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CREATING EMOTIONS TO ENCOUNTER CULTURAL HERITAGE SUPPORTED BY A NEUROSCIENTIFIC APPROACH

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INTRODUCTION

In our cities, tourism is focused not only on outdoor monuments and landscapes, but also on indoor environments (first and foremost, museums: but they're certainly not the only ones): actually, there is no sharp-edged line between the two, as both contribute to the strong impact of cultural tourism, that in turn generates an intolerable pressure on our cities.

Some solutions have been proposed, included the VR implementation, but the question is: can virtual reality relieve this pressure?

On the other side, many difficulties could make access to places of cultural interest difficult or impossible: from the accessibility matter to global emergencies, security risks, economic or social difficulties.

In many cases, keeping museums open, or letting tourists visit sites of relevant interest is highly inadvisable or even impossible. Then, Virtual Reality is emerging in the cultural heritage sector, offering unprecedented opportunities for inclusion and keeping Heritage accessible to a wider range of users,[1] but the question again is: can virtual reality replace real experiences?

The answer to both questions, of course, is no. However, VR solutions simply re-proposing things as they are in physical reality would not fully exploit all their potential. The possibility to manipulate the environment in which the cultural encounter takes place is an important point in favor of VR: Actually, while real museums have to choose between possible layouts, which do not necessarily meet the sensibilities of all visitors, virtual ones can offer a set of different presentations and/or interpretations which can be targeted and offer multifaceted presentations of the same object (without replacing the real experience, but balancing the limits of a physical arrangement).

Supported by the psychological sciences, the Authors tested the impact of different possible settings by monitoring the emotional and cognitive reactions of a sample of respondents, finding differences and constants depending on age, gender and cultural background. The paper illustrates the results of this experimental study carried out in virtual museum environments: in this way, the complexity and the richness of cultural finds can be preserved in difficult times.

The role of emotions in cultural encounters

The core of the research is on the role of emotions in cultural encounters.
Despite the so-called affective turn in humanities, and the partial rediscovery of emotions in the last decades, they are still under evaluated while they significantly influence all experiences, included the cultural ones. In this case, they can support memorization, trigger reflection and create empathic responses.
What exactly emotions are is not yet definitively defined, because they are both conscious and unconscious (that is, bodily) processes. Their origin is of a chemical nature, not under the control of the by conscious thought: only at a second stage they are processed by the mind to become feelings that we are aware of and able to recognize. Then, this project was carried out in collaboration with Neuroscientists.
In order to understand how people respond to spatial attributes, and to test the different emotions triggered by different settings in museums, some experiments have been carried out: the Authors, via Neuroscience' Method, tested the impact of different, possible settings by monitoring the emotional and cognitive reactions of a sample of respondents.
The results can be very inspiring to create a set of (virtual) solutions for different people, in relation with cultural content. The main question is: do the properties of space affect the encounter with the displayed objects? The hypothesis, of course, is yes. But, putting in practice, it might be somewhat weird to state that we can communicate a story, or rather, the emotions linked to a story, with lines, materials, lights, colors, textures.

An experiment to understand the effect of different interior settings

A museum room, presenting an object in a certain atmosphere, generates an emotional, spontaneous response in visitors: in terms of valence and arousal.[2]
In this experiment the same space to display the same objects was modified according to several versions, to respond to the tastes and perceptual understandings of different people, increase the quality of spatial experience and the appreciation of cultural contents.
The question is: do the properties of space vary the attitude that people have towards a given environment and therefore their encounter with the displayed objects? The hypothesis is ye
The research team studied different design solutions to display two archeological pieces
Starting from the stories of two people as reported in Roman tombstones, it was discussed what was the best way to present them, changing spatial attributes such as light, color, material and graphics.
The first piece is a funerary mask which, as the accompanying tombstone recalls, was commissioned by the mother of the depicted girl (Claudia Victoria), who died aged eleven, to always remember her face. The second item is an epitaph recalling a goldsmith (Lucifer), his passion for his work and his ability to create light.
Based on the assumption that different design solutions create different emotional effects, the research team altered some spatial attributes such shapes, colors, surfaces, openings, textures, graphic elements, and of course light, aiming to reveal visitor's conscious emotional responses and their preferences. A very simple room was designed to display the pieces, starting from a spatial baseline as neutral as possible, on which to make further modifications: a room with a length of 4 m, a width of 3.5 m and a height of 4.5 m; wall surfaces finished in white plaster; floor element finished in concrete; ceiling element finished in white plaster. To develop display solutions specifically designed for each piece and its story, the two archaeological pieces were studied separately. Starting from the stories of Claudia Victoria and Lucifer as reported in Roman tombstones, it was discussed what was the best way to represent them. The proposed alterations were chosen to be in harmony with the history of the works

and to arouse specific emotional states. In some cases, the alterations have been proposed in combination, in other cases a single alteration has been used (fig.2).
The related research question was: can you communicate a story, or rather, the emotions linked to a story, with lines, materials, lights, colors (Figure1)? If yes, knowing the story and not knowing it, can lead to a different emotional responses? Which spatial settings obtain greater involvement in relation to the disposed object[3]?
The experimental protocol was thus designed splitting the sample in two groups: the first one received the information/story related to the objects, so that it affected their evaluation of the display from an emotional perspective; the second one did not receive any previous information/story about the objects, so that they expressed a judgment mainly of aesthetic nature (fig.1)
The different settings sequence (fig. 2, fig.3) was presented online, asking to choose an emotional state from a predetermined list. It was aimed to understand whether the expected emotional state for each alteration reflected the emotional state actually chosen by the interviewees.

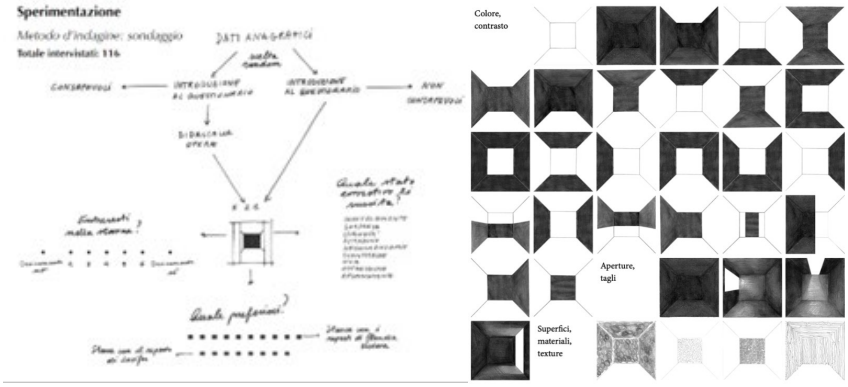


Figure 1. Concept: study of elements to modify for interior settings such as shapes, colors, surfaces, openings (right)

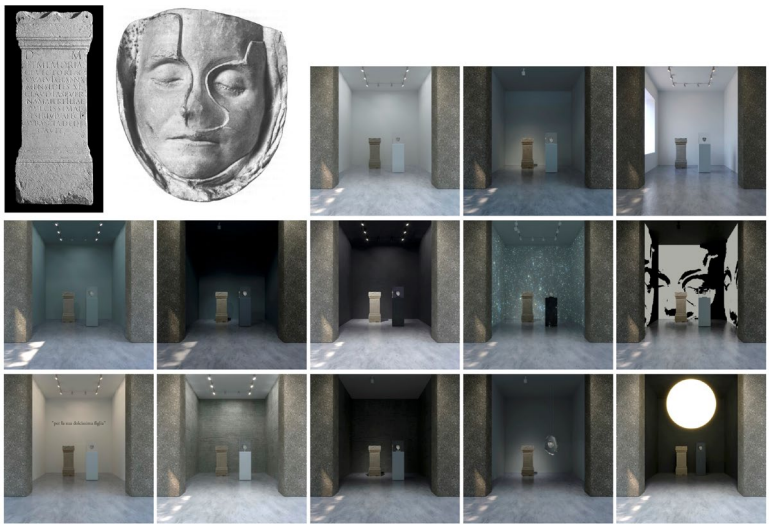


Figure 2. Different settings created for the epigraph and plaster cast of Claudia Vittoria situated on the top left part, with alterations of light, surface treatment, graphic elements and volumetric articulation.

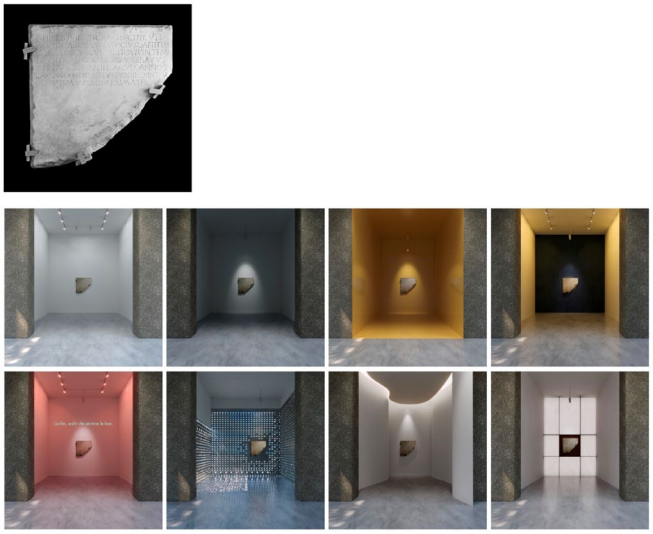


Figure 3. Different settings created for the epigraph of Lucifer situated on the top left part, with alterations of light, surface treatment, graphic elements and volumetric articulation.

For each image two questions were asked. The first question was «Would you like to enter the room?». The answers, expressing a motor response, were given on a seven-point Likert scale. The second question was: «What emotional state does the image arouse?» Respondents could choose between nine emotional states, four of which were positive: involvement, surprise, curiosity, attraction, four negative: disinterest, boredom, oppression, rejection and one neutral: no emotion. The choice of emotional states was dictated by the need to find emotions or moods that were relevant to the museum sphere for the interviewees.

At the end of the questionnaire, all the images were proposed again, all together but separately for the two pieces: thirteen images related to Claudia Victoria's findings and eight images related to the Lucifer epitaph. For both groups it was asked: «which do you prefer? » Then, respondents were asked to select one of the images.

The results of the experiment

The results are summarized in figures 4-8, which, for the sake of brevity, only report the case of Claudia Victoria findings).

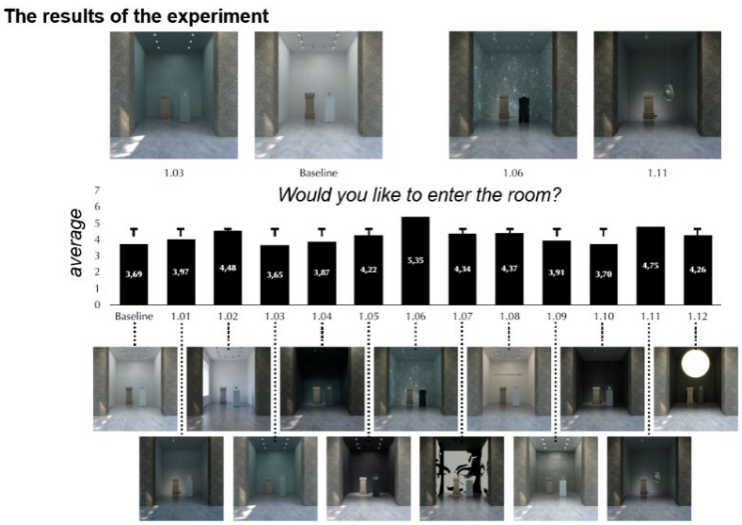


Figure 4. Claudia Victoria's results

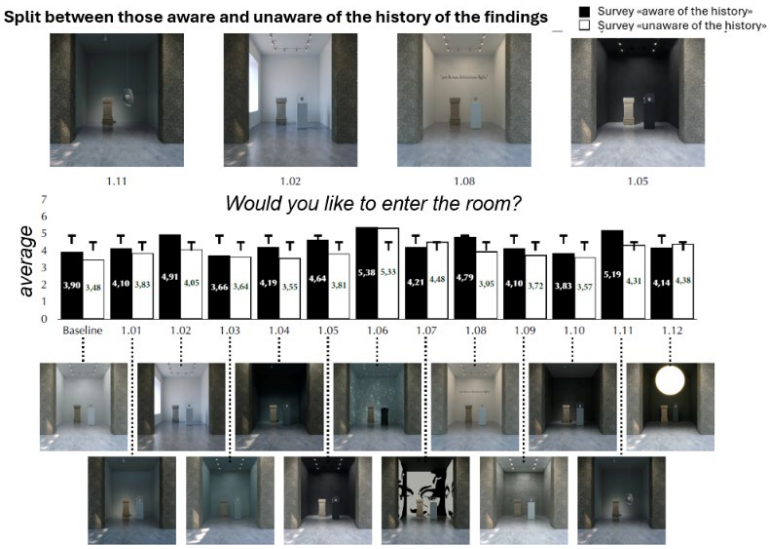


Figure 5. Claudia Victoria's results, split between those aware and unaware of its history

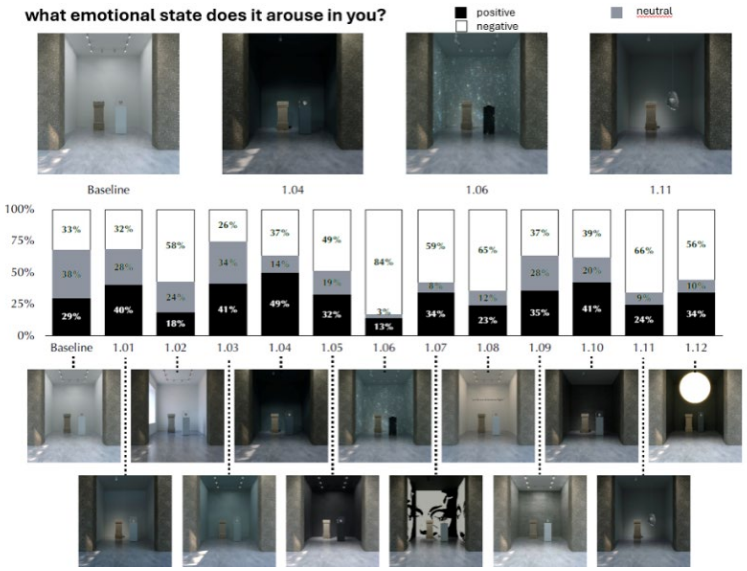


Figure 6. Claudia Victoria's results, referred to emotional states

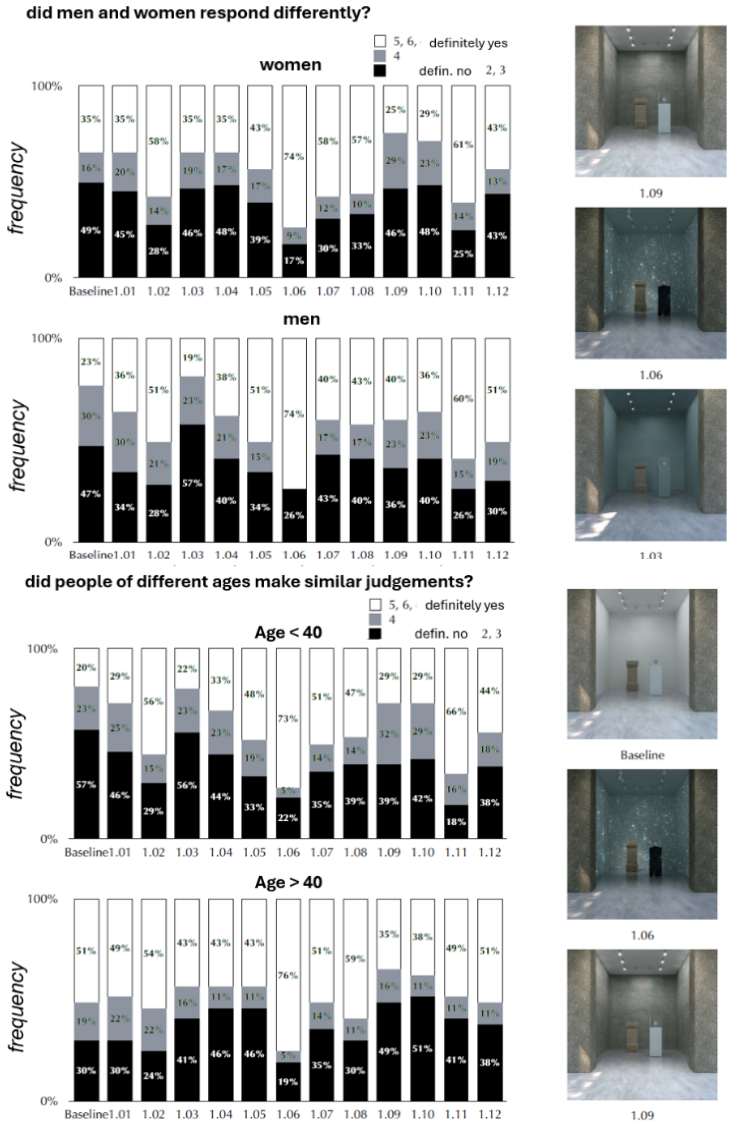


Figure 7. Claudia Victoria's results, split by gender(above) and split by age(below)

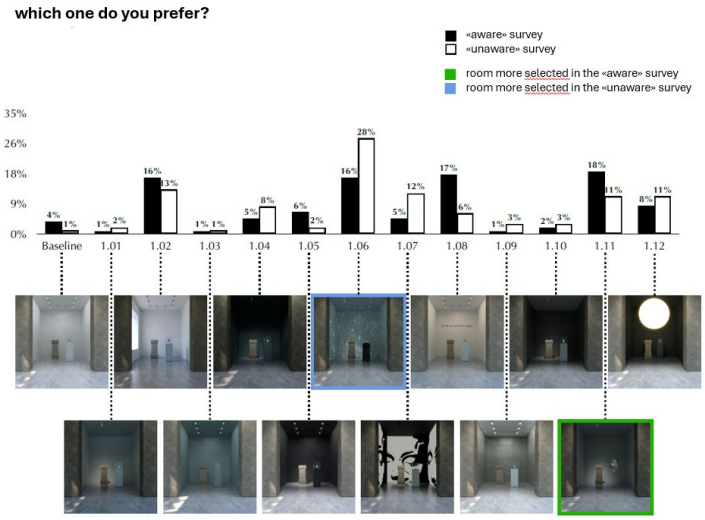


Figure 8. Claudia Victoria's results: general preferences

Comparing the answers of the first question ("Would you like to enter the room?") with the answers of the second one ("What emotional state does the image arouse?") it is clearly seen that there exists a direct correlation between them. Who choose to enter the room express positive emotional states and who express a low willingness to enter, express negative emotional states or no emotion.
Regarding the answers to the question “which one do you prefer?” the preferences show significant differences, and this finding proves that interior setting has a great impact on pleasantness and appreciation. The statistical analysis showed that the least-liked category for Claudia Victoria’s findings was the alteration of the surface treatment and the most liked category was the alterations of lighting design. While the solutions without a particular contrast regarding colour, material and light get lower votes (e.g. baseline), solutions with elements that represent higher contrast especially regarding lighting design/concept get higher votes (e.g. room with lighting concept interpreting a sky full of stars) (Figure 4).
If we compare the answers of Claudia Victoria’s finding with Lucifer’s finding, the latter were given higher average votes. Also among the spatial alternatives created for the finding of Lucifer, the baseline received lower votes while alterations of light with higher contrast get higher votes. Volumetric alterations such as the alternative with curved lines received higher votes, too (Figure 9).

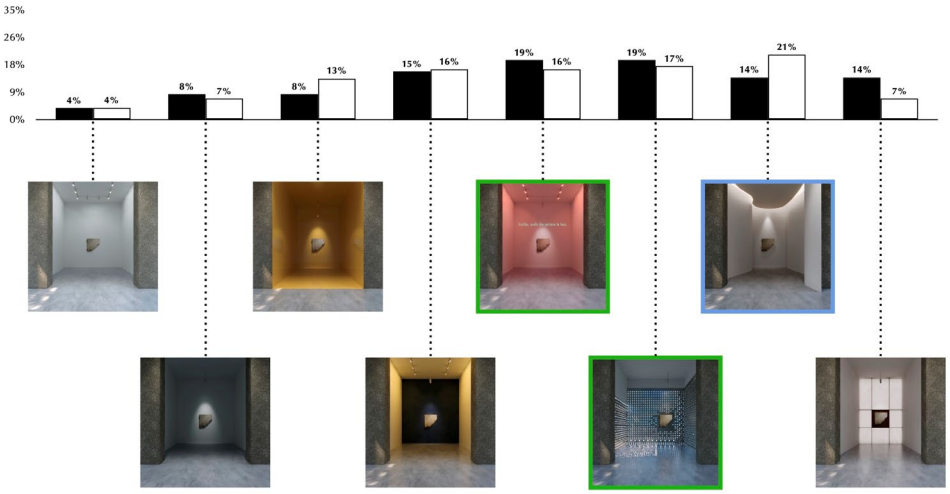


Figure 9. Preferences for different settings created for the second piece (epigraph of Lucifer).

There are no statistically significant differences between the responses to the conscious questionnaire and the responses to the unconscious questionnaire, but the trends are clearly different, as shown in fig…. It can be noted that when the setting expressly refers to history of objects, to be aware or not of it significantly changes the preferences.
The same can be stated regarding the differences of gender: there are no statistically significant differences, however it can be observed that in general males seem to have a greater tendency to express negative judgments, while females seem to have a greater tendency to express positive judgments.
Regarding «age groups» factor, there are many similarities between the different groups. It can nevertheless be inferred that the baseline is the room where under 40s would enter least, while over 40s would enter to a large extent; instead, there is convergence on the room that neither group would like to enter. Moreover, young people seem less inclined to get involved than older people, and they express less positive judgements

CONCLUSIONS AND PERSPECTIVES

This study needs to be framed in a wider context, which involves communicating cultural heritage on the one hand, and the possibility of enjoying it in different ways, tailored to different audiences, thanks to virtual solutions.

It was an opportunity for two kinds of reflections: concerning the multiplicity of solutions for displaying the same objects (expose the same object (and, by extension, also more complex cultural systems) and the multiplicity of visitors' reactions and preferences.

Visitors, as we know, are not all the same (in terms of background, age, inclinations and interests, gender, memories, beliefs), so resorting to different displays can be a way of conveying the values and meanings of a cultural heritage to different sensibilities.[4]

In particular, if physical access is inadvisable or impossible, the virtual visit can balance its lower degree of sensorial involvement with a multi-layered reading, which allows one to appreciate in one case the aesthetic values, in the other the emotional ones; in one case the narrative contents, in the other the informative ones, in an experience that is difficult to replace.



Figure 10. Ecological experimentations in the frame of META-MUSEUM European project (left) and Neuromuseum national project (right, performed via VR environment)

After this study, further experiments were carried out by the research team in ecological conditions (i.e. not in the laboratory or online, but directly in museums), with wearable devices measuring neurophysiological parameters, to monitor the participants' bodily reactions to cultural stimuli,[5] as depictd in fig 10, showing the measurement of brain waves and emotional parameters via a casque and a "bracelet" with finger rings, during a cultural experience (physical and virtual).

All these experimentations pave the way for many other experiments in interior as well as exterior spaces (such as archeological digs and sites). They can significantly contribute to understand and interpret the so called "genius loci", and they can be an innovative support for addressing the "dissonant" heritage, where the emotional side is conflictual and sometimes traumatic.

Finally, this approach makes it possible to communicate the heritage in a more conscious way,
putting the user at the centre. This is indeed a way of preserving the complexity and the richness of cultural finds, in difficult times.

NOTES

[1] Michela Benente and Valeria Minucciani, "Inclusive Museums: From Physical Accessibility to Cultural Appropriation", in Proceedings of the International Conference AHFE 2020, AISC 1202, edited by Giuseppe di Bucchianico (Heidelberg: Springer, 2020), 189-195

[2] Elisabetta Canepa, Architecture IS Atmosphere (Roma: Mimesis International, 2022)

[3] Carlos Marti Aris. Las variaciones de la identidad. Ensayo sobre el tipo en arquitectura (Demarcación de Barcelona del Colegio de Arquitectos de Cataluña, 1993 / Fundacion Caja De Arquitectos, 2014)

[4] Jean-Michel Tobelem, La culture pour tous. Des solutions pour la démocratisation? (Paris: Fondation Jean-Jaurès, 2016)

[5] As part of the national project Neuromuseum, (funded by the Italian Ministry of University and Research and coordinated by Valeria Minucciani), and the international project Meta-Museum (funded by Europe, in the frame of Horizon Europe Program, coordinated by Valeria Minucciani)

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