

The SPARROWHAWK

IAN NEWTON

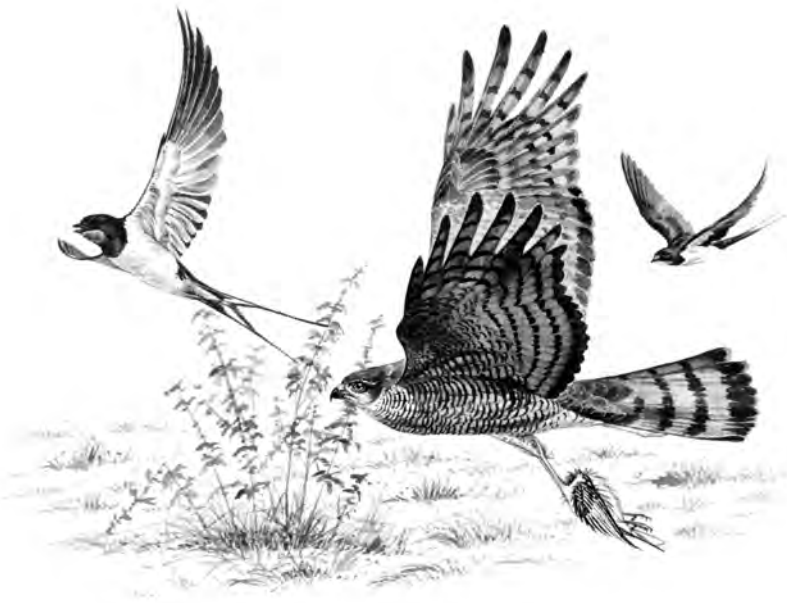


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CHAPTER 7

Hunting and feeding behaviour

The Sparrowhawk is the only woodland raptor in Europe which primarily eats small birds. Its foraging behaviour is hard to study, because most hunting occurs in cover, and the individual prey captures occupy no more than a moment, so are easily missed. The ordinary observer sees chiefly those types of hunting which occur in the open, glimpsing the hawk for only a few seconds in a longer sequence. When we put radio-transmitters on wild Sparrowhawks, we soon discovered that the main hunting technique had not even been described, and what was recorded in textbooks formed only a small part of the total repertoire. But even with these radio-tagged birds, some of which caught around ten prey per day for their young, we saw very few captures, despite following some individuals for several days at a time. Falconers with trained hawks can witness more attacks, but here the situation is to some extent contrived (Mavrogordato 1960, Fox 1981, Kenward 1978, 1982). In this chapter, therefore, I can give no more than a broad idea of hunting behaviour, and describe particular incidents which help to complete the picture.

Although for much of the year the countryside abounds in small birds, Sparrowhawks often have difficulty in feeding themselves. This is because small birds have various defences, some of which are highly effective. Only a tiny fraction of the birds that a hunting hawk encounters can be attacked with any chance of success, and even then they usually detect the hawk in time to escape. A warning call from just one individual is enough to send all the small birds in the vicinity scuttling for cover. As the hawk moves through woodland, its passage is marked by a succession of alarms, and as it crosses fields, flock after flock rises before it, while still safely out of range. In fact, after detection by the prey, the hawk has no more than about three seconds to grab that prey before it escapes. Little wonder that Sparrowhawks often go hungry, and that shortage of food is a major factor limiting their numbers and breeding success.

To catch its prey, a Sparrowhawk has the benefit of a keen eye, great stealth and manoeuvrability. But it is not particularly fast in level flight. The usual speed is 30–40 km per hour, reaching 50 km per hour in short bursts. The hawk is thus somewhat faster than most songbirds, which fly at less than 35 km per hour, but slower than Swallows, waders and larger prey, such as pigeons. For its size, a Sparrowhawk can twist and turn with remarkable ease, but smaller birds can still out-maneuvre it. To avoid an attacking hawk, small birds normally dive into cover, but larger and faster birds take to the air. Flocking species in open country may bunch together, and perform fast zig-zag flights which hinder the hawk in singling out a victim. Thus to be successful, the hawk has to approach closely without detection, and then dash in and seize its prey as quickly as possible.

HUNTING TECHNIQUES

Short-stay-perch-hunting

In the commonest prey-searching technique, the hawk makes short flights from perch to perch, pausing on each to scan the surroundings before moving on. In thick woodland, the bird may fly as little as a few metres between successive perches; in open woodland, where the view is wider, it may fly 50 m or more; and in open country the bird usually proceeds from one tree or patch of cover to the next, whatever distance is required. At each stop, the bird pauses for a few seconds or up to several minutes. It usually sits well hidden in the top third of a tree or bush, and peers out. On leaving, the bird dips down, flies low over the ground, and at the last moment swings up to perch in another tree. This flight is both energy saving and concealing. As the bird leaves, it uses the momentum of the fall to build up speed along the ground and slows itself by rising abruptly to the next perch. The bird is concealed because for most of the route it is close to the ground. This was the usual searching technique used by all but one of our 57 radio-marked birds. It would have been impossible to record this properly without the help of radios.

Attacks on prey vary according to circumstance. If the hawk gets close to its quarry, it may approach in a *direct flying attack*, travelling at full speed straight towards the target; the hawk makes no attempt to conceal itself, and relies on overtaking the prey before it can escape. Distant prey are approached more stealthily, in a *indirect flying attack*, in which the hawk takes advantage of any cover or ground contours to hide itself. As it leaves cover, it typically gives a few quick pumps with its wings to clear foliage and build up speed, and then makes as much of the approach as possible on a glide, the still wings further reducing the chance of detection. The victim may be snatched from the ground or a perch, but more often it sees the hawk at the last moment, and is seized in mid air as it tries to escape. It is at this stage that the quick reactions and agility of the hawk are put to good effect, as it twists and turns to grab its fleeing prey. The concentration by the hawk at the time of attack must be extreme, because every move in the prey seems to be anticipated and countered. Small prey may be taken in one foot, but both feet are needed to subdue large prey.

Three outcomes of an attack are possible: either the prey is caught, or it flees and the hawk follows in a *tail chase*, or the prey escapes and the hawk gives up. In tail chasing, falconers have observed that experienced accipiters often follow in a bird's blind spot, below and just behind, then swing up to seize the prey after a short burst of acceleration (Jack 1971, Fox 1981). If the first attempt to grasp the prey fails, the hawk may swing up for a second stoop, or even a third, but it seldom follows its prey for more than about 30 m into the air. In this sense, the open sky is as much a refuge for the prey as is cover.

High soaring and stooping

One radio-marked hen hunted mainly by stooping on prey from a high soar. She would circle up to just beyond the range of human vision, and then stoop almost vertically down, with closed wings, to attack a Starling flock passing below. She did this repeatedly during the week I was following her, but I only once saw her kill. In this case she dived through the flock, then swung up again, turned upside down and grabbed a Starling from below. This enabled the hawk to take advantage of her upward momentum, and avoid the impact of a full-bodied strike. It was another technique which I might not have seen without the use of a radio transmitter, but it has been described by other observers (Rudebeck 1950).

Several times I saw different Sparrowhawks circle up to more than 100 m, and then suddenly leave on a long downward glide. Each time the descent was swift, and possibly enabled the hawk to get close to prey in open country, away from perches or cover, as trained Sparrowhawks occasionally attack in this way. Diving approaches are thus of two types: the almost vertical stoops at airborne prey, and the slower and shallower dives to reach prey on or near the ground. In both types the hawk proceeds headlong without flapping its wings, and throws its feet forward at the last moment to seize the prey; no attempt is made at concealment but, because of the height

and speed of attack, some degree of surprise is presumably gained (Fox 1981).

Contour-hugging flight

Sparrowhawks fly fast and low along wood edges, riversides and hedgerows, continually slipping from one side of a hedge to the other, ready to take any small bird by surprise (Owen 1932, Pounds 1936). This is the hunting technique which is seen most often, but it was used relatively little by our radio-marked birds. Probably in many such hedge-hopping flights, the hawk has already seen its victim beforehand, perhaps from as much as a kilometre distant. Only this would explain why the hawk manages to emerge from cover just at the spot where the intended victim is sitting. Nonetheless, the hawk seems also to attack small birds which are encountered by chance as it flies from one perch to the next.

Similar flights occur at the level of the canopy in woodland, especially where tree-feeding birds, such as Crossbills*, abound. The hawk moves slowly over the trees, and makes a dash at any bird caught unawares. Flights of this type were seen when Sparrowhawks attacked tit flocks near Oxford (Morse 1973). After first appearing above the canopy, the hawk approached the flock from below. The tits were then higher than the hawk, but the moment the alarm was sounded, they all shot downwards to low vegetation. Of five attacks seen, one was successful, and another probably so; two failed because the tits flew down before the hawk could strike, and the fifth because the tit concerned darted behind a tree trunk at the last moment. After each attack the hawk left immediately, and the tits resumed feeding.

Still-hunting

The hawk sits concealed near pools or other places visited by small birds, and waits for one to approach. In my experience this is not a frequent method of hunting. When our radio-marked hawks were feeding young, and presumably hunting at near maximum capacity, they moved around almost all the time in active search, and spent little time in one place. Still-hunting is often hard to distinguish from resting, especially as a bird may do both together. However, still-hunting does seem to be used as a technique in its own right in open areas with no cover, where the best chance of the hawk getting close to prey is to remain still. On extensive coastal flats, Sparrowhawks sit on the ground for long periods, leaping into flight to attack small birds which pass by.

Low quartering

The hawk flies slowly, just above stalling speed, 1–3 m above the ground, with head angled down, apparently searching, before suddenly dropping on prey, with legs extended. I have seen Sparrowhawks use this flight along a hedge top where fledglings were perched, and above rough grass where voles occurred, and also when trying to re-locate adult birds which had gone into cover. Indeed, Sparrowhawks probably use this technique mainly when

* Scientific names of prey species are given in Table 17.

they are searching for something they know is there, because the flight is often repeated over the same spot, and interspersed with sitting and watching. They are less good than harriers at low quartering, for their wing-loading is greater and they cannot fly so slowly without stalling; nor can they hover in one spot like a Kestrel, at least not for more than a moment or two.

Hunting by sound

Sparrowhawks can recognise sounds which indicate food. Both they and other accipiters can be attracted to bird distress calls, or to artificial sounds which resemble them. They sometimes appear at mist nets when the birds which are being extracted begin to call. Fox (1981) described how his captive hawks approached prey which they could evidently hear but not see. Typically, the hawk approached the noise slowly in short flights, appearing alert (supposedly listening) at each stop. It did not necessarily take the most direct route, but moved so as to remain in cover and get as close as possible without being seen, before moving in to attack. At other times, the hawk dived at a patch of cover where it could hear prey, causing the prey to fly, or at least to flinch, revealing its position to the hawk, which then swung in to attack.

Hunting on foot

Although most attacks are probably made on the wing, Sparrowhawks also approach prey on foot. In thick spruce woods, they will hop and run from branch to branch apparently searching for nestlings, and in open fields they will run along the ground to approach prey hidden behind low vegetation. Naunton (1973) saw a male travel on foot for 50 m up a path in a weedy field, apparently to get close to a finch flock.

Some general points

The technique used at any one time depends on the terrain and the prey, but the overriding feature of most of the Sparrowhawk's hunting behaviour is self concealment. This can range from such obvious tactics as keeping in cover until the last moment, if necessary taking a circuitous route, to more subtle tactics, such as flying close to the ground, and keeping a tall plant between itself and the prey, or positioning itself with the sun behind it in its flight towards the quarry (Fox 1981). Some of these tactics have been seen only with falconers' birds, as there would be little chance of observing wild birds in such detail.

Sparrowhawks sometimes persist in chasing their prey into buildings or bushes, and indeed many individuals die from collisions with obstacles (Chapter 22). I have several times seen juveniles fluttering at thick hedges, reaching in and trying to seize some songbird which had taken refuge there. One bird sat for 20 minutes on an isolated bush, where a thrush had taken retreat. I eventually scared the hawk away, but even then the thrush was reluctant to leave. On another occasion, Brian Etheridge caught by hand a juvenile Sparrowhawk which was spread-eagled on a hedge top, holding

at legs-length a screaming Blackbird which it was unable to pull out. The hawk was so preoccupied that it did not notice his approach. Normally, however, if a small bird can reach cover which is impenetrable to a hawk, the bird is safe whether or not it is hidden. Barnard (1979) described how a House Sparrow, chased into a hedge, instantly 'froze' and became silent. It remained thus 'until the hawk struck, whereupon it quickly dodged a short distance (4–5 cm) to either side of the line of strike and froze again; this behaviour was repeated during all strike attempts'. Although the hawk and Sparrow were only about 30 cm apart, the Sparrow was protected so long as it stayed in the hedge.

According to falconers, it is in the art of self concealment that experienced adult hawks clearly excel over young ones. The latter are much more likely to make a direct flying attack at the prey from too great a distance or in full view, so that the prey escapes. Experience also teaches a hawk when to give up. Young hawks, after a failure to catch prey, may persist with strike after strike in what, to the human onlooker, seems a hopeless situation, whereas adults usually leave immediately to try elsewhere (Barnard 1979). Young hawks flown by falconers also learn how best to attack a particular prey without injuring themselves. They learn, for example, to grip a young Rabbit at the head end, so as to avoid a kick from the hind legs. In captive hawks, Fox (1981) found no difference between adult and young in the percentage of attacks that were successful, but thought that the adults, because of their greater skill, could exploit a wider range of opportunities. This is a plausible idea, but hard to test objectively, because of the problem of defining an 'opportunity'. If it held in wild birds, however, adult hawks could survive in situations where young could not.

Although Sparrowhawks usually forage alone, hunting in pairs has been reported, with one bird driving prey towards another, or both chasing the same item (Bernt 1970, Naunton 1973). Such instances may have resulted from genuine co-operation, or from chance events with two birds in the same place simultaneously. For where prey birds gather in large numbers, they often attract more than one hunting hawk. Thus at the large Starling roost at Leighton Moss (northwest England), up to five Sparrowhawks have been seen in the air at once, and on some occasions seemed to benefit from one another's presence.

Attack success

Little information is available on attack success, apart from that obtained by Rudebeck (1950–51) at Falsterbo in Sweden. At this bird observatory, hundreds of Sparrowhawks and other birds pass each autumn on migration. Over several years, Rudebeck saw 190 attacks by Sparrowhawks on potential prey, of which only 12% resulted in capture. Attacks were not always easy to discern, as some consisted of no more than a slight deviation in flight. They may therefore have been more frequent than recorded, and attack success correspondingly lower. The commonest type consisted of a short fast chase after prey taken by surprise; but some long-distance attacks, long

chases, long stoops, and attacks on mobbing birds were also seen (Table 15). Most attacks were on birds which were perched when first encountered; very few were on birds already in flight, and these almost always failed, partly because such birds had freedom of movement in the airspace, and could outmanoeuvre their pursuer.

SPECIALISATION IN DIET

Individual raptors are often said to specialise on particular prey, taking many more than the average for their species in the area. This idea comes partly from falconry experience and partly from the differences in diet which can sometimes be found between neighbouring pairs. Such differences in Sparrowhawks were always linked with local variations in the abundance of particular prey, so that the hawks were not selecting differently from the same spectrum of prey, they were merely taking whichever species were most available locally. However, two types of behaviour may lead to apparent specialisation, at least in the short term. First, individual Sparrowhawks often return to where they made a previous capture, and if only one species is available there, this will result in a temporary run of that species in the diet. Secondly, individuals sometimes develop particular techniques of prey capture, which make certain prey more available than otherwise. The radio-tagged female which hunted by stooping at flying prey took many more Starlings than other females breeding in the same wood. Similarly, one individual among the several studied by Tinbergen (1946) took many nestlings, including those of hole-nesters. This bird had probably developed for itself a special technique of nest finding. In general, however, any local, seasonal or annual variations in the diet of Sparrowhawks could usually be attributed to parallel variations in the range of prey available.

KILLING AND EATING

Small prey items are probably killed by the impact of capture, or by being squeezed in the hawk's foot, especially by the two large claws which can each penetrate more than a centimetre. Nonetheless, some birds are not killed in this way, and twice I scared a hawk into releasing its prey, which to my amazement flew away. If the victim persists in struggling, the hawk will continue to 'knead' it, opening and closing its grip on the body, so that the victim is repeatedly squeezed and stabbed. You can feel this for yourself if you take a hungry falconry bird onto your (gloved) hand. Keep your hand still and the bird will perch quietly, but wriggle your hand and the hawk will continually shift position and squeeze with its feet. This is presumably how larger quarry are often killed.

Otherwise, Sparrowhawks have no specific action for despatching large prey. They seem merely to attempt to bring the victim to ground, hold it

down, and start eating. The long legs of the hawk enable the prey to be held at long range, an advantage in dealing with thrashing wings or jabbing bill. In a prolonged fight on the ground between a male Sparrowhawk and a Mistle Thrush, the two kept jumping up at one another, the hawk attempting to grasp the thrush in its feet and the thrush pecking with its bill. Eventually the hawk managed to stand on its victim and start eating. Some minutes later, I scared the hawk off, and found that the thrush was still alive with its flight feathers removed, and part of its wings and back eaten. Another time, I disturbed a hen Sparrowhawk from a pigeon, which after a short time flew away, with its back naked and bleeding, and some wing feathers missing. In these cases, the prey would have been killed by the act of feeding, though the early removal of flight feathers may have helped to prevent escape. To the Sparrowhawk, it does not matter whether the victim is killed immediately, only that it stays reasonably still while being eaten.

By these actions, Sparrowhawks are able to subdue prey larger than they can carry or eat in one meal. Females often kill Woodpigeons, but they cannot lift them well, only drag them for short distances along the ground. This must limit their ability to conceal carcasses, and keep them safe from scavengers. Also, being smaller than many other predators in the countryside, Sparrowhawks have little chance of protecting carcasses against marauders in the daytime, and still less against Foxes at night. They may often lose to other animals portions of the large prey items which they kill, or in winter as a result of them freezing solid overnight. Nonetheless, hawks often do return to feed on carcasses which escape the attention of scavengers, and Mick Marquiss (1981) saw a hawk kill a pigeon, feed on it, and then stand on it (possibly guarding it) for about 20 minutes, before feeding again.

Observations indicate the maximum weights of prey that Sparrowhawks can carry. A female which killed a feral pigeon was unable to carry its prey in level flight and still air; it did manage to lift the pigeon, with difficulty, for three metres over a level surface, and to carry it down a 25 m slope, but was unable to clear a 1.5 m wall at the bottom (Weir 1981). The hawk was trapped and found to weigh 340 g, with the remains of a previous meal in its crop, and the pigeon carcass weighed 430 g. Weir watched another female carrying a young Capercaillie *Tetrao urogallus*, estimated at 350 g, over a distance of one kilometre to the nest. It seems, therefore, that females can carry, with relative ease, items as heavy as themselves. Such birds as Jays and Lapwings are well below this range. Females cannot eat such prey in one sitting, but they can at least get them to a safe caching site for consumption later. Remains of Woodpigeons and other large prey are often found on hawk nests (Chapter 4). As Woodpigeons normally weigh more than 500 g, Sparrowhawks probably could not carry even severely emaciated ones. So the remains on nests must presumably come from individuals which are killed nearby, and partly eaten or dismembered beforehand. Male Sparrowhawks, which weigh about 150 g, can probably also carry prey as heavy as themselves. Their range certainly includes Mistle Thrush and Fieldfare, which weigh around 120 g. When in flight Sparrowhawks carry prey tucked

close under their belly near the centre of gravity. This is aerodynamically most efficient.

A hawk normally plucks its prey on a stump, log or other low mound, or occasionally on a horizontal branch or old nest in a tree. The hawk stands on its victim to hold it down, and pulls out bunches of feathers in its bill. On the ground, the site of action often appears afterwards as a circle of feathers, around where the hawk stood. From small prey, the hawk eats all parts of the carcass, and leaves only feathers, but from large birds it often leaves bill, legs or other remains, and occasionally the gizzard or a piece of gut. From really large prey, a hawk leaves other parts of the skeleton too, including the shoulder girdle with wings and primary feathers attached, and occasionally also the sternum, often notched where pieces of bone have been bitten out. Sometimes whole eggs are discarded from the bodies of victims. From mammals, the hawk leaves fur or pieces of skin with fur attached, and occasionally the guts and tails of small rodents and the feet and legs of young Rabbits and other bone remains from larger mammals.

When a Sparrowhawk is feeding a mate or small young, it normally plucks a prey completely before handing it over, but when feeding itself, it plucks and eats at the same time, removing the feathers as it comes to them while eating. This is another time when Sparrowhawks are vulnerable to food-robbing, either by other Sparrowhawks or by other predators, so this rapid eating probably serves to get as much as possible into the crop in a short time. Both the tendency to take prey to cover, and the mantling behaviour, in which the hawk crouches over its prey, with wings and tail drooped and fanned, serve to shield the prey from the eyes of potential pirates. Even large young in the nest do this, facing away from their brood-mates. Sparrowhawks always seem to bolt their prey as fast as possible, and the plucking movements are sometimes almost too quick for the eye to follow. Larger raptors, with less to fear from food robbers, eat in a more leisurely way.

In the depleted raptor fauna of Britain, it is easy to underestimate the importance of food-robbing in the time between catching and eating, as it is seldom seen, but I have watched Sparrowhawks being robbed by other Sparrowhawks, as well as by Kestrels and Crows. In North America and Africa, where the raptor fauna is more intact, there are records of individual prey passing through the clutches of up to five different raptors before being finally consumed. No doubt food-robbing has been important in the evolution of Sparrowhawks, and may account for much of the eating behaviour we see today.

Occasional large meals, separated by long fasts, are typical of many raptors, in striking contrast to most other birds, which take numerous smaller items and spend much of each day eating. To cope with large meals, Sparrowhawks have a capacious crop, which in the male can hold up to 35 g (35 cc) of food, and in the female up to 45 g. With a further 10 g in the gizzard, a male can hold up to one-third of its body weight in fresh food, and the female up to one-fifth. Having eaten, a hawk then has to wait until the food has passed down the gut before it can feed again, and a bird with

a full crop usually does not even attempt to hunt. Gorging is common among predators and allows them to make good use of their larger kills.

Sparrowhawks seem to eat most of their prey near where they caught it, but in the breeding season they carry items to the nesting place. Plucking posts there soon become covered with feathers from prey, but considering the number of birds that are killed during the breeding cycle, only a small proportion are plucked near the nest. When providing food for females or small chicks, male Sparrowhawks remove the head from each victim, as well as the feathers, so that the female is presented with a naked, headless food item. I do not know whether the male does this because he likes to eat the heads himself, or because they are difficult for the female with small chicks to deal with. Either way, considering the number of items killed for small chicks, the males themselves at this stage could live chiefly on heads.

SUMMARY

To catch their prey, Sparrowhawks rely largely on concealment, getting as close as possible before making a short swift attack. The main searching method is short-stay-perch-hunting, in which the bird moves through woodland, from perch to perch, at each pause briefly scanning its surroundings for prey. Other hunting methods include the 'contour hugging' flight in which the hawk flies swiftly along hedges or other lines of vegetation on the chance of surprising a victim, and stooping from a high soar onto prey in the open. Slow quartering (like a harrier) is seldom practised, and still-hunting is probably practised mainly in open habitats. Both sexes can carry items as heavy as themselves; they pluck prey before eating, and from larger victims they leave some bones and other parts. Some aspects of feeding behaviour, including choice of feeding sites, caching, fast-eating and gorging, probably help to reduce the chance of food-robbing.