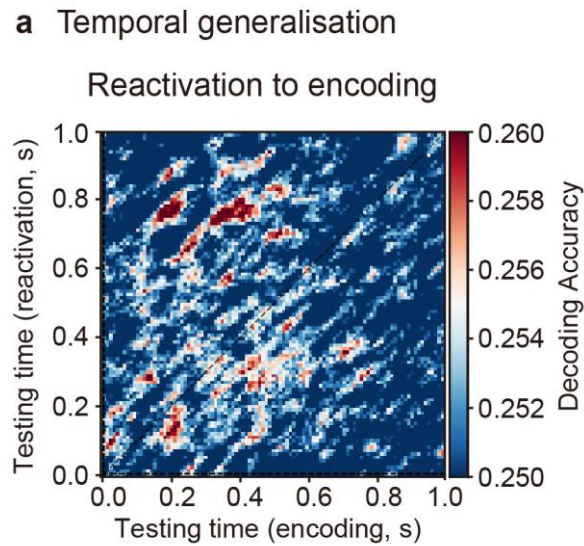


**Supplementary materials**  
**“Transformed reactivation of latent working memory enables hierarchical language processing”**

**Supplementary Figure 1**



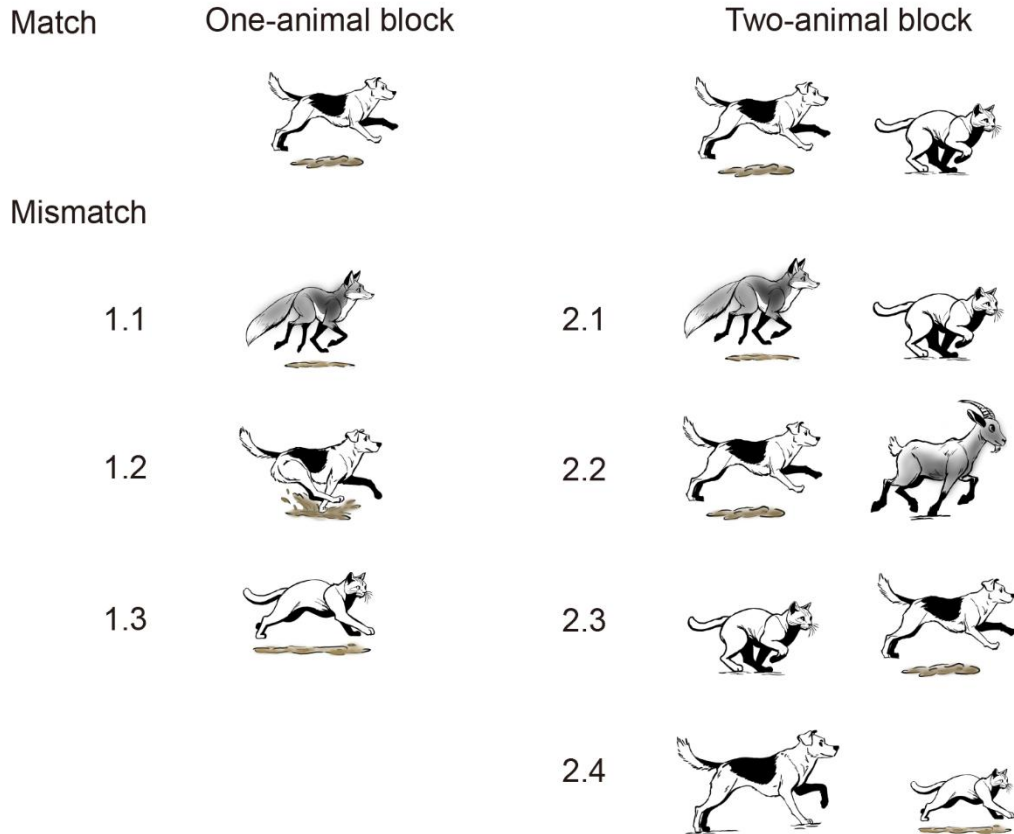
**Figure S1. Temporal generalization from reactivation to encoding.**

**(A)** Temporal generalisation analysis. Classifiers trained during subject reactivation (0–1.0 s from verb onset) and tested during encoding (0–1.0 s from subject onset) showed no significant cross-phase generalisation (cluster-based permutation test,  $p > 0.05$ ).

## Supplementary Figure 2

Example sentence:

Look! The dog, who chases the cat, jumps over the mud.



**Figure S2. Illustration of stimulus conditions in the sentence-picture matching task.**

Example sentence and corresponding probe images used in the experiment. Trials were divided into one-animal and two-animal blocks. In match trials, the picture corresponded exactly to the described event. In mismatch trials, a single aspect of the event was altered. In one-animal blocks, mismatches included (1.1) an unmentioned animal performing the action, (1.2) an incorrect action, and (1.3) the embedded-clause animal performing the main-clause action. In two-animal blocks, mismatches included (2.1) replacing the main-clause animal, (2.2) replacing the embedded-clause animal, (2.3) swapping the chasing roles of the two animals, and (2.4) assigning the main-clause action to the embedded-clause animal.

**Supplementary Table 1. Experimental sentences and design factors**

| Sentence ID | Sentence  | Main-clause subject | Relative-clause noun | Relative-clause type | Verb phrase |
|-------------|---|---------------------|----------------------|----------------------|-------------|
| 1           | Look! The cat, who the dog chases, jumps over the mud.  | 1                   | 2                    | 2                    | 1           |
| 2           | Look! The cat, who chases the dog, jumps over the mud.  | 1                   | 2                    | 1                    | 1           |
| 3           | Look! The cat, who the dog chases, steps into the mud.  | 1                   | 2                    | 2                    | 2           |
| 4           | Look! The cat, who chases the dog, steps into the mud.  | 1                   | 2                    | 1                    | 2           |
| 5           | Look! The cat, who the fox chases, jumps over the mud.  | 1                   | 3                    | 2                    | 1           |
| 6           | Look! The cat, who chases the fox, jumps over the mud.  | 1                   | 3                    | 1                    | 1           |
| 7           | Look! The cat, who the fox chases, steps into the mud.  | 1                   | 3                    | 2                    | 2           |
| 8           | Look! The cat, who chases the fox, steps into the mud.  | 1                   | 3                    | 1                    | 2           |
| 9           | Look! The cat, who the goat chases, jumps over the mud. | 1                   | 4                    | 2                    | 1           |
| 10          | Look! The cat, who chases the goat, jumps over the mud. | 1                   | 4                    | 1                    | 1           |
| 11          | Look! The cat, who the goat chases, steps into the mud. | 1                   | 4                    | 2                    | 2           |
| 12          | Look! The cat, who chases the goat, steps into the mud. | 1                   | 4                    | 1                    | 2           |
| 13          | Look! The dog, who the cat chases, jumps over the mud.  | 2                   | 1                    | 2                    | 1           |
| 14          | Look! The dog, who chases the cat, jumps over the mud.  | 2                   | 1                    | 1                    | 1           |
| 15          | Look! The dog, who the cat chases, steps into the mud.  | 2                   | 1                    | 2                    | 2           |
| 16          | Look! The dog, who chases the cat, steps into the mud.  | 2                   | 1                    | 1                    | 2           |
| 17          | Look! The dog, who the fox chases, jumps over the mud.  | 2                   | 3                    | 2                    | 1           |
| 18          | Look! The dog, who chases the fox, jumps over the mud.  | 2                   | 3                    | 1                    | 1           |
| 19          | Look! The dog, who the fox chases, steps into the mud.  | 2                   | 3                    | 2                    | 2           |
| 20          | Look! The dog, who chases the fox, steps into the mud.  | 2                   | 3                    | 1                    | 2           |
| 21          | Look! The dog, who the goat chases, jumps over the mud. | 2                   | 4                    | 2                    | 1           |
| 22          | Look! The dog, who chases the goat, jumps over the mud. | 2                   | 4                    | 1                    | 1           |
| 23          | Look! The dog, who the goat chases, steps into the mud. | 2                   | 4                    | 2                    | 2           |
| 24          | Look! The dog, who chases the goat, steps into the mud. | 2                   | 4                    | 1                    | 2           |
| 25          | Look! The fox, who the cat chases, jumps over the mud.  | 3                   | 1                    | 2                    | 1           |
| 26          | Look! The fox, who chases the cat, jumps over the mud.  | 3                   | 1                    | 1                    | 1           |
| 27          | Look! The fox, who the cat chases, steps into the mud.  | 3                   | 1                    | 2                    | 2           |
| 28          | Look! The fox, who chases the cat, steps into the mud.  | 3                   | 1                    | 1                    | 2           |
| 29          | Look! The fox, who the dog chases, jumps over the mud.  | 3                   | 2                    | 2                    | 1           |
| 30          | Look! The fox, who chases the dog, jumps over the mud.  | 3                   | 2                    | 1                    | 1           |
| 31          | Look! The fox, who the dog chases, steps into the mud.  | 3                   | 2                    | 2                    | 2           |
| 32          | Look! The fox, who chases the dog, steps into the mud.  | 3                   | 2                    | 1                    | 2           |
| 33          | Look! The fox, who the goat chases, jumps over the mud. | 3                   | 4                    | 2                    | 1           |
| 34          | Look! The fox, who chases the goat, jumps over the mud. | 3                   | 4                    | 1                    | 1           |
| 35          | Look! The fox, who the goat chases, steps into the mud. | 3                   | 4                    | 2                    | 2           |
| 36          | Look! The fox, who chases the goat, steps into the mud. | 3                   | 4                    | 1                    | 2           |
| 37          | Look! The goat, who the cat chases, jumps over the mud. | 4                   | 1                    | 2                    | 1           |
| 38          | Look! The goat, who chases the cat, jumps over the mud. | 4                   | 1                    | 1                    | 1           |

| Sentence ID | Sentence  | Main-clause subject | Relative-clause noun | Relative-clause type | Verb phrase |
|-------------|---|---------------------|----------------------|----------------------|-------------|
| 39          | Look! The goat, who the cat chases, steps into the mud. | 4                   | 1                    | 2                    | 2           |
| 40          | Look! The goat, who chases the cat, steps into the mud. | 4                   | 1                    | 1                    | 2           |
| 41          | Look! The goat, who the dog chases, jumps over the mud. | 4                   | 2                    | 2                    | 1           |
| 42          | Look! The goat, who chases the dog, jumps over the mud. | 4                   | 2                    | 1                    | 1           |
| 43          | Look! The goat, who the dog chases, steps into the mud. | 4                   | 2                    | 2                    | 2           |
| 44          | Look! The goat, who chases the dog, steps into the mud. | 4                   | 2                    | 1                    | 2           |
| 45          | Look! The goat, who the fox chases, jumps over the mud. | 4                   | 3                    | 2                    | 1           |
| 46          | Look! The goat, who chases the fox, jumps over the mud. | 4                   | 3                    | 1                    | 1           |
| 47          | Look! The goat, who the fox chases, steps into the mud. | 4                   | 3                    | 2                    | 2           |
| 48          | Look! The goat, who chases the fox, steps into the mud. | 4                   | 3                    | 1                    | 2           |