SIMULTANEOUS ACTION OF BIRDS: A SUGGESTION.

BY WINSOR M. TYLER, M. D.

THE House Sparrow (*Passer domesticus*) affords a good example of a habit common among Fringilline birds when gathered in flocks, the habit of all starting up as one bird from their feeding ground and returning almost immediately from perches near by, singly or a few birds at a time. On any day between November and March, in town centres where House Sparrows congregate, large numbers of these birds may be watched going through this interesting manœuvre.

At sunrise on the morning of December 29, 1912, more than a hundred Sparrows were feeding in the snow-covered street which passes through the centre of Lexington, Mass. Over the space of an acre or two, the birds were collected in half a dozen flocks at points in the street where food was plenty. Although busy filling their crops after a fifteen-hour fast, they remained on the ground scarcely a full minute at a time; without apparent reason, and with no warning note that I could detect, a flock whirred away into the elm branches overhead and within a few seconds the birds began gradually to re-assemble at the place they had just left. Other flocks did precisely the same thing. The instant departure of a large flock is impressive; there is no frightened start of one bird, the others trailing on behind; the birds rise with the suddenness of a rifle's crack.

The birds fly back and forth between the street and some near cover so frequently that they spend perhaps no more than two-thirds of the time in feeding. When they rise in a body it happens rarely that one or two birds do not leave with the others, but feed on, undisturbed by the precipitous flight of the majority. Individual action is occasionally shown also by a single bird, who flies off to join another flock. This flying off of one of their number has apparently no effect on the remainder. Individual action, although occurring in members of a flock of feeding Sparrows, is the exception; as a rule the flock moves as a unit.

As one watches the Sparrows leave their feeding ground time

after time, apparently without cause, but of their accord, one cannot help believing that some purpose, perhaps unknown to the birds themselves, underlies these interruptions. But more mysterious than the purpose of these sudden risings, is the means by which a large number of Sparrows decide, with the unanimity of a single bird, to fly up.

One's first thought is that the birds in a flock start in response to a note of warning given by one of their number. It is not necessary to suppose a leader; any bird perceiving danger, or fancying that he perceives it, might sound a warning which would arouse his companions to retreat. That a man, even although he stands very near a flock of birds, seldom, if ever, hears an alarm note,— or indeed any note at all,— is no proof of the absence of a signal. However, one feels a little skeptical when he considers the almost incredibly rapid response to a hypothetical signal inaudible to human ears. I believe also that the Sparrows themselves give more positive indication that in their concerted actions they do not, or need not, depend on signals. It is a common habit of the House Sparrow when gathered together, often in large companies, to chatter or scold. Each bird repeats for minutes at a time his "chape" or "chillip" note, adding his voice to the din of the chorus. These choruses often end on the instant. No orchestra leader could more quickly silence the instruments under his control on one beat, yet, in the case of the Sparrow, it is unbelievable that an alarm note could be heard above the general uproar.

There is another point which counts against the practicability of a signal. It is chiefly when large numbers of Sparrows are assembled in a flock that the sudden uprisings are conspicuous. One might almost say that the unanimity was directly in proportion to the number of birds present. That this proportion would *appear* to hold is self evident,— for the larger the rising flock, the greater the impression on the eye; but a little observation will show that a small flock of Sparrows acts in a very different way. A small flock of House Sparrows will generally remain feeding in the street until they are frightened away, and then they will leave the feeding ground severally, a few birds at a time. Those nearest the approaching danger, or the most timid, start first, to be followed successively by the remainder. Here are the very conditions under

which a signal could best be heard,— very few birds make up the flock and all could hear the signal, but instead of simultaneous action there is individual alarm.

It is possible that fear may be communicated throughout a large flock by any one of their number starting up in alarm, but that this explanation is always, or even often, responsible for the uprisings is improbable on account of the regularity of the retreats to cover.

The behavior of the individuals composing a flock of Sparrows, as opposed to their movements "en masse" is well seen if one slowly approaches a flock at rest in shrubbery. Now, the birds gradually withdraw; each bird as he feels himself in danger, retreats. He at first hops deeper into the bushes and later, perhaps, flies. One bolder than the others, may remain alone near the danger even after the others have flown. Under these circumstances the birds act just as one would expect any company of individuals to act at the approach of danger; — when threatened each individual seeks safety. It is true that in the movements as a body, each individual may be seeking safety, but here there is a difference; each bird in a large flock starts at the same instant and, until perched, acts exactly as his companions do. It is possible that sometimes the birds are really frightened away, but, in that case, they act as if they all perceived the danger and reacted to it as a unit. This instant response is clearly distinct from the straggling retreat from a passing carriage.

I was interested to note, some time ago, the behavior of a large flock of birds collected in an open field with no cover near. Although the birds were not House Sparrows, they belonged to species in which the habit under consideration is well marked. The note indicates that the proximity of shelter, which might act as a stimulus to retreat, is not responsible for the interruptions while feeding. "Feb. 7, 1911. Twenty Goldfinches and more than twice as many Redpolls are feeding on the snow upon weed-seeds. This large flock of nearly a hundred birds is spread out over half an acre of meadow land where the weed stalks, sticking thickly through the snow, afford abundant food. In spite of the plentiful supply of food, the birds are restless and keep starting up and alighting at once near by, but there is not, as noted previously, a general movement of the flock in one direction; the flock as a whole is stationary.

Also, until I make the birds apprehensive by coming near them, there is no flying off to cover and back as I have noted in Juncos and Tree Sparrows. However, in this case there is no cover near." These birds showed the same uneasiness, the same tendency to fly in numbers from their feeding ground as noted in the House Sparrow, but here, with no cover to retreat to, they merely started into the air and at once settled quietly among the weeds.

When House Sparrows and certain other birds of similar feeding habits are assembled in flocks, they may act in two ways,— individually and as a unit. When they act individually, we understand their behavior well enough; they act much as we should under the same circumstances; they are quite human. But when we see a hundred birds acting as one, and watch them as, without warning, they start on the instant and whir away like leaves in a gust of wind, we must needs believe that some superhuman force is at work among them. Can it be that, for a time, each of the hundred little brains forms a part of a common mind which, ever watchful for danger, only recognises it in the abstract and periodically drives the flock to seek shelter? This hypothesis is consistent with the facts; it would explain otherwise meaningless interruptions of feeding as well as the instantaneous flights, without signal, of busily occupied birds.

If such is the case,— if a subconsciousness of danger hangs over each large flock while feeding,— the birds are, or seem to be, uninfluenced by it and unaware of it until, like an explosion, it throws them all into the air; as if the common mind governed a single body instead of a hundred.

In addition to the sudden risings from their feeding grounds, birds often display unanimity of behavior on other occasions. The simultaneous action of birds in rapid motion is well illustrated by closely-packed companies of flying Sandpipers. Each bird, when the flock changes its direction, escapes collision with its neighbors by turning at the same moment, in its tracks, so to speak. If a flock of Sandpipers changed its direction as a train of cars rounds a curve (each car swinging to one side only when it reaches the curved portion of the track) simultaneous action in the birds would not be required; each bird in that case would *follow the example* of the bird immediately in front of him. Flocks of Sandpipers, however, do not wheel in this way, or they do not always do so. Any

one can satisfy himself on this point by watching a flock of *Ereunetes pusillus*, for example, flying past in bright sunlight. At first, if you are between the sun and the birds, their white underparts shine out as the light strikes under the raised wing; later, in the distance, the birds appear as a group of flickering bright spots,— until the flock turns. Then, in an instant, every bird disappears; each has turned away at the same moment and presents to the eye only the narrow edge of the wings and the smallest diameter of the body,— invisible in the distance.

One advantage of maintaining a food-shelf is that the birds which visit it, after they have fed, often remain near and afford excellent opportunities for study at close range, while the birds are entirely at ease and wholly unconscious of being observed. At such times they sometimes display traits and habits which under other circumstances, even after long acquaintance, they will not have shown. For example, in the winter, after a little band of Chickadees have satisfied their hunger at my food-shelf, they often spend half an hour or so in the shrubbery and arbor-vitæ trees eight or ten feet from the window. As a rule, they call cheerily to each other; sometimes, however, there comes a sudden hush,— every bird has become silent and perfectly motionless. For minute after minute, by the watch, the birds hold their quiet, and seemingly rigid, attitudes. I have timed them thus for eight minutes. It is difficult to find them as they sit as if frozen to the twigs; they are perched here and there, widely separated, some half-hidden in the evergreens, others exposed on bare branches. At last the stiff pose gradually gives way; one bird begins to move his head,— to look about a little from side to side. Every other bird is acting in the same way; now all are hitching slightly on their perches, some of them uttering their conversational notes in an undertone; now one or two give a rapid jingling call and hop from their perches; the spell is broken; the frozen statues are once again living, active, wide-awake Chickadees.

The point of especial interest here is the identical behavior of the birds,— their prolonged immobility, their silence, their quick passage from death-like stillness to activity. Although, to be sure, the transition occupies several seconds, the birds pass through it simultaneously (as nearly as the eye can follow their movements)

and not one after another. Naturally the commencement of the stillness is rarely observed,— I can only say that it takes place quickly,— but the period of immobility and the liberation from it I have seen often. Not a bird moves until the spell is broken, and when the release comes, it comes at once to every bird.

These Chickadees, very likely, are resting while they digest their recent meal, but that the necessity for rest should come to each bird at the same instant and persist for exactly the same time implies something more than chance; it suggests a relationship between the members of the flock, similar to that which, binding together a flock of Sparrows, enables them to start into the air in a body. The life of a bird is made up of cycles; in the great yearly cycle, which includes the breeding period and moult, preceded and followed by migration, birds over wide areas of country act (owing probably to physiological reasons) in fairly close unison. But how much closer must be the relationship between the members of a flock of birds in the daily cycle, during the winter months, when, with sexual jealousies dormant, they roam about amicably in search of food! Is it not possible that the need of food, the desirability of rest and the necessity for a safe night's shelter is perceived by the flock as a whole; that, acting as a unit, the sum of the intelligence of all the members of a flock keeps the company together, provides it with food and maintains a continuous watch for danger?

Psychologists recognize in the human race a subconscious power of thought-transference which, although proved beyond a doubt to exist, is rendered uncertain and made difficult to study because it is obscured and held in check by our "objective" mind,— our every-day, reasoning, thinking mind. This psychical power, telepathy, is defined as "the conveyance of thought or feelings from mind to mind by other than ordinary channels of sense." (Encyclopædia Britannica, 11th Ed., Vol. XXVI, p. 546).

When we realize that in animals the objective mind,— the barrier to telepathic action,— is, compared to our minds, slightly developed, is it not only possible, but even probable that birds possess greater telepathic power than man (to an extent inversely proportional, perhaps, to the development of their respective reasoning — objective — minds) and that this telepathic power is responsible for their concerted actions?