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Testing a Return-Anticipating Dog, Kane

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Introduction

Many dog owners claim that their dogs know when they are coming home, as shown by their waiting at doors, windows or gates (Sheldrake 1994, 1999a). In random household surveys in Britain (Sheldrake and Smart 1997; Sheldrake et al. 1998) and the United States (Brown and Sheldrake 1998) an average of 48 percent of the dog owners said their animal anticipated the return of a member of the household. A fifth of these dogs were said to show their anticipation more than ten minutes in advance. Many dog owners claim that this behavior occurs even when the person returns at an unusual time and when the people at home do not know when they are returning (Sheldrake 1999a). Similar anticipations of people's returns have also been reported in cats, horses, parrots, geese and several other domesticated species (Sheldrake and Smart 1997; Brown and Sheldrake 1998; Sheldrake et al. 1998; Sheldrake 1999a).

Nothing is known about the function or the evolutionary origins of this behavior.

Although such claims are common, they are generally dismissed as anecdotal, or treated as the products of selective memory or wishful thinking on the part of pet owners. But almost no research has been carried out on this subject. What if some companion animals really do show anticipatory behavior before their owners return? Could this be explained as a response to routine, or to clues from people at home, or to the sound of familiar footsteps or vehicles, or because of a tendency to go to the window for reasons unconnected with the owner's imminent return?

In more than 200 trials with a dog called Jaytee, it was found that on 80 percent of the occasions when his owner went out, the dog anticipated her return by going to wait for her at a window (Sheldrake and Smart 1998; 2000). Jaytee usually began to wait just before the time she set off, to come home. Her journeys lasted more than ten minutes and were from places more than nine km away. He still anticipated her returns when no one at home knew when she would be coming, and when she travelled in unfamiliar vehicles such as taxis (Sheldrake and Smart 1998). He also anticipated her returns when he was left on his own (Sheldrake and Smart 2000).

In a series of 12 videotaped trials in which his owner returned at randomly-selected times, communicated to her by means of a telephone pager, Jaytee was at the window, on average, four percent of the time during the main period of his owner's absence and for 55 percent of the time when she was on her way home (Sheldrake and Smart 2000). This effect was highly significant statistically ($p<0.0001$).

The same dog was tested independently in four separate trials by skeptics, who claimed that the dog had failed to signal his owner's return (Wiseman et al. 1998). But their claim depended on an arbitrary criterion based on two minutes of the dog's behavior, rather than taking into account all the data. When their published data were plotted on graphs , they showed the same pattern as has been reported previously (Sheldrake 1999b). In their trials, during the first ten minutes of his owner's return journey Jaytee was at the window for an average of 78 percent of the time, compared with four percent of the time during the main period of her absence, and this difference was statistically significant ($p=0.02$) (Sheldrake and Smart 2000). For further discussion of these results, see Sheldrake (2000) and Wiseman et al. (2000).

The data collected on Jaytee showed that his anticipations could not be explained in terms of routine, because he still anticipated his owner's return when she came at non-routine, randomly-selected times. In addition, his responses could not be explained in terms of picking up cues from people at home, because they did not know when his owner would be returning. Jaytee also reacted when he was alone. Nor could his anticipations be explained in terms of smell or hearing, because he began to wait by the window when his owner was more than nine km away, and did so even when she was travelling in unfamiliar vehicles (Sheldrake and Smart 2000).

In view of the wide-ranging implications of these studies with Jaytee, it seemed important to find out if the same kind of behavior could be observed in other dogs. Could these results be replicated with a different dog and a different owner? The purpose of this study was to determine just that.

Methods

Dog, Owner and Environment

A suitable dog for study was located by publishing an appeal in a local newspaper expressing an interest in carrying out experiments with dogs that seemed to know when their owners were coming home. The owner of a male Rhodesian ridgeback (Kane, 18-months-old), responded. Kane's owner, Sarah Hamlett (SH), a student, lived in Middleton, a town in Greater Manchester, England with her partner, Jason Hopwood (JH). Several months prior to the study, JH noticed that Kane seemed to know when SH was coming home. The dog would look out of a window when SH was on her way home, standing on his hind legs with his front paws resting on a table in front of the window. The window that Kane looked out of overlooked the road on which SH approached their ground-floor flat, but the road was partially obscured by a hedge, and approaching cars were visible only when they were less than 100 m away.

Most of the time that SH was out, her partner JH was in the flat, but on some occasions (noted below) he too went out.

In addition to Kane, there was also a female Rhodesian ridgeback puppy called Kirah living in the flat, unrelated to Kane. This puppy was 14-weeks-old at the time our trials began in July 1998, and had little or no influence on Kane's visits to the window.

Trials

A series of ten pre-planned trials was conducted from July-October, 1998. For these trials SH travelled at least eight km by car, and while she was away from home the area by the window was filmed continuously on time-coded videotape by a camera mounted on a tripod. Using a long-play tape and with the camera in the long-play mode, up to four hours of continuous recording were possible without

anyone needing to attend to the camera. The camera was set up and switched on by one of us (PS), sometimes just before SH set off, and sometimes after she had left the house. Having set up the camera and switched it on, PS left the house and did not return until the experiment was over. The owner herself noted down the time at which she set off on her homeward journey. She travelled in her own car, and switched off the camera soon after her return.

In the trials, SH came home at non-routine times from a variety of places more than eight km from her home. As a student, she had to attend college at different times of day, and also went to visit her horse, work in her father's shop and do voluntary work in a several veterinary clinics. SH did not tell either PS or JH when she would be returning; indeed she herself did not usually know in advance.

In three of the trials SH set off at times randomly selected by PS after the experiment had begun and communicated to her by means of a telephone pager. PS was 14 km away from SH's house when she selected the return times. These times were within a prearranged period (60 minutes long), which was divided into six equal intervals; one of these was selected at random by throwing a die, and a bleep on the pager was given by PS to SH at the beginning of this interval.

The details of the individual trials were as follows:

Returns at non-routine times

1. July 21. SH left home at noon and drove 9.5 km. PS set up the camera and started recording at 14:49 hours. (JH went out at 15:15 hours and returned at 16:08 hours.) SH set off to go home at 17:10 hours and arrived at 17:29 hours.

2. July 29. SH left home at 12:29 hours, when the camera was already switched on. Drove 11 km. Set off to go home at 14:50 hours and arrived at 15:13 hours.

3. August 12. SH left home at 11:01 hours when the camera was already switched. Drove 8 km. Set off to go home at 13:31 hours and arrived at 13:50 hours.

4. August 26. SH left home before noon and drove 9.5 km.. PS set up the camera at 14:01 hours. (JH went out at 15:25 hours and returned at 16:20 hours.) SH set off to go home at 16:49 hours and arrived at 17:12 hours.

5. September 3. SH left home at 10:45 hours and drove 9.5 km. JH set up the camera at 11:14 hours. She set off to go home at 13:29 hours and arrived at 13:43 hours.

6. September 22. SH left home at 09:50 hours and drove 11 km. PS set up the camera at 10:10 hours. Set off to go home at 13:15 hours and arrived at 13:27 hours.

7. October 7. SH left home before 11:25 hours and drove 27 km. PS set up the camera at 11:48 hours. She set off to go home at 14:10 hours and arrived at 14:53 hours.

Returns at randomly-selected times

1. September 10. SH set off at 10:16 hours when the camera was already switched on and drove 8 km. She was carrying a telephone pager and was told that PS would bleep her at a randomly-selected time between 12:00 and 13:00 hours. PS paged her at 12:20 hours and she set off at 12:23 hours, arriving at 12:34 hours.

2. September 17. SH set off at 10:28 hours when the camera was already switched on and drove 8 km. She was carrying a telephone pager and told that PS would page her at a randomly-selected time between 12:00 and 13:00 hours. PS paged her at 12:50 hours and she set off at 12:51 hours, arriving at 13:04 hours.

3. September 30. SH left home at 1029 hours when the camera was already switched on and drove 10 km. She was carrying a telephone pager and told that PS would bleep her at a randomly-selected time between 12:00 and 13:00 hours. PS paged her at 12:30 hours and she set off at 12:31 hours, arriving at 12:45 hours.

Analysis

The analysis of the videotapes was carried out "blind" by an independent rater, Dr Amanda Jacks (AJ), who did not know when SH set off to come home or other details of the trials. The videotapes were viewed in the fast-forward mode for the long intervals in which Kane was not at the window. When he was seen going to the window, the tapes were rewound so that his movements could be studied in detail. His movements were recorded by writing down the exact times (to the nearest second) when he was standing with his front paws on the table by the window, and the exact times at which he left the window at the end of each visit. This pattern of behavior was distinctive and unambiguous (Fig. 1). At other times he did not stay near the window; he was usually either out of the field of view of the camera, or lying on a sofa (Fig. 1). The videotapes were also analyzed independently by PS; her scores agreed very well with those of AJ, showing occasional differences of only a second or two. The overall difference between the scores from the two scorers was only 0.6 percent. However, only AJ's scores were used in the compilation of the results shown below.

Two pre-planned methods of analyzing the data, as in our previous study (Sheldrake and Smart 2000), were used. First, for each trial, the percentage of the time that Kane spent by the window was calculated for three periods:

1. The first ten minutes after SH was paged, when she was on her way home (the "return period"). All homeward journeys lasted at least 11 minutes, counting from the time that SH set off by car. Thus, Kane's reactions in the last one or more minutes of SH's journey were omitted from the analysis in case he could have been responding to the sounds of her car approaching. In two cases where the journey time lasted for more than 23 minutes but less than 33 minutes, the percentage of time for the combined first and second tenminute periods of the return journey was also calculated, and similarly in the case where the journey time was over 43 minutes, the percentage of time for the combined four ten-minute return periods was calculated. In separate analyses, the results were also analyzed by including only the first or the last of the ten-minute periods during her homeward journey.

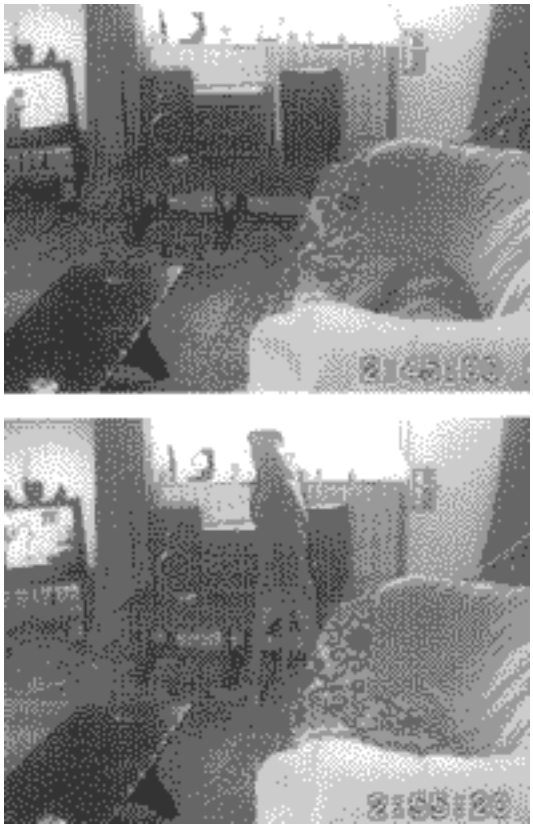


Figure 1. Pictures from the videotape of the trial conducted on July 29. Above: Kane lying on the sofa five minutes before SH set off to come home. Below: Kane at the window five minutes after SH set off homewards, 18 minutes before she arrived.

2.The ten-minute period prior to SH's return (the "pre-return period").

3.The time when SH was absent prior to the pre-return period (the "main period"). Because the trials varied in length, the length of the main period recorded on videotape ranged between 120 and 180 minutes. (In some cases, as noted above, recording began after SH had left home, and the behavior of Kane before the recording began is of necessity omitted from this analysis.)

The percentages of the time that Kane spent by the window in these three periods, the main period, the pre-return and the return period, were analyzed statistically by a repeated-measures analysis of variance (ANOVA), and comparisons of pairs of periods were made using the paired-sample t test.

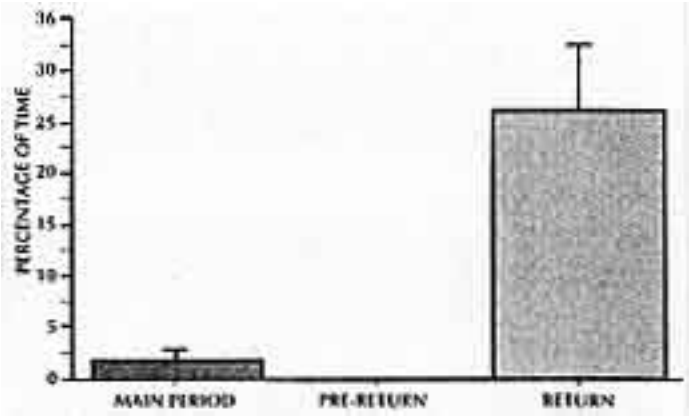


Figure 2. Mean percentage of time spent at the window by Kane during the main period of SH's absence, during the ten minutes prior to her setting off to come home ("pre-return") and during her homeward

journey ("return"). Standard errors are indicated by bars.

The second method of analyzing the data also involved ten-minute return periods, but the main period was also divided up into ten-minute intervals, defined in relation to the time at which SH set off to come home. The total number of seconds that Kane spent by the window in each of these ten-minute periods was then plotted on graphs, so that the pattern of his behavior could be examined in detail. In five trials, SH departed before the camera was switched on, and hence the first part of her absence was not recorded. The periods were numbered from the time she left home, but the points on the graphs (see Results) begin only when the recording began, namely at period 3 on Sept 22 and Oct 7, at period 4 on Sept 3 and Sept 10 and at period 18 on July 21.

Results

Kane's visits to the window were unmistakable and unambiguous. He stood with his forelegs resting on the table so that he could see out (Fig. 1) and he was clearly alert and attentive. When he was not at the window, he was either out of the field of view of the camera, or resting or sleeping on the sofa. The detailed records of Kane's visits to the window are shown in Appendix 1.

Kane spent a significantly higher proportion of the time at the window when SH was on her way home than when she was not $F(2,18)=14.51$, $p=0.0002$). By the paired-sample t test, comparing the main period and return period, the difference was also strikingly significant ($t(9)=3.85$, $p=0.004$). During the main period of SH's absence, Kane was at the window an average of only 1% of the time.

By contrast, he was there for 26% of the time during the return period (Fig. 2). He did not go to the window at all during the ten-minute pre-return period.

In addition, we analyzed the data in two alternative ways. In two trials, the return period consisted of two ten-minute periods, and in one trial there were four ten-minute periods. When there was more than one tenminute period while SH was returning, instead of calculating the average over all tenminute periods during her return journey, as in the analysis above, we took into account only the first or the last ten-minute return period. (For seven of the trials there was only a single ten-minute return period, and so this period counted as both first and last, and was included in both alternative analyses).

Taking into account only the last tenminute return period, Kane was at the window an average of 29 percent of the time, compared with 26 percent of the time when all ten-minute return periods were included, and the significance was greater (repeatedmeasures ANOVA $F(2,18)=17.63$; $p<0.0001$; paired-sample t test, $t(9)=4.22$, $p=0.002$). With only the first ten-minute return period, Kane was at the window an average of 22 percent of the time ($F(2,18)=12.66$; $p=0.0004$; paired-sample t test, $t(9)=3.60$, $p=0.006$).

The detailed time courses of the individual trials are shown in Fig. 3. The general pattern is clear. In nine out of ten trials, Kane was at the window most while SH was on her way home. The exception was a trial (on September 17) in which he did not go to the window at all.

In three trials, on July 21, August 26 and September 10, Kane went to the window for 100 seconds or more when SH was not coming home. Were these false alarms, or was there some other explanation? On July 21, during period 22, SH's partner JH went out, and Kane appeared to be watching him leave. In period 25, JH returned, and Kane went to the window when he was approaching the house. On August 26, Kane's visits to the window again took place when JH went out and was coming back. On September

10, there were unusual loud noises outdoors when Kane went to the window, as if to see what was happening. Therefore none of these visits appear to have been false alarms, and all had obvious alternative explanations. By contrast, there were no such local explanations for Kane's visits to the window when SH was on her homeward journeys.

In three trials, on September 10, 17 and 30, SH was paged to come home at randomly-selected times not known to her in advance, and of which her partner was unaware. In one of these trials, Kane did not go to the window at all, but in the other two he went there while she was returning, just as he did in the other trials when she returned at nonroutine times of her own choosing (Fig. 3).

Another way of looking at the data is to compare the number of 10-minute periods in which Kane paid a visit to the window when SH was not returning with those in which she was. Taking all ten trials together, there were 133 ten-minute periods before SH set off to come home, and 15 while she was returning. Kane visited the window in 13 out of 133 periods when she was not returning (9.7%), and 11 out of 15 when she was (73.3%). This again shows that his visits to the window did not take place at random, but occurred with a far higher frequency when SH was on her way home than when she was not.

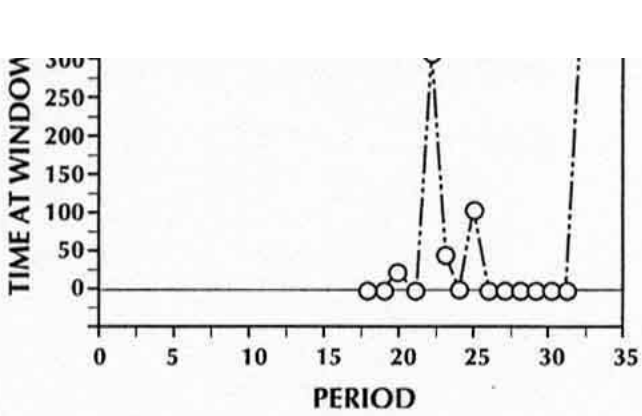
The contrast between Kane's behavior when his owner was and was not coming home was even more striking when the number of distinct visits to the window was taken into account. Before SH set off to come home, there were 16 visits in 133 periods; when she was returning there were 24 visits in 15 periods, giving averages of 0.13 and 1.60 visits per period, respectively.

One conceivable explanation for Kane being at the window when SH was coming home would be that he simply went to the window more and more the longer SH was out. If his behavior followed this pattern, then he would automatically be at the window most in the final periods, when she was coming home. An inspection of the graphs in Figure 3 shows that there was indeed a tendency for Kane to spend a higher proportion of the time at the window when SH was on her way home after longer absences than after shorter ones.

With the exception of the trial on July 29, in the shorter trials Kane tended to spend less time at the window during her returns, while in the longer trials he spent more time at the window during her returns. Why should this be so? One obvious explanation is that animals are often more excited and show more eager signs of anticipation the longer their owners have been away. With very short absences, they may hardly react at all.

Nevertheless, a skeptic might argue that Kane's tendency to spend more time at the window the longer that SH was absent supported a "going-to-the-window-more-and-more" hypothesis. However, an inspection of the graphs in Fig. 3 does not support this idea.

Although he tended to spend longer at the window when SH was on her way home after a long rather than a short absence, Kane did not show an increasing tendency to go to the window more and more prior to her return the longer SH was out. In the "prereturn" ten-minute period he did not visit the window in any of the trials (Fig. 2) and indeed he did not visit the window in any of the trials in the three ten-minute periods prior to SH's return (Fig. 3). If he went to the window more and more the longer she was out, he should be there for an increasing proportion of the time in the periods just before she set off to come home. This is not what happened.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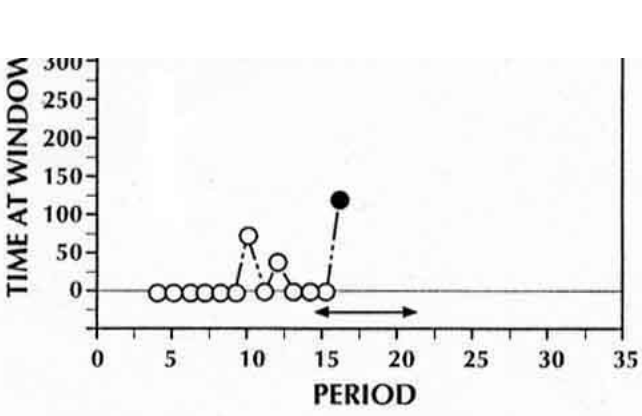
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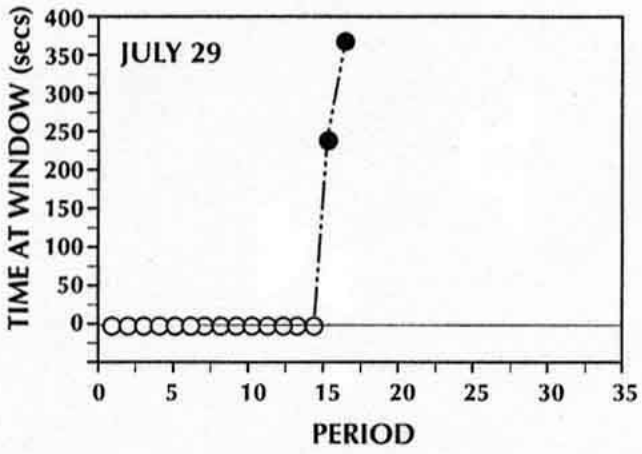
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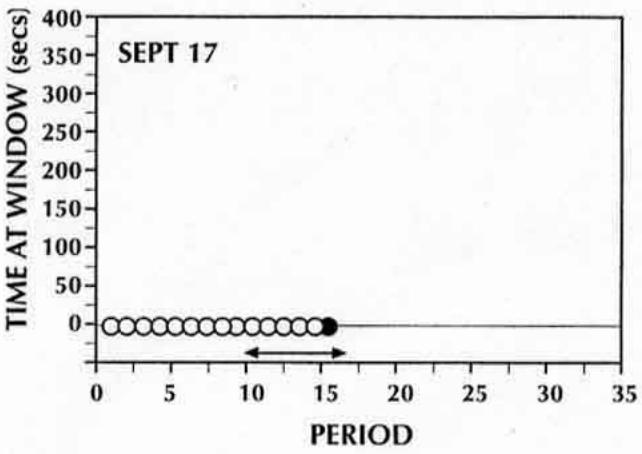
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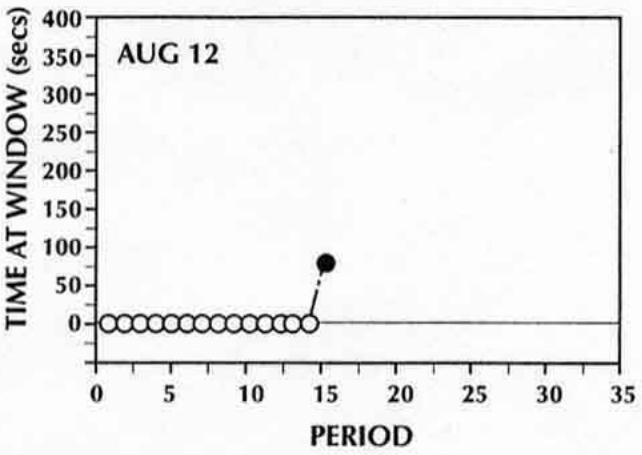
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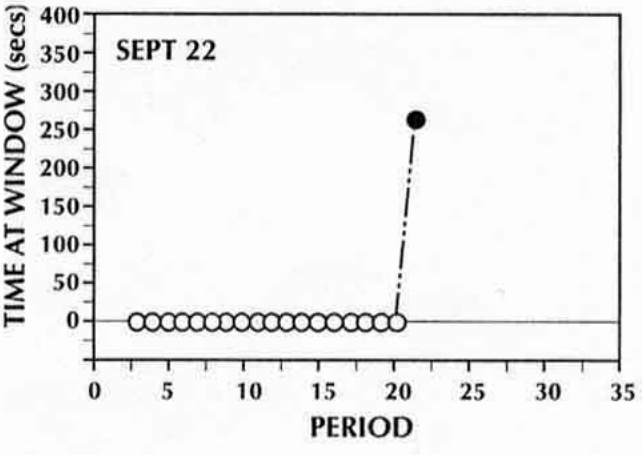
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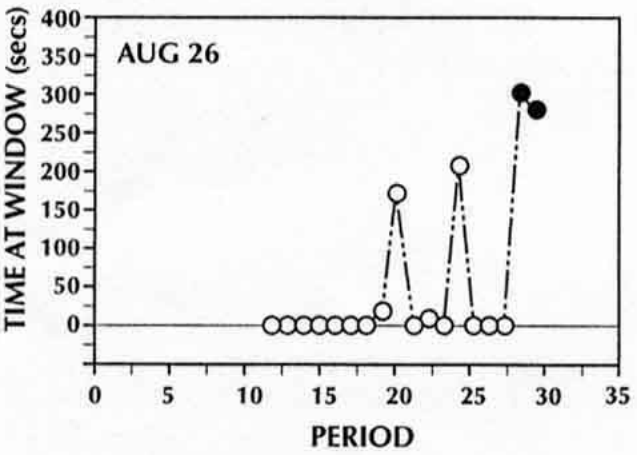
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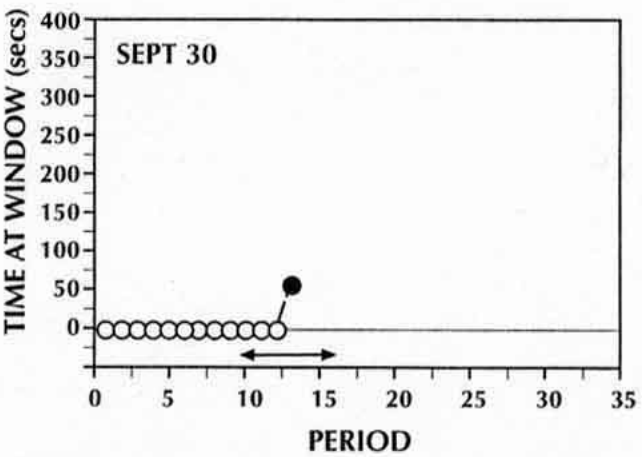
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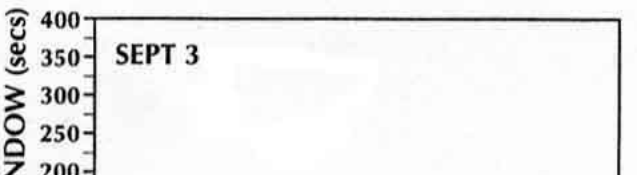
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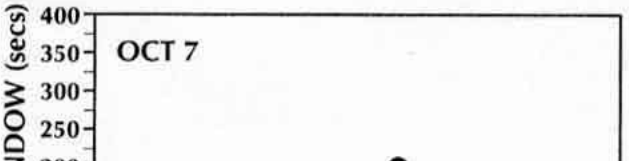
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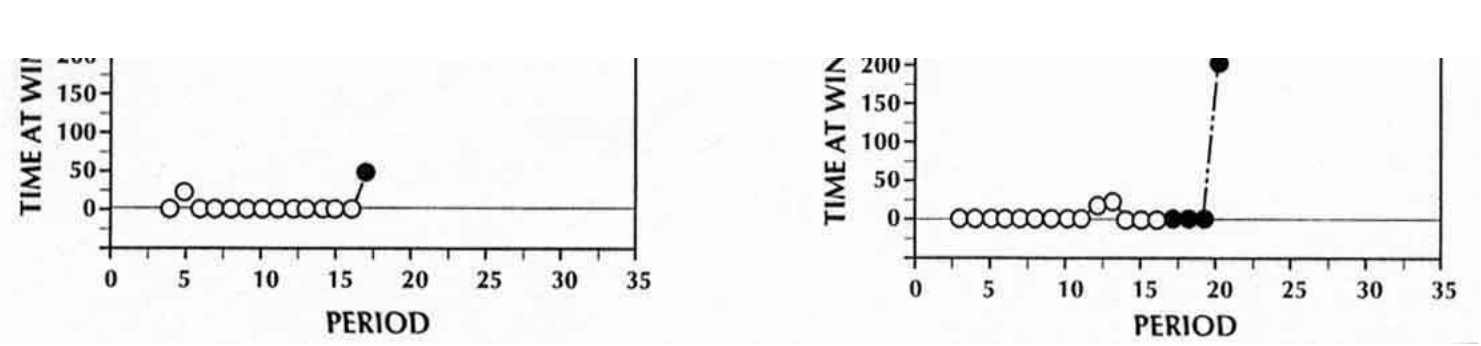

Figure 3. The time courses of all ten trials. The ordinate shows the total number of seconds that Kane spent at the window in each ten-minute period; the abscissa shows the series of ten-minute periods, defined in relation to the time at which SH set off to come home. In three trials, on 10,17 and 30 September, SH was paged to come home at randomly selected times. The "window" in which she could have been paged is indicated by a line with two arrowheads. The points for the ten-minute periods during which SH was returning are indicated by filled circles (- •-).

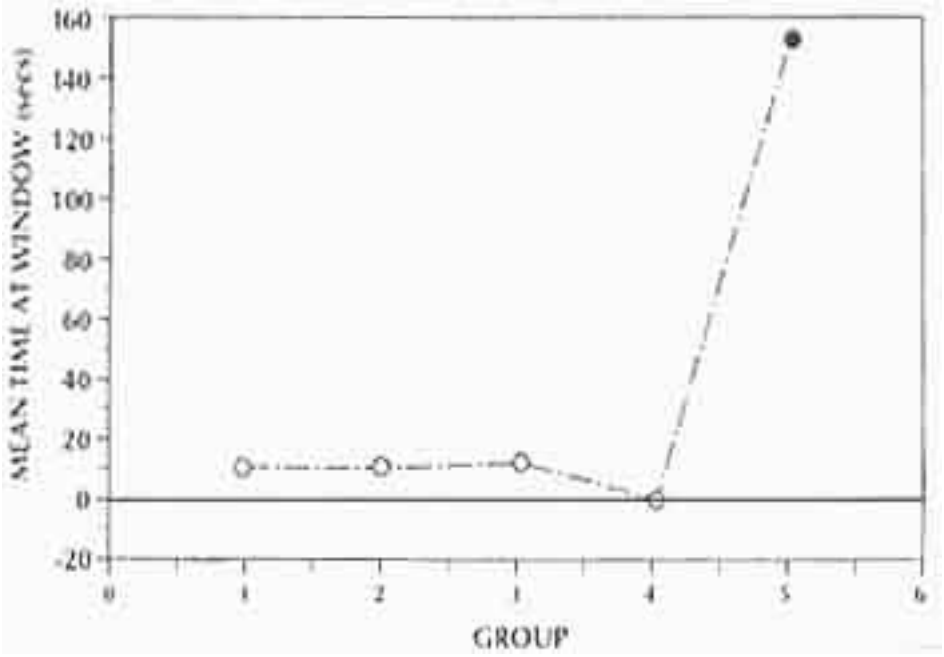

Figure 4. Combined data from all ten trials showing the mean time per ten-minute period that Kane spent at the window during the two hours before SH set off to go home (Groups 1 to 4) and during her return period (Group 5). Group 1 consists of the periods from 120 to 90 minutes before SH set off homewards; Group 2, 90 to 60 minutes; Group 3, 60 to 30 minutes; Group 4, 30 to 0 minutes.

In order to test this possibility more rigorously, for each trial we took the 12 periods prior to SH setting off and divided them into 4 groups of three periods each. A fifth group consisted of the return periods. Fig. 4 shows the average number of seconds Kane spent at the window in these five groups. There was no tendency for him to visit the window more and more as time went on.

Another possible explanation for Kane being at the window most when SH was on the way home would be that he habitually went there at a particular time of day, and that SH's returns happened to coincide with this time. To test this theory, in Fig. 5 we have plotted the total time that Kane spent at the window at different times of day, summed over all ten trials. There was no regular time-of-day pattern. A comparison of Fig. 5 with Fig. 3 confirms that Kane's visits to the window were not a matter of routine, but were primarily related to his owner's homeward journeys.

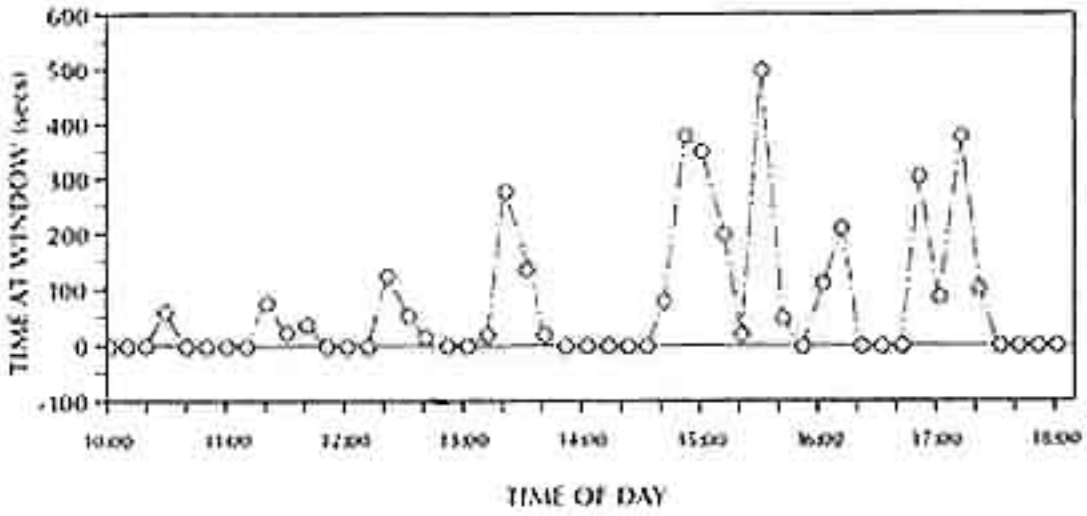

Figure 5. The total amount of time Kane spent at the window at different times of day, summed over all ten trials.

Discussion

Kane's anticipatory behavior was clear. In nine trials out of ten he went to look out of the window when his owner was on her way home. On most of the occasions on which he went to look out of the window when she was not coming home, there seemed to be a clear external reason, namely the going out and returning of SH's partner, or loud noises outdoors. But even including these visits to the window that clearly had nothing to do with his anticipation of SH's return, he spent a far higher proportion of the time at the window when she was on the way home than when she was not, and this effect was highly significant statistically.

Kane's visits to the window when his owner was on the way home cannot be explained in terms of his going to the window more and more as time went on; he did not do this. In all ten trials, he did not make a single visit to the window in the 30 minutes prior to SH setting off to go home. Nor can his behavior be explained in terms of a habitual tendency to go to the window at a particular time of day. These results establish that Kane really did anticipate his owner's returns.

Kane's pattern of behavior differed from that observed in the study of another returnanticipating dog, Jaycee, in that his waiting by the window began only when his owner was actually on her homeward journey, whereas Jaytee's reactions usually began while his owner was planning to do so, i.e. shortly before his owner set off (Sheldrake and Smart 2000). A review of more than 500 case histories of return-anticipating dogs has revealed that there are several different patterns of response: some dogs begin waiting shortly before their owner sets off, like Jaytee; others start waiting only after the owner has set off, like Kane; and others respond only a few minutes before the owner arrives home (Sheldrake 1999a).

Granted that Kane was able to anticipate his owner's returns at non-routine and randomly-selected times, how might this be explained? Could he have heard or smelled her coming? This is highly implausible since his looking out of the window began when his owner was more than 7 km away. To detect the sound of a particular car at this distance in the busy conurbation of Greater Manchester, or to detect its smell, irrespective of the wind direction, would far exceed the known sensory capacities of dogs (Sheldrake 1999a). Although experiments in which SH travelled by taxi were not carried out, it was

established in the study of Jaytee that anticipations still occurred when the owner was travelling in unfamiliar vehicles (Sheldrake and Smart 1998, 2000).

Although SH did not return at routine times, did she return after a predictable time had elapsed, and could Kane have responded to such a pattern? This is implausible because SH's absences ranged from 130 to 330 minutes and did not follow a predictable pattern. Nor was Kane habitually waiting at the window at a particular time of day.

Could Kane have picked up clues from SH's partner? Very unlikely. JH did not know when she was coming home, and he could not have guessed when she was being paged at randomly-selected times. Or perhaps JH somehow knew unconsciously by telepathy when SH was coming home, and then unconsciously communicated his anticipation to Kane. This is an unattractively convoluted explanation. Many other people, like JH, claim that the dog alerts them to an impending return of an absent member of the household even at unexpected times (Sheldrake 1999a). If they were picking up this information telepathically and somehow transferring it to the dog by subtle cues, then we would have to assume that somehow dogs brought to consciousness human telepathic abilities which were otherwise unconscious and detectable only in the presence of dogs or other domestic animals. There is no evidence for this hypothesis, and it goes against many owners' own interpretation of what is going on, namely that the dog is alerting them to an impending return, rather than vice versa.

If the possibility of telepathy is admitted, then the simplest and most straightforward explanation is that the dogs themselves are responding to their owners directly. In the present case, the hypothesis that best fits the facts is that Kane himself responded telepathically to his owner's thoughts and intentions when she was on the way home. The problem with this suggestion is that some people reject the very possibility of telepathy on theoretical grounds (e.g. Humphrey 1995). And even among those who regard the existence of telepathy as a question to be answered empirically rather than theoretically, no one knows how it might work. Nevertheless, there is already much empirical evidence for person-to-person telepathy (for a review and meta-analysis of experimental research, see Radin 1997) and also for person-to-animal telepathy (reviewed by Sheldrake 1999a).

Anticipations of the arrival of a member of the household occur in a variety of other domesticated species (Sheldrake and Smart 1997; Brown and Sheldrake 1998; Sheldrake et al. 1998; Sheldrake 1999a). But so far there has been ractically no experimental research on this behavior except in dogs. Nor does anything seem to be known about return-anticipation in the wild. Much remains to be discovered.

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