

Priming of shape in metacontrast and object-substitution masking

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Introduction

Priming with unseen stimuli in metacontrast studies is well established (e.g. Breitmeyer & Hanif, 2008; Breitmeyer et al., 2004, 2005, 2007; Enns & Oriet, 2007; Kentridge et al., 2008; Klotz & Neumann, 1999; Ro, Singhal, Breitmeyer, & Garcia, 2009; F. Schmidt & Schmidt, 2010; T. Schmidt, 2002; T. Schmidt & Seydell, 2008; Tapia & Breitmeyer, 2011; Tapia et al., 2010, 2011, 2013; Vorberg, Mattler, Heinecke, Schmidt, & Schwarzbach, 2003)

Priming with unseen stimuli in object-substitution masking (OSM) is less established (Chen & Treisman, 2009)

Metacontrast masking reduces stimulus visibility significantly even under focused attention conditions (Boyer & Ro, 2007; Ramachandran & Cobb, 1995; Shelley-Tremblay & Mack, 1999)

Reduction of stimulus visibility in OSM depends on stimulus location uncertainty and distributed attention (Di Lollo, Enns, & Rensink, 2000; Enns & Di Lollo, 1997, 2000; Pöder, 2012, but also see Argyropoulos, Gellatly, Pilling, & Carter, 2013)

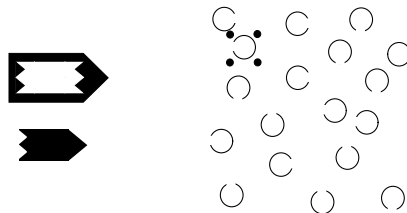


Figure 1. Examples of metacontrast (left) and object-substitution masking (right) stimuli

Attention modulates masked priming (Enns & Oriet, 2007; Finkbeiner & Palermo, 2009; Huang, Zhou, & Chen, 2011; Kentridge, Nijboer, & Heywood, 2008; Naccache, Blandin, & Dehaene, 2002; F. Schmidt & Schmidt, 2010; T. Schmidt & Seydell, 2008; Tapia et al., 2010, 2011, 2013)

Predictions

If masked priming depends on attention:

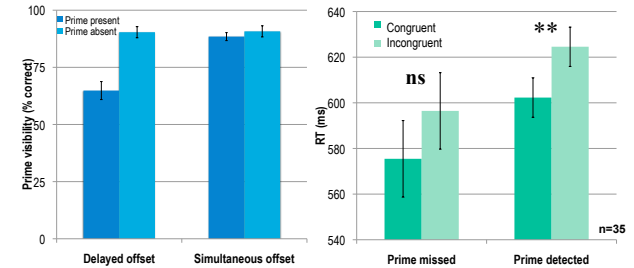
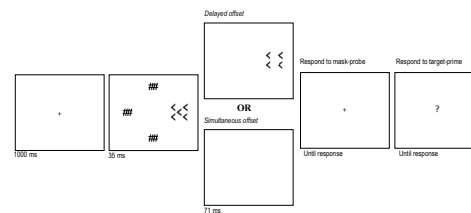
1. Priming should be more robust in a metacontrast than in OSM paradigm
2. Priming in metacontrast should be reduced with stimulus location uncertainty and distributed attention

Conclusion

Lack of priming with unseen stimuli in OSM and metacontrast under distributed attention suggests that **some degree of focused attention is required for masked priming**

Experiment 1

Priming of shape in OSM

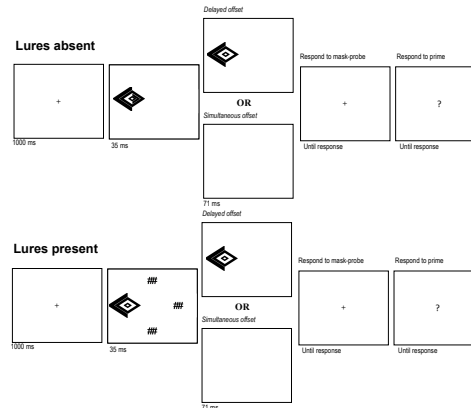


Left: Experimental design. Middle: Prime visibility was significantly reduced in delayed offset prime-present trials. Error bars represent between-subjects SEM. Right: Significant priming was obtained only when prime was detected (seen) ($d=0.44$). Error bars represent within-subject SEM.

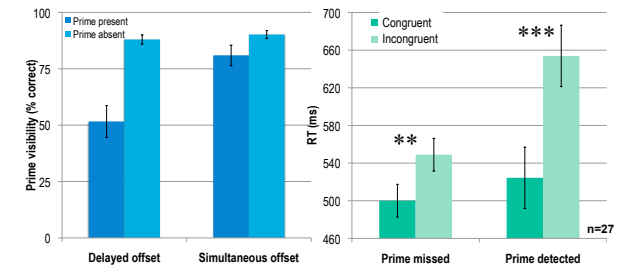
Priming with seen, but not unseen stimuli in OSM

Experiment 2

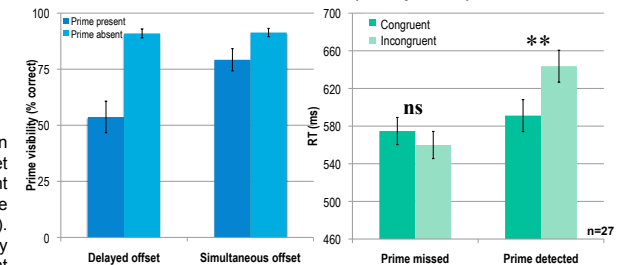
Priming of shape in metacontrast



Focused attention (lures absent)



Distributed attention (lures present)



Above: Experimental design. Upper right: Results in focused attention condition. Prime visibility was significantly reduced in delayed offset prime-present trials (error bars correspond to SEM), and significant priming was obtained in both prime detected ($d=0.76$) and prime undetected ($d=0.54$) trials (error bars correspond to within-subject SEM). Lower right: Results in distributed attention condition. Prime visibility was again reduced in delayed offset prime-present trials, but significant priming was obtained only when prime was detected ($d=0.59$).

Priming with seen and unseen stimuli in metacontrast, but not when attention is distributed



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