

Motor congruency and multisensory integration jointly facilitate visual information processing before movement execution

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Introduction

Attention allows us to select important sensory information and enhances sensory information processing. Attention and our **motor system** are tightly coupled: attention is shifted to the target location before a goal-directed movement is executed, which is known as the **pre-movement shift of attention (PMsA)**.

Previous studies have shown that **congruence** in the motor system can boost visual information processing^{1,2}. Additionally, sensory information processing can be enhanced by **multisensory integration (MSI)**^{3,4}.

In this study we investigated whether the combination of MSI and motor congruency can further boost the PMsA and can enhance visual information processing even further.

Method

- 15 participants
- 2-AFC visual discrimination task
- EyeLink II (SR Research) and MiniBird (Ascension Technologies)
- Congruent eye- and hand movements
- Discrimination target presented in planning phase

Three conditions:

- (1) without sound (Com)
- (2) with sound spatially and temporally aligned (Com+)
- (3) with sound temporally misaligned (Com+-)

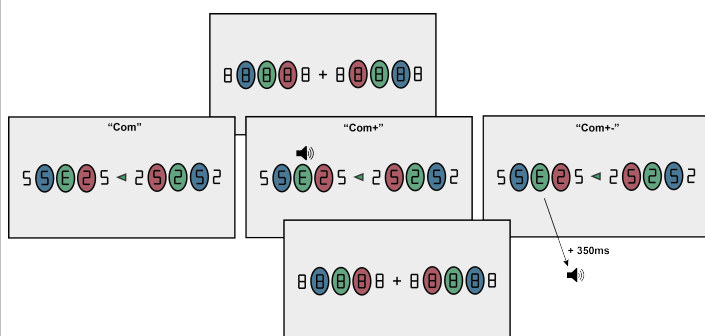


Figure 1: Visual discrimination task.

Participants make combined eye and hand movements to the green target locations (10° eccentricity) as soon as the arrow cue appears (1800-2200ms after fixation onset). The target ("E" or inverted "E") is presented for 250ms and surrounded by distractors ("5" and "2").

Results

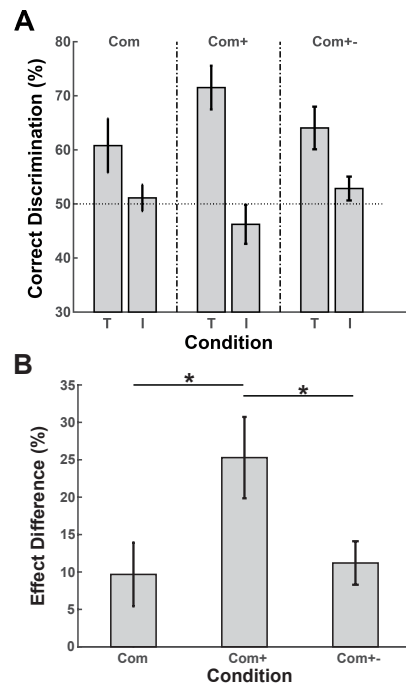


Figure 2: A) Performance on discrimination task. T= Target location; I= Irrelevant location. B) Effect difference.

Mean saccade latency = 293ms (SE = 21.65ms)
 Mean reach latency = 300ms (SE= 17.92)
 Mean saccade amplitude = 9.17° (SE = 0.31°)
 Mean reach amplitude = 9.14° (SE = 0.52°)

Mean latencies and amplitudes did not differ statistically between conditions

Discussion & Conclusion

- **Our findings indicate that congruence in the motor system and MSI can synergistically enhance visual information processing compared to congruence in the motor system alone**
- Utilizing both motor congruency and MSI can be of direct relevance for rehabilitation programs in patient groups with difficulties in attention, such as stroke patients suffering from visuospatial neglect

Acknowledgements & References

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