



HAL
open science

How does object shape the visual appearance of scene context?

Clara Carrez-Corral, Pauline Rossel, Carole Peyrin, Louise Kauffmann

► **To cite this version:**

Clara Carrez-Corral, Pauline Rossel, Carole Peyrin, Louise Kauffmann. How does object shape the visual appearance of scene context?. Forum annuel du GDR Vision (GDR Vision 2024), Feb 2024, Grenoble, France. hal-04554720

HAL Id: hal-04554720

<https://hal.science/hal-04554720>

Submitted on 22 Apr 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

How does object processing shape the visual appearance of scene context ?

Clara Carrez-Corral¹, Pauline Rossel¹, Carole Peyrin¹, Louise Kauffmann¹
¹Univ. Grenoble Alpes, Univ. Savoie Mont Blanc, CNRS, LPNC, 38000 Grenoble, France

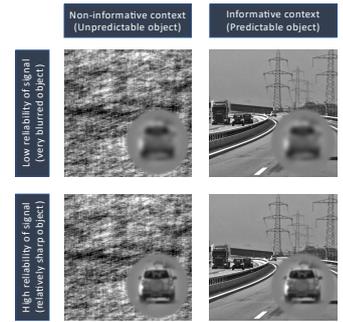
CONTEXT

Visual perception is not only determined by the intrinsic characteristic of **sensory inputs** but also by the **expectations** we have about them [1].

Previous studies on scene perception have for example shown that **context-based expectations** influence object categorization speed [2] and accuracy [3] but also their **subjective perception when visual inputs are noisy** [4].

Blurred objects than can be expected on their contextual information are perceive as sharper than the exact same blurred object that cannot (i.e., embedded in a meaningless, non-informative context) [4].

This effect was shown to be **modulated by the quality** (i.e., reliability) of visual signals and was stronger as visual inputs were noisy (i.e., blurred) [1,4,5].



AIM :

Can object-based expectations reciprocally sharpen the visual perception of scene contextual information ?

METHOD → BLUR PERCEPTUAL MATCHING TASK

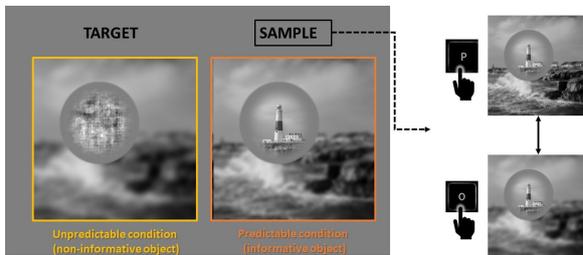
Participants : N = 30 (21.35 ± 3.61 years, 16 F)

Stimuli : 20 real-world scenes (10 indoors/10 outdoors scenes), containing a main object, resized to 350 x 350 pixels and converted to 256-level gray-scale images.

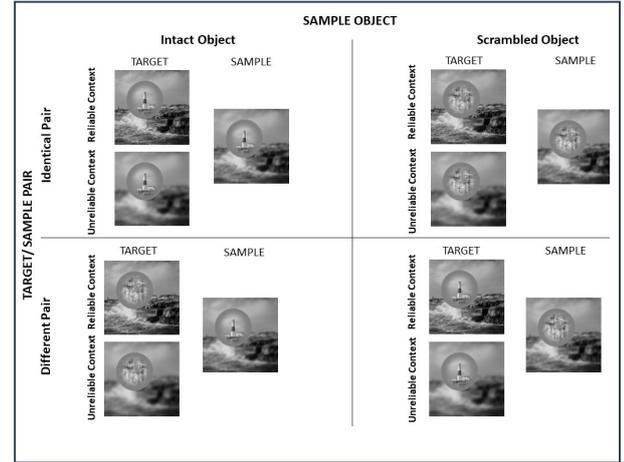
For each scene, contextual information was blurred with 31 blur levels. On each blurred context, we integrated an intact or phase-scrambled object.

Procedure :

- ❖ 2 images (Target and Sample) appear simultaneously on the screen.
- ❖ **Different blur level for each context → Participant had to adjust the blur level of the Sample context to match it with the Target one.**



Experimental conditions:

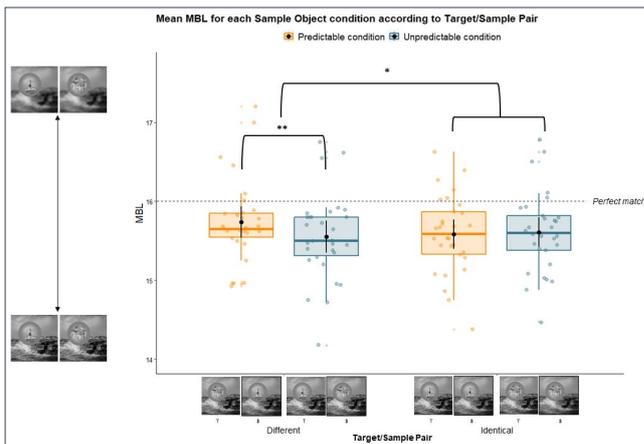


- ❖ **Mesure** : Matched Blur level (MBL) = Blur level attributed to the Sample context when matched to the Target context)

→ In the Different Target/Sample Pair condition:

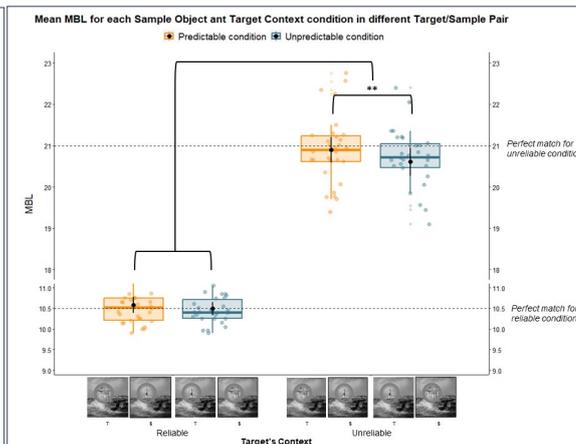
At an objectively equal blur level, scene contexts that can be expected based on object information (containing an intact object) should be subjectively perceive as sharper than context cannot (containing a scrambled object). Participants should compensate this perceived difference between contexts by attributing a higher blur level to Sample context when it contain an intact object than when it contain a scrambled object.

RESULTS



→ **Interaction between Target/Sample Pair type and Predictability of Context** : The MBL attributed to the context of the Sample is significantly higher when the object present in the context is intact (predictable) than when the object is scrambled (unpredictable).

→ Therefore, in Different Target/Sample pair condition, at an objectively equal level of blur, participants perceive the context containing an intact object as sharper than a context containing a scrambled object.



→ This effect is significantly more pronounced when the Target Context is unreliable (i.e., blurrier than the Sample context)

→ This perceptual sharpening effect of expectation increase as the signal reliability decrease.



CONCLUSION

Object-based expectation can also sharpen the perception of scene contextual information, especially when the signal reliability is low. Our findings are in line with recent neuroimaging findings^[6], demonstrating the reciprocal influence between context and object-based expectations in shaping the visual perception of scenes.

REFERENCES:
 [1] Pevs, C., Kuk, P., & Yee, D. (2020). The Perceptual Prediction Paradigm. *Trends in Cognitive Sciences*, 24(2), 13-24.
 [2] Jendry, D. R., Hise, D., Roussel, G. A., & Fabre-Thorpe, M. (2008). Early interference of context congruency on object processing in rapid visual categorization of natural scenes. *Journal of Vision*, 8(13), 11-11.
 [3] Jansport, J. L., & Pithon, M. C. (2004). Scene Consistency in Object and Background Perception. *Psychological Science*, 15(8), 529-534.
 [4] Rossel, P., Peyrin, C., Basso-Schiller, A., & Kauffmann, L. (2022). It makes sense, so I see it better! Contextual information about the visual environment increases its perceived sharpness. *Journal of Experimental Psychology: Human Perception and Performance*, 48(4), 332-352.
 [5] Rossel, P., Peyrin, C., & Kauffmann, L. (2022). Subjective perception of objects depends on the interaction between the validity of context-based expectations and signal reliability. *Vision Research*, 205, 108191.
 [6] Moshier, M., Burke, E., & de Lange, F.P. (2022). Predictive processing of scenes and objects. *Nature Reviews Psychology*.