Buzzards. Headings of birds sighted before 1700 CET were estimated ($\pm 10^{o}$) by reference to known compass points. R = .6165; θ = 174.36^{o}

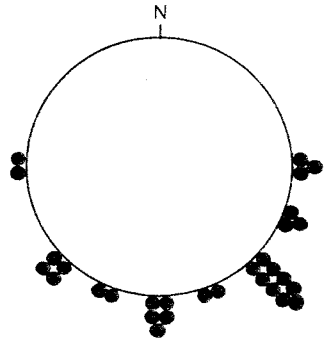

Fig.2. Scatter diagram of headings of flocks of four or more Honey Buzzards. R' = .6797 ; θ = 159.00^{o}
The direction of the resultant vector for singles (Fig.1) lies outside the 95% confidence limits for θ'. The more rigorous Watson and Williams two sample test is not applicable because the two concentration coefficients differ significantly ($p < .05$).

These results strongly suggest that some Honey Buzzards follow the coast. Direct evidence that contrary winds increase the fraction following the coast would only be obtainable from a much larger sample of directional data than that at my disposal.

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