# The cut-and-paste effect in rapid visual categorization

Qi Wang[1], Weina Zhu[1], Jan Drewes[2]
[1]School of Information Science, Yunnan University, Kunming, China .
[2]Institute of Brain and Psychological Sciences, Sichuan Normal University, Chengdu, China .

## Introduction

Previous studies have shown that animal stimuli are afforded privileged processing in the human visual system, with reaction times to animal stimuli being faster than to other objects. However, pasting an object on a background can impair the reaction time in categorization tasks.

Here we investigate that whether pasting an object on a natural scene background will affect the response time to animal stimuli differently than other object types.

## Method

**Stimuli:** Animal(original/pasted) vs. Vehicle(original/pasted)

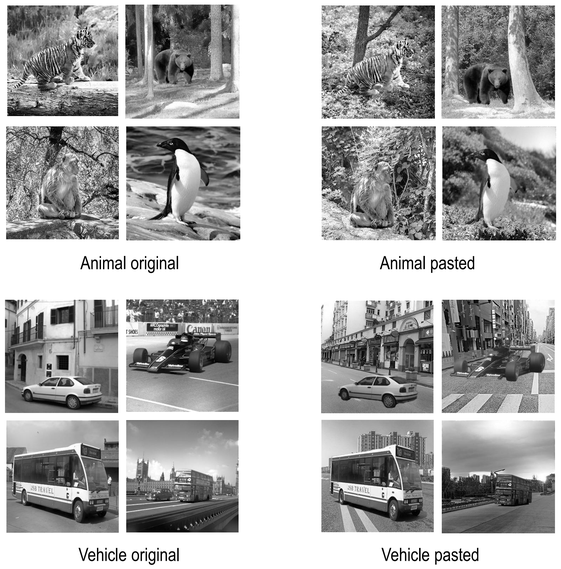
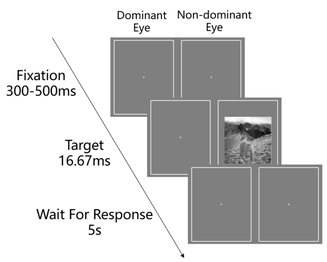



**Figure 1** **Stimulus**

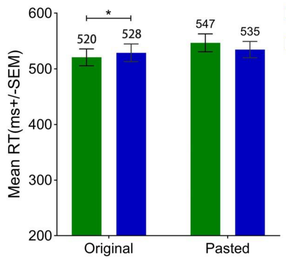
**Paradigm:** 2AFC (←/→)



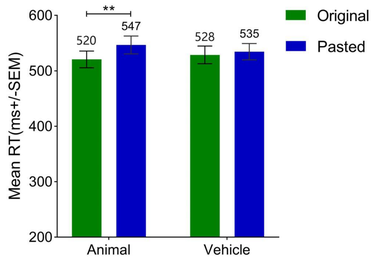

The corresponding key (left or right) needs to be pressed as soon as possible when subject sees the target (animal or vehicle).

**Figure 2** **paradigm**

## Results




- Animal original is faster than vehicle original (520vs. 528ms , p=0.047).
- Animal pasted is slower than vehicle pasted (547vs. 535ms , p=0.12).




- Animal original is faster than animal pasted (520vs. 547ms , p<0.001).
- Vehicle original is faster than vehicle pasted (528vs. 535ms , p=0.355).

**Figure 3** **Reaction time**

The results may be caused by the ‘paste’ manipulation, This manipulation may cause the visual saliency of the images to change, which leads to the changes of reaction time. According to the position relationship between the most salient zone and the target aera on image, we calculated the most salient zone by the saliency toolbox and divided the images into three categories(Inside\Close\Outside).

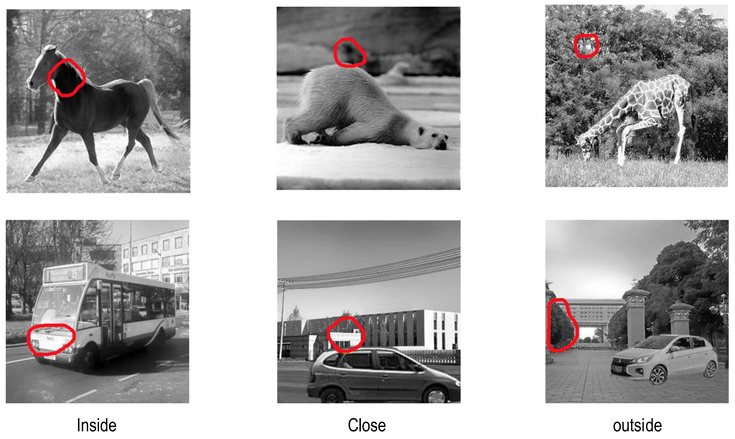



**Figure 4** **Saliency zone**

## Results

For animal images, after paste manipulation, the proportion of inside salient zones has not changed(Figure 5(a)), but the reaction time to animal original(inside) is faster than to animal pasted(inside)(522vs. 539ms , p<0.001) (Figure 6(a)).

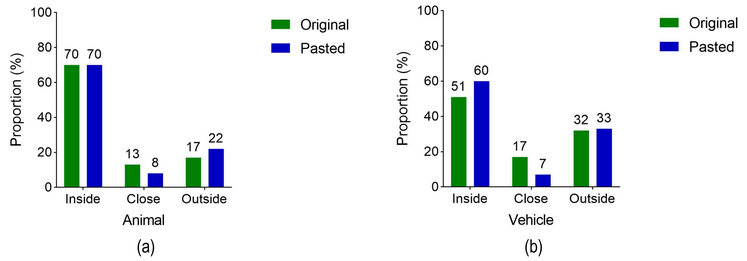



**Figure 5** **Proportion**

However, for vehicle images, after paste manipulation, the proportion of inside salient zones has increased(Figure 5(b)), and the reaction time to vehicle original(inside) is also faster than to vehicle pasted(inside)(528vs. 537ms , p=0.125) (Figure 6(b)), but there is no significance.

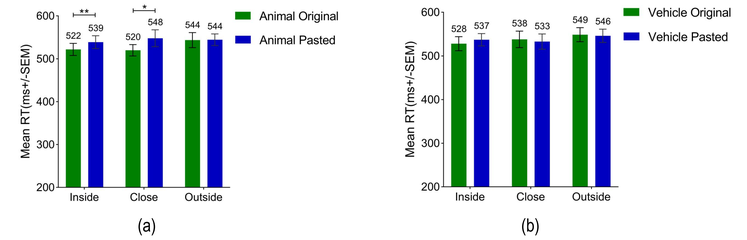



**Figure 6** **Reaction time**

## Conclusion

- Pasting an object on a background will impair the recognition of object, especially for animal object.
- Saliency may not affect target recognition.
- The cause of the loss of recognition performance may be the change of edge of the target and of the degree of fusion between the target and the background. Vehicle targets and backgrounds may blend better than animal.

**Acknowledgements** : This work was supported by the National Natural Science Foundation of China (61263042, 61563056)