VISUAL COMPLEXITY AND COHERENCE ON THE PERCEIVED PLEASANTNESS IN HIGHER EDUCATION CLASSROOMS

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1. Context

The increase in the number of higher education courses on offer makes us not only question the commitment to the quality of teaching and learning, but it also raises questions about the pleasantness of teaching environments.

With regards to the importance of the design of teaching environments, it must be noted that for Sanoff (2001), the classroom environment contributes to learning when it is carefully designed and meets the needs of its users.

It must be understood, however, that according to Villarouco (2011), the ergonomics of the environment go beyond purely architectural issues, to include the adaptability and conformity of the space to the tasks and activities that will be undertaken in them, and which are also mediated through the feelings and perceptions of users.

Based on this point of view, environments are also related to psychological phenomena, which are subjective, and which are recognized as environmental attributes which can influence the user's performance within the environment.

With a focus on the affective assessment of environments, an empirical investigation based on Facet Theory was carried out. Two characteristics of the attributes of classrooms for higher education (facets), complexity and coherence (obtained by reducing contrast), were chosen for study due to their possible influences in the perceived pleasantness of this type of environment.

In this context, and being in favor of new guidelines and a review of existing attitudes towards environmental projects for higher education, this article aims to provide empirical data on the effects of complexity and coherence of classrooms for higher education on perceived pleasantness.

From the point of view of its importance for the ergonomic methodology of built environments, this research is justifiable as it will contribute data which will guide the development of environmental projects. It will therefore, in a broader sense, increase the perceived visual quality of classrooms in higher education and the affective needs of its users, since the design process cannot be reduced to the act of simply designing a building or an environment that is only adequate from the practical-functional point of view.

In addition, it should be noted that Kaplan and Kaplan (1989) define environmental assessment as the product of two processes related to human survival: "involvement" and "making sense", since an environment must be engaging to attract attention, and make sense so that one can operate in it. Complexity and coherence are the environmental characteristics related to these two human processes.

Complexity concerns the diversity of elements in a scene, which means the number of different visible elements and the distinctions between them. It has been suggested that too little complexity is monotonous and too much is stressful. An intermediate level is possibly the most pleasant (Berlyne, 1972; Wohlwill, 1976; Nasar, 2000).

Coherence is defined as the degree to which the scene fits together, including factors that facilitate the organization of the layout, its comprehensibility and structuring, and which can reduce uncertainty and increase the hedonic tone (beauty or pleasantness) of the scene (Kaplan & Kaplan, 1989).

Although the perceived visual quality depends, in part, on perceptual/cognitive factors, it is, by definition, an emotional judgment that involves evaluation and feelings (Nasar, 1988). As a result, in this research perceived pleasantness was measured through evaluative judgments of classroom scenes of higher education, in which the characteristics of complexity and contrast were systematically manipulated.

Based on the findings of Ward and Russell (1981), in relation to the descriptors of affective quality, this research intends to evaluate the perceived pleasantness of several classroom scenes for higher education.

With the aim of summarizing the empirical evidence gathered, it is worth noting that according to Nasar (2008), the effect of complexity on the perceived pleasantness of the environment would be significantly greater for scenes with medium complexity than for those with minimum or maximum complexity. In relation to the effects of coherence (obtained by reducing contrast), it is suggested that pleasantness would be higher for scenes with high coherence (low contrast) and less for scenes with low coherence (high contrast).

2 Method

Facet Theory (FT) was used here to structure the research design into a conceptual model defined by a structuring sentence for the assessment of perceived pleasantness in higher education classrooms, which reflects the relationships between the internal elements of the facets, as it is precisely these relationships that will be tested in the empirical situation through images of higher education classrooms.

The empirical research carried out, which was exploratory and without the use of probabilistic sampling (Marconi & Lakatos, 2002), used an online questionnaire based on the Multiple Sorting Procedure as a method to collect the data.

The classroom scenes for higher education, obtained from Google Images, were validated by a group of students from the UFPE Postgraduate Program in Ergonomics, who acted as judges, with the aim of obtaining a consensus on three different levels of perceived complexity and contrast between the scenes.

After gaining introductory information about each participant's profile, they were asked to indicate the extent to which they would prefer to be in and stay in each of the nine classroom scenes. In the universe of possible responses, five different levels were offered, ranging from "nothing" (minimum preference) to "too much" (maximum preference).

In order to develop a correspondence between the system of conceptual definitions provided by the structuring sentence and empirical observations, classic Facet Theory makes use of computational programs that apply multidimensional scaling techniques which, in general, aim to systematize and discover a hidden structure amongst the data. Among the techniques most associated with facet analysis, Similarity Structure Analysis (SSA) stands out (Costa Filho, 2014), and is used to analyze the data obtained in this research.

3. Results

By the end of the research, there were 20 respondents with a complete level of higher education, aged between 29 and 56 years, most of whom were women (15), aged between 29 and 43 years old.

The data obtained from online surveys was tabulated on a Microsoft Office Excel spreadsheet, with the aim of ordering the five different levels of the proposed scale that each of the nine classroom scenes for higher education received from each participant. This raw data was then fed into the HUDAP (Hebrew University Data Analysis Package) to initiate the processing of SSA and to verify the effect of complexity and consistency on the perceived pleasantness of this type of environment.

The results of the SSA diagrams revealed that both tested facets - complexity and contrast - form regional contiguity structures between the items of the same internal element, confirming the influence of both categories on the assessment of the perceived pleasantness of classrooms for higher education. It is also possible to verify that the two diagrams of the SSA show circular shapes that divide each of them into three distinct regions.

These results deserve special attention, as this pattern of division denotes that the two categories (facets) have a strong influence on the assessment of perceived pleasantness in classroom scenes of higher education. The two facets play a "modular" role in the SSA maps, a pattern in which the items represented in the central part of the circular shapes (moderate complexity and low contrast) have a more general and regulatory character for the suggested assessment than those in the peripheral regions, which correspond to the specific aspects related to the descriptor of the investigated affective quality (pleasantness).

The results also suggest that the research participants are more influenced by higher education classroom scenes with moderate complexity and low contrast (high coherence) in the assessments of perceived pleasantness, validating the formal frame of reference that environments with moderate complexity and low contrast (high coherence) influence perceived pleasantness.

The data obtained was also interpreted using a table of distribution of data frequencies, which considered the sum of the scores attributed by all research participants for the nine scenes of higher education classrooms. This second analysis helped determine the integrated levels of complexity and contrast which increase and decrease the pleasantness perceived in classroom scenes of higher education.

The collected data, in a broad context, contradicts the expected effect of complexity and contrast (coherence) on evaluative responses to perceived pleasantness in environments.

The classroom scene for higher education with maximum complexity and high contrast (low coherence), was perceived by respondents as the MOST pleasant; while the scene with moderate complexity and high contrast (low coherence) was perceived as LESS pleasant.

The empirical results, ascertained through the frequency distribution table of the data, differ from that which is suggested by the theory for the perceived pleasantness of environments.

4. Conclusion

As demonstrated, through the aid of Facet Theory, the environmental characteristics selected for the assessment of pleasantness in classrooms for higher education - complexity and contrast - proved to be relevant and consistent for the type of evaluation proposed.

The results obtained through the diagrams of the SSA, which corroborate with the theoretical reference frame, demonstrated empirically that the classroom scene for higher education with moderate complexity and low contrast (high coherence) influences the assessment of perceived pleasantness in this type of environment.

Using the frequency distribution table of the data obtained, it was also found that the scene with maximum complexity and high contrast (low coherence) increases perceived pleasantness, which is contrary to what the theory suggests with regards to perceived pleasantness in environments.

5. References

Berlyne, D. E. (1972). Ends and meanings of experimental aesthetics. *Canadian Journal of Psychology, 26.*

Costa Filho, L. (2014). O enfoque da Teoria das Facetas na avaliação de lugares. In C. Mont'Alvão & V. Villarouco, (Orgs.), *Um novo olhar sobre o projeto, 2: a ergonomia no ambiente construído* (pp. 11-26). Recife: Editora UFPE.

Kaplan, S., & Kaplan, R. (1989). *The experience of nature: A psychological perspective.* New York: Cambridge University Press.

Marconi, M. A., & Lakatos, E. M. (2002). *Técnicas de pesquisa: planejamento e execução de pesquisas, amostragens e técnicas de pesquisas, elaboração, análise e interpretação de dados.* 5. ed. São Paulo: Atlas.

Nasar, J. L. (2008). *Visual quality by design.* Michigan: Haworth, Inc.

Nasar, J. L. (2000). The evaluative image of places. In W. B. Walsh, K. H. Craik, R. H. Prince, 2nd ed. (Eds.). *Person-environment psychology: new directions and perspectives* (pp. 117-168). New Jersey: Lawrence Erlbaum Associates.

Nasar, J. L. (1988). The effect of sign complexity and coherence on the perceived quality of retail scenes. In J. L. Nasar (Ed.), *Environmental Aesthetics: theory, research, & applications* (pp. 300-320). New York: Cambridge University Press.

Sanoff, H. (2001). *School building assessment methods.* Disponível em: <http://www.edfacilities.org/pubs/sanoffassess.pdf>. Acesso em: 05 out. 2018.

Villarouco, V. (2011). Tratando de ambientes ergonomicamente adequados: seriam ergoambientes? In C. Mont'Alvão & V. Villarouco, (Orgs.), *Um novo olhar sobre o projeto: a ergonomia no ambiente construído* (pp. 25-46). Teresópolis: 2AB.

Ward, L., & Russell, J. The psychological representation of molar environments. *Journal of Experimental Psychology: General*, 110, p 121-152, 1981.

Wohwill, J. (1976). Environmental aesthetics: The environment as a source of affect. In: I. Altmann, J. F. Wohwill (Eds.), *Human Behaviour and Environment: Advances in theory and research, V. 1.* p 37-86, New York: Plenum, 1976.