The effect of thematic relations on visual crowding of familiar objects

Nicolas Slaski*[1], Bilge Sayim[1], and Solène Kalénine[1]

[1]Laboratoire Sciences Cognitives et Sciences Affectives - UMR 9193 – Université de Lille, Centre National de la Recherche Scientifique – France

Résumé

Target identification in peripheral vision deteriorate when the target is surrounded by other visual stimuli (flankers). This phenomenon is known as visual crowding and has been extensively demonstrated for a large range of visual features (e.g., Herzog & Sayim, 2020). Interestingly, despite the inability to recognize a crowded target, higher-level semantic information may still be processed. For instance, crowded characters can still induce a semantic priming effect suggesting that their meaning passes through the bottleneck of crowding. However, how crowding may impact the identification of familiar manipulable objects remains a largely open issue. Everyday visual environments are often crowded with objects that convey rich semantic information. In particular, objects may be thematically-related (e.g. pen-notebook). Thematic relations share neurocognitive mechanisms with use action representations (Kalenine & Buxbaum, 2016). Moreover, thematically-related objects correctly positioned for action facilitate perceptual judgements, even implicitly (e.g. Roberts & Humprheys, 2011). Here, we hypothesize that thematic relations may survive crowding to some extent and influence the effect of crowding for familiar manipulable objects.

33 right-handed participants took part in the study. Stimuli were 12 sets of images of manipulable objects taken from Roux-Sibilon et al. (2018). Each set involved 3 objects: an "active" object (e.g. pen) and a "passive" object (e.g. notebook) of a thematic relation and an "unrelated" object (e.g. hat). Arranged in left/right pairs, objects were either thematically related (e.g. pen + notebook) or unrelated (e.g. pen + hat or notebook + hat). In the thematic condition, objects were correctly positioned for action (i.e. active object on the right) or not. Pairs were presented isolated or flanked by meaningless objects (crowding condition). A fixation cross was displayed in the screen center. Object pairs were randomly presented in the upper or lower peripheral visual field (6.2○) for 150 ms. After stimulus offset, a written object name was centrally displayed, any participants had to determine whether it corresponded to one of the objects presented by pressing one of two keys with their right hand.

Preliminary results show lower performance when pairs were crowded (65.7% correct) compared to isolated (83.4% correct). Performance was better when pairs were thematically related (78.0% correct) compared to unrelated (71.1% correct). Importantly, crowding interacted with thematic relations. The facilitating effect of thematic relation on target identification was reduced in the crowded condition. Yet thematic knowledge passed through the bottleneck of crowding: participants still showed better performance when crowded pairs were thematically related than unrelated. Our findings suggest that thematic relations can support visual identification of manipulable objects when perception is deteriorated.

*Intervenant

Mots-Clés: visual crowding, thematic relation, action representation, visual periphery, object identification