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Is the *Podarcis muralis* lizard left-eye lateralised when exploring a new environment?

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The typical lateral eye position in ectotherms likely facilitated the spread of visual lateralisation—i.e., the different use of the eyes—in those species. The diffusion of this form of lateralisation seems due to the possibility of carrying out more than one task simultaneously, some controlled by one eye and the visual structures it feeds and some by the other. Similar to other species, exploratory and monitoring behaviours seem to be under left “eye system” control. Wild individuals of the Common wall lizard *Podarcis muralis* were tested individually in captivity to ascertain whether they showed lateralisation when exploring a new environment, using preferentially the left eye. In Experiment 1, the lizards explored a maze. A left-turning bias was found, both at individual and population level, indicating a possible right hemisphere visual control. In Experiment 2, lizards explored a T-maze, preferring to enter the left rather than the right arm though without any particular preference in the head turns. In Experiment 3, the lizards had to exit an opaque box within a terrarium. We found a left-eye preference again for head turn while leaving the box. Our findings support the hypothesis of right hemisphere mediation of exploratory and monitoring behaviours in *Podarcis muralis*. In addition to previous studies on the same species, our results support the hypothesis of a simultaneous control of anti-predatory and exploratory behaviours (left-eye mediated) and predatory behaviour (right-eye mediated).

Keywords: Common wall lizard; Exploration; Control; *Podarcis muralis*; Visual laterality.

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Behavioural asymmetries are rather widespread in vertebrates (MacNeilage, Rogers, & Vallortigara, 2009; Vallortigara & Rogers, 2005). There is much evidence that lateralisation could benefit individual fitness (Güntürkün et al., 2000; Rogers, 2000; Rogers, Zucca & Vallortigara, 2004). The lateralisation is particularly frequent in visual asymmetries, i.e., the preferential use of a specific eye for looking at a specific stimulus, and they are more evident in animals with lateral eyes (Vallortigara, Rogers, & Bisazza, 1999). In fact, different reactions, according to the nature of the cue, to right- and left-placed stimuli occur in several species of vertebrates (Vallortigara, 2000).

Behavioural biases associated with eye use are present in routine tasks of day-to-day behaviour, such as feeding and vigilance (Bisazza, Pignatti, & Vallortigara, 1997; Casperd & Dunbar, 1996; MacNeilage et al., 2009). One important ability is that of simultaneously attending to multiple cues (Reddon, Gutiérrez-Ibáñez, Wylie, & Hurd, 2009; Rogers et al., 2004; Vallortigara & Rogers, 2005). In all vertebrate classes the left hemisphere is found to be used to control cues perceived with the right eye and related to predatory and feeding behaviour (Giljov, Karenina, & Malashichev, 2009; Rogers, 1997; Valenti, Sovrano, Zucca, & Vallortigara, 2003; Vallortigara, Rogers, Bisazza, Lippolis, & Robins, 1998). That hemisphere is specialised in processing what needs a focused and detailed observation, such as prey or food in general (Vallortigara & Rogers, 2005; Robins, 2006). In contrast, the right hemisphere controls behaviours involved in intense negative emotional responses, such as fear (Andrew & Rogers, 2002; De Boyer Des Roches, Richard-Yris, Henry, Ezzaoui, & Hausberger, 2008; Koboroff, Kaplan, & Rogers, 2008), even due to the presence of a predator (Adamec, Blundell, & Burton, 2003; Lippolis, Bisazza, Rogers, & Vallortigara, 2002; Lippolis, Westman, McAllan, & Rogers, 2005). It processes spatial cues as well as the needs of a diffuse or global attention, i.e., the immediate surrounding for change (Andrew & Rogers, 2002; Robins, 2006), such as in vigilance behaviour. Birds have been shown having spatial navigation lateralised and mediated by the right hemisphere (Cozzutti & Vallortigara, 2001; Prior, Wiltschko, Stapput, Güntürkün, & Wiltschko, 2004; Tommasi, Gagliardo, Andrew, & Vallortigara, 2003; Tommasi & Vallortigara, 2001; Vallortigara, Pagni, & Sovrano, 2004).

Ethological works about lateralisation in exploration are limited, particularly in lizards. However, starting from the above evidence, we expected that exploratory behaviour too should be guided by the left “eye system”. Lizards provide an interesting model to study lateralisation. In fact, as in birds, the almost complete decussation of the optic chiasma and the lack of a large interhemispheric connection allow cues to be perceived with an eye and processed almost entirely with the contralateral brain hemisphere

(Deckel, 1995; Emmerton, 1983). This organisation allows each visual system to work largely independently (Schaeffel, Howland, & Farkas, 1986).

Podarcis muralis is a territorial lizard with well-developed explorative and vigilance behaviour. We ascertained that *Podarcis muralis* lizards preferred looking at the prey with the right eye, in a T-maze and in a detour test, then processing the predatory input with the left hemisphere (Bonati, Csermely, & Romani, 2008; Csermely, Bonati, & Romani, 2009). They also preferred to escape to the right side of a terrarium looking back at the predator with the left eye (Bonati, Csermely, López, & Martín, 2010). In this study we aimed to investigate if this species also shows lateralisation in exploratory and in vigilance behaviour. We expected that the preferential control of the environment would have been processed by the left “eye system”, according to the hypothesis of a simultaneous control of exploratory/vigilance behaviours and prey search by different hemispheres.

EXPERIMENT 1

Method and materials

We collected 21 wild adult *Podarcis muralis* lizards, 12 males and 9 females, from different locations in Parma or nearby, from June to July. Captures were made by noosing; the lizards were put in cloth bags immediately after and carried to the laboratory, where they were housed individually in $120 \times 50 \times 50$ cm wood terraria. Each terrarium had the front and one lateral side of glass, a 2×2 mm wire mesh ceiling, floor covered with sand, and one pebble and one brick for refuge and/or basking site. They were located in a former greenhouse, with full glass sides but opaque roof. Light, photoperiod, and temperature were therefore natural, although artificial light and heat could be provided if necessary.

Once in the terrarium, the lizards were fed mealworm larvae (*Tenebrio molitor*), dusted with multivitamin powder, and allowed to accustom themselves to the new environment for 24 hours before the tests were started; water was provided *ad libitum*. At the end of the experiment lizards were released at the same site of capture and none of them was harmed by the experiment, which was carried out under licence from Italian authorities.

The experimental apparatus was a maze consisting of a 54×66 cm PVC base with 6.5-cm high sides (Figure 1). Thirteen $12 \times 6 \times 6$ cm blocks were scattered regularly on the base at the distance of 6 cm from each other. Four additional $6 \times 6 \times 6$ cm blocks were located against two sides of the base; their length was limited to one-half of that of the others so as to maintain the regular reciprocal distance among the blocks. The blocks' presence had to induce the exploring lizard to continuously change direction when it arrived at T-crossroads, forcing it to decide to go either to the left or to the right. The

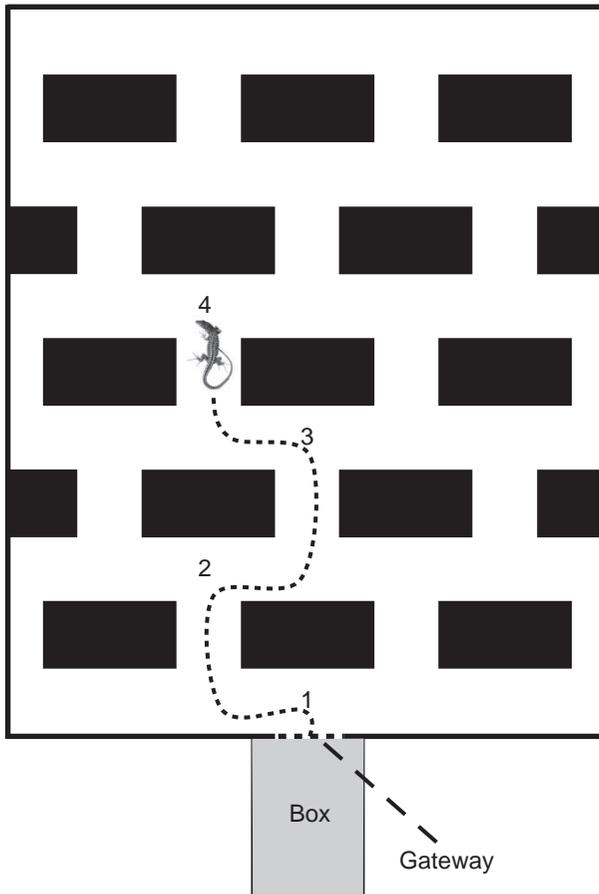


Figure 1. The maze explored by the lizards in Experiment 1. When the gateway was lifted, the lizard could enter the maze to explore it. Only when the lizard arrived at T-crossings, in this example marked 1 to 4, was the direction choice considered.

blocks were attached to the base with adhesive tape. They were made of a series of commercial Duplo[®] bricks and covered with plastic adhesive paper with marble colouration to prevent the lizards from climbing them. The whole maze was covered with a transparent and colourless Plexiglas[®] panel.

Tests were performed the day after capture. A lizard was gently removed from the terrarium and placed in a $15 \times 9 \times 6.5$ cm box external to the maze, but attached to it. The lizard remained in the box for 5 minutes to acclimatise; thereafter the experimenter, located behind a black cloth blind, remotely operated a thin cable to lift up the PVC gateway that had prevented the lizard from entering the maze before the test through a 4.5×3 cm

opening. The test started when the lizard spontaneously entered the maze; the gateway was closed immediately after. The lizard could move freely within the maze for 15 minutes, and at the end it was returned to its terrarium. The maze floor was cleaned with ethyl alcohol after each test to prevent any possible effect of chemical cues on subsequent individuals.

The tests were carried out when the air temperature was within the 27–35 °C range. Light was natural and homogeneous for the whole experimental apparatus. We considered the following behaviour parameters: (1) the first direction chosen immediately after entering the maze; (2) the frequency of direction changes during the maze exploration. Only the turns when the lizards had to choose between the right and the left direction (T-crossroads) were considered.

We used the Binomial test to compare the number of turns to the left or to the right performed by each lizard, the Mann-Whitney U test (U) and the Wilcoxon matched-pairs signed ranks test (T^+), to compare the number of turns performed by each sex and by each individual lizard, respectively. Considering the repeated turns, a laterality index (LI) was calculated as: (frequency of right turns)/(total frequency of right turns + left turns) \times 100. Values of LI more or less than 50% indicated a left or right preference, while a 50% value indicated no preference in turning at all. The one-sample t -test (t) on the mean of the laterality indices was therefore used. We made calculations with the SPSS 15.0 for Windows (2006) software. The probability, set at $\alpha = .05$, was two-tailed throughout, unless otherwise stated.

Results

Once they had entered the maze the lizards were not frightened but clearly explored the new environment, walking circumspectly, frequently turning the head and flicking the tongue. Sometimes they tried to climb the blocks or the maze sides, but without evident escape attempts, apparently to explore them. All lizards showed good motivation to explore the maze, as none tried to return to the box before the test finished.

The first turn that lizards performed immediately after entering the maze was invariably to the left, regardless of their gender (Table 1). The subsequent movements of the lizards were in various directions, moving progressively farther from the entering point. The average number of turns per lizard per test was 15.00 ± 2.3 , with no significant differences between sexes (males: 15.08 ± 1.7 ; females: 14.89 ± 5.1 ; $U = 1.602$, $N = 21$, $p > .1$). The average number of turns to the left during the exploration of the maze was much higher than to the right (9.81 ± 1.3 and 5.19 ± 1.2 , respectively; $T^+ = 3.276$, $N = 21$, $p = .01$). The preference for the left direction in exploring more than to the right was confirmed by the LI calculation,

TABLE 1
The first turn and the amount of left and right turns performed by the lizards when exploring the maze of Experiment 1.

Sex	First turn	No. of left turns	No. of right turns	<i>p</i>
M	Left	22	6	.001
M	Left	9	1	.010
M	Left	12	3	.014
M	Left	13	4	.018
M	Left	11	3	.022
M	Left	5	0	.031
M	Left	10	3	.035
M	Left	9	3	.054
M	Left	8	3	.081
M	Left	6	11	.094
M	Left	10	6	.122
M	Left	10	13	.136
F	Left	8	2	.044
F	Left	8	2	.044
F	Left	16	10	.079
F	Left	1	5	.094
F	Left	27	25	.106
F	Left	3	0	.125
F	Left	7	4	.161
F	Left	5	2	.164
F	Left	6	3	.164
TOTAL		206	109	

Lizards are ordered for significance within sex.

which was highly significant ($t = 4.532$, $df = 20$, $p < .001$). The same bias occurred in both males (10.42 ± 1.2 and 4.67 ± 1.1 , respectively; $T^+ = 2.673$, $N = 12$, $p < .01$) and females (14.89 ± 5.1 and 9.00 ± 2.6 , respectively; $T^+ = 1.979$, $N = 9$, $p < .05$). There was no significant difference between sexes in the LI ($t = 0.761$, $df = 19$, $p > .01$).

Considering the number of turns to the left or to the right performed by each lizard we found that 9 (42.9%) individuals of the 21 tested showed lateralisation (Binomial test); all of them to the left. Of these nine lizards, seven (77.8%) were males and only two (22.2%) were females. Another male turned nine times to the left and three times to the right, resulting in a strong, although not significant, tendency to show left lateralisation ($p = .054$). Only two males and one female tended to turn to the right more frequently than to the left, but this did not reach any significant difference. The lateralised males corresponded to 58.3% of the tested males, while the lateralised females comprised a much smaller proportion (22.2%) of the tested females.

EXPERIMENT 2

Method and materials

We used 20 adult lizards (12 males and 8 females) in this experiment. Capture locations, methods, and study period were similar to those of Experiment 1, and this test protocol lasted 1 day. At the end of the experiment the lizards were released at the same site of capture and none of them was harmed by the experiment itself, which was carried out under licence from Italian authorities.

The experimental apparatus was a PVC T-maze, which has been described in detail elsewhere (Bonati et al., 2008); the only difference was the absence of prey (Figure 2). At testing each individual was gently removed from its terrarium and gently forced to enter the central arm of the maze, which was then closed. Here the lizard remained undisturbed for 20 minutes. The test started when the gateway preventing access to the lateral arms was lifted up from behind a black cloth blind, from where the experimenter recorded the behaviour of the animals, and the lizards had the opportunity to explore the whole maze freely for a maximum of 10 minutes.

Tests were carried out when the air temperature was within the 27–35 °C range. Light was natural and homogeneous for the whole experimental apparatus. At the end of each test the maze floor was cleaned with ethyl alcohol to prevent any possible effect of chemical cues on subsequent individuals. We considered the following behavioural parameters: (1) the first lateral direction chosen after immediately entering the lateral arm; (2) the direction of the first head turn; (3) the frequency of left or right head turns; (4) the total duration of left or right head turn; (5) the frequency of tongue flicking.

The durations were measured with a digital stopwatch. We used the Binomial test to calculate the frequency of individuals choosing either maze arm, the Wilcoxon matched-pairs signed ranks test (T^+) to compare the data coming from the same individual lizard, and the Mann-Whitney U test (U) to compare the data between sexes. Both tests were calculated with the SPSS 15.0 for Windows software (2006). The probability, set at $\alpha = .05$, was two-tailed throughout, unless otherwise stated.

Results

Once the gateway was crossed, the lizards immediately started exploring the lateral arm of the maze, not showing any evident sign of fear in such an unknown environment. Immediately after entering the arm they stopped for a while, turning the head and then moving to either the left or the right arm of the maze. The first head turn after crossing the gateway was almost equally to the left and to the right ($N = 12$ and $N = 8$, respectively; Binomial

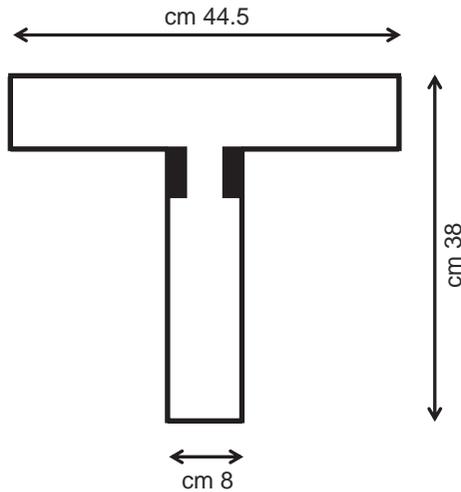


Figure 2. The T-maze used in Experiment 2. When leaving the central arm, the lizard was free to choose either lateral arm to explore.

test, $p > .05$). However, while males did not show any difference (five lizards to the left and seven to the right; Binomial test, $p > .01$), the females were significantly biased to the left (seven lizards to the left and one to the right; Binomial test $p < .05$).

Then, when leaving that position most ($N = 14$) lizards moved initially to the left arm of the maze, while only 6 moved to the right arm (Binomial test, $p < .05$). However, analysis of each sex revealed that males had just a strong tendency to go to the left arm (nine lizards went to the left and three to the right; binomial test, $p = .054$), whereas females had no preference (five lizards to the left and three to the right). We did not find any statistical difference between sexes for the other behaviours considered; we therefore decided to consider the following results irrespective of the lizards' gender.

The mean total duration of head turn to either side was similar (180.2 ± 10.2 s to the left and 194.1 ± 16.5 s to the right; $T^+ = 0.317$, $N = 20$, $p > .1$) and the same was found for the mean frequency to turn to the left and to the right (78.5 ± 11.0 times and 14.5 ± 0.9 times, respectively; $T^+ = 1.638$, $N = 20$, $p > .1$).

The lizards frequently flicked their tongue during exploration. The mean frequency of such a behaviour was significantly higher when performed with the head turned to the left than to the right (20.2 ± 2.3 flicks and 12.4 ± 1.5 flicks, respectively; $T^+ = 3.120$, $N = 20$, $p < .002$).

EXPERIMENT 3

Method and materials

We collected, by noosing, 21 adult *Podarcis muralis* lizards (11 females and 10 males) from rock walls at a high mountain population (Puerto de Navacerrada, Guadarrama mountains, central Spain) in June 2008. Lizards were maintained at the El Ventorillo field station, 5 km from the capture site, in PVC cages ($49 \times 29 \times 25$ cm) with a vermiculate substratum and some rocks for hiding. Lizards were fed daily with mealworm larvae, and water was provided *ad libitum*. Photoperiod and temperature were both natural and regulated with artificial lighting controlled with a timer. Lizards stayed in captivity for 1 week at least, for acclimatising to laboratory conditions before starting the experiment. At the end of the experimental period lizards were released at the same site of capture. None of the lizards was harmed during the tests. Lizards were captured under licence from the Comunidad de Madrid Environmental Agency.

At testing, the lizards were placed individually in a box ($18 \times 4.5 \times 4.5$ cm) placed in the middle of the short side of a $100 \times 50 \times 50$ cm glass terrarium that had a polystyrene floor (Figure 3). All the terrarium's sides were shaded with polystyrene panels to avoid external stimuli influencing the test. No cover was added. At the beginning of the test the experimenter, staying back from the apparatus, opened the box manually and waited until the lizard came out from the box. The box's shape induced the lizard to exit it with the body axis aligned to the terrarium's longitudinal axis. Lizards could not see the experimenter at the back of the terrarium until they turned the head, i.e., when the test stopped. The test ended when the lizard turned its head leftward or rightward with respect to the box to explore the environment.

The lizard behaviours considered during the test were: (1) the frequency of left/right head turns, calculated in relation to the longitudinal axis of the box while the lizard was coming out of the box; (2) the durations of left/right head turns while the lizard was coming out of the box; (3) the frequency of tongue flicking during the left/right head turns while the lizard was coming out of the box; (4) the frequency of left/right head turns when observing the experimenter at the back of the box. All tests were recorded with a mini DV colour video camera, $17 \times 9 \times 8$ cm in size, hidden in front of the box outside the terrarium and positioned at the distance of 82 cm from the box. The video software Virtualdub was used for frame-by-frame videotape analysis for recording behaviour, which was made continuously using a digital event recorder.

All the 21 lizards performed 10 tests each, to get a lateralisation analysis at the individual level. To limit the pseudo-replications effect, every lizard was tested a maximum of twice daily, with at least a 6-hour inter-trial time.

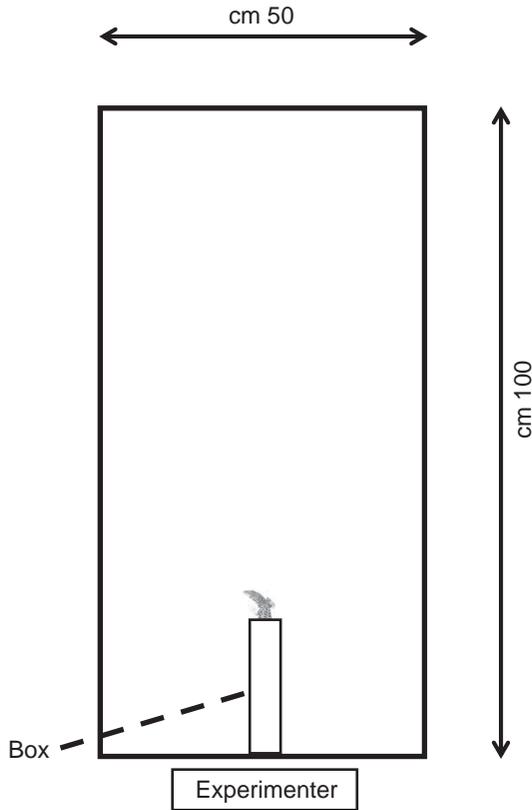


Figure 3. In Experiment 3 the lizard was allowed to leave the opaque box where it was previously kept.

We used the Binomial test to analyse the head-turning preference among the individuals and the Chi-Square Component z Index (z) to compare the sample's total choice frequency against the relative expected frequency for turning leftward and rightward. We also used the Mann-Whitney-Wilcoxon test (W_x) to compare left/right head-turning durations. The Mann-Whitney-Wilcoxon test was calculated with the SPSS 15.0 for Windows software (2006). Means are $\pm SE$ and the probability, set at $\alpha = .05$, was two-tailed throughout, unless otherwise stated.

Results

When the lizards came outside the box they moved slowly towards the exit and turned their head: this occurred 135 times to the right and 111 times to

the left ($z = 1.082$, $p < .05$). Moreover, they had the tendency to keep the head right-turned for longer times than left-turned ($T^+ = 1.796$, $N = 149$, $p = .07$). We did not find any statistical difference between sexes for these and the other behaviours considered; we decided therefore to consider the results irrespective of the lizards' gender (Table 2).

When the lizards arrived at the end of the box and put their head outside, all of them turned the head and raised it slightly towards the experimenter, who stayed back from the box. In particular, when the lizards came out in the first test they turned their head 16 times to the left-hand side and 5 times to the right one ($z = 1.697$, $p < .05$). Nevertheless, in all the tests as a whole the lizards turned their head with similar frequency to either side (91 times to the left and 93 times to the right; $z = 0.252$, $p > .05$).

Three individuals had a bias to turn their head in a preferred direction (Binomial test, $p < .05$ all) and one had just a tendency to do so (Binomial test, $p < .07$). This bias was for the left-hand side in three individuals and for the right side in one case. Tongue flicking outside the box was performed

TABLE 2
The first turn performed, together with the frequency of head turning to the back in Experiment 3.

<i>Sex</i>	<i>First turn</i>	<i>No. of left turns</i>	<i>No. of right turns</i>	<i>p</i>
M	Left	8	2	.044
M	Right	2	8	.044
F	Left	8	2	.044
M	Left	7	2	.070
F	Right	3	7	.117
F	Left	3	6	.164
F	Left	6	3	.164
M	Left	6	4	.205
M	Left	6	4	.205
F	Left	6	4	.205
M	Left	4	6	.205
M	Left	4	6	.205
F	Right	4	6	.205
F	Right	5	3	.219
F	Left	3	5	.219
M	Left	5	5	.246
F	Left	5	5	.246
F	Right	5	5	.246
M	Left	3	4	.273
F	Left	4	3	.273
TOTAL		101	96	

Lizards are ordered for significance value.

significantly more often when the head was turned to the left than to the right (204 times vs 167, respectively; $z = 1.358$, $p < .05$).

GENERAL DISCUSSION

Our data show a left-side bias when *Podarcis muralis* lizards explore a novel environment. This is clear in all our experiments. The left-side lateralisation in exploration is found at both the individual level and the population level.

Being an active forager this species has a high predisposition to explore, which in turn is the basis of the strong behavioural response recorded in all our experiments, particularly in males. In fact, the lateralised females are clearly fewer than the lateralised males, particularly in Experiment 1. This difference between male and female lateralised individuals is very likely due to the strong territorial behaviour of males, which display a stronger motivation than females to control and defend their territory, leading them to be more motivated than females to explore and to move around when they enter a new environment. However, the LI of each individual tested did not differ between sexes. The constant first and likely more spontaneous turn to the left shown by every lizard in the maze and in the T-maze reveals a strong left-turning preference. In Experiment 1 this is apparent at the individual level: almost one-half of lizards, mostly males, showed lateralisation for this behaviour, invariably for the left direction. If we add the individuals with a strong tendency to do so to the lateralised ones, the percentage of left-turning preference increases. The LI analysis confirmed the bias even in the population as a whole.

We are aware that turning to the left could be indicative of a motor bias present in this species. However, the movement, particularly during the exploratory behaviour, is preceded by a high level of attention in patrolling the environment and it likely guides the subsequent direction choice. There is evidence in other species of a left-eye processing in using environmental layout to guide locomotion to a target site using spatial information (Andrew & Rogers, 2002). This is similar to the escape with a body C-bend observed in several fish species, where sensory visual information is necessary at the very beginning of the movement to know the nature of the stimulus and to coordinate a successful escape—i.e., where it is and where to flee (Eaton & Emberly, 1991; Lippolis, Joss, & Rogers, 2009). A preferential direction of escape, then, could be due to an asymmetry at the tectal level that has been demonstrated in the pigeon (*Columba livia*) as a cause of visual lateralisation (Güntürkün & Bohringer, 1987). This can be true for the exploratory behaviour too. The movement is likely guided by the perception of visual stimuli at the left side, inducing the lizard to move in the same direction and to be more able to explore the environment using the right hemisphere. Hence, the left-lateralisation we found could be a consequence

of a left visual lateralisation, indicating a preference in observing a new environment with the left eye and consequently in elaborating information with the right hemisphere.

However, the analysis of the head rotation in this context reveals that lizards used the left and the right eye similarly when exploring a T-maze arm. We think that this behaviour could be a consequence of the restricted experimental conditions. Having once made the first choice and having arrived at the end of the arm they chose, the restricted environment caused lizards to change direction because they could not proceed, and consequently to use either eye indifferently without any important consequence to their performance. This hypothesis is supported by Experiment 3, where the lizards had to look frontally when coming out of the box. At the very beginning of their exit, their right head-turn is very likely indicative of a left-eye observation of what they are facing. The tendency when coming out of the box to keep the head preferentially round to the right for longer in observing the environment in front of them could be the evidence of a left-eye preference during the exploration of an unknown area. The higher frequency of right head-turning confirmed this.

Moreover, when the lizards kept just the head outside the box, with the body remaining in the box, the majority of them rolled their head—likely viewing above and to the back. In particular, we found a left-turn preference in doing so in the first test, and just some individuals showing lateralisation. Viewing the back with a left turn is again likely to be indicative of a left “eye system” processing in that context. This finding was also found in the escape behaviour (Bonati et al., 2010). After being stimulated by the experimenter, lizards sometimes stopped during the escape and turned the head preferentially to the left, i.e., using the left eye to monitor the feigned predator (Bonati et al., 2010; Koboroff et al., 2008).

From our experiments a preference in tongue flicking also arose when, during both the exploration of the T-maze and when coming out of the box, lizards kept the head turned to the left. The tongue flicking is clearly tied to exploration. However, while tongue flicking with a left head-turn in Experiment 3 supports a left-eye exploration, in the T-maze it could indicate a right-eye observation of the environment in front of the individual, in contrast to the other findings. Mammals such as dogs and mice, during exploration in captivity, are known to move preferentially near the wall of a new environment. Such a tendency could be valid for lizards too in such a restricted environment as the lateral arms of the T-maze. We believe that our lizards behaved similarly and the tongue flicking during the left head-turn was performed to explore the arm/side next to them, which was watched with the left eye. Even this result, then, is in accord with a preferential observation with the left eye during exploration, as expected.

In conclusion, our results show the existence of a left-eye preference in *Podarcis muralis* lizards when exploring a new environment. This is also in accord with previous studies on other species, such as chicks (*Gallus gallus*) and humans among others, that showed the left “eye system” ability to process global aspects of the environment without focusing on the local aspect, which is instead a left hemisphere function predisposition (MacNeilage et al., 2009; Posner & Petersen, 1990). Previous studies conducted on *Podarcis muralis* showed that it is specialised in observing the prey with the right eye (Bonati et al., 2008; Csermely et al., 2009), but looks at the predator with the left eye during an escape run (Bonati et al., 2010). It then processes feeding cues with the left hemisphere and threatening cues with the right hemisphere. The findings of this study show that the right hemisphere is also specialised in processing exploratory behaviour.

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