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Architectural enclosure's effect on office worker performance: A comparison of the physical and symbolic attributes of workspace dividers

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ABSTRACT

Most studies of offices examine their physical or symbolic attributes independently. Yet office components can contain both attributes. To minimize unintended but potentially negative effects on occupants, researchers must consider both the physical and symbolic attributes of components when making recommendations about their deployment. This study compares the effects of the physical and symbolic attributes of architectural enclosure on worker performance using a survey database that contains workers' ratings of their office components. The amount of enclosure is determined by the height of the occupant's workspace divider, with taller dividers offering more enclosure. Divider height is positively associated with ratings of the two physical attributes considered: speech privacy and visual privacy. Divider height, however, does not affect occupants' ratings of a home-like atmosphere or workplace pride, the symbolic attributes considered. Yet, the occupants indicate that the two symbolic attributes are more important than the two physical attributes in improving their work performance. This might lead to office design choices. An office designed to maximize worker performance might do so by maximizing its symbolic impact. This analysis suggests that an office's symbolic impact may not always be increased by including more offices with tall dividers like enclosed, private offices.

1. Introduction

Office design problems can be difficult to solve due to the multitude of factors affecting workers. It is challenging to understand how changes to one factor might affect other factors [1]. For example, a decision to improve collaboration may affect privacy. As this example suggests, designers need ways to control competing factors in their designs [2]. Although much has been discovered regarding individual relationships between buildings and occupants, the research community has just begun to investigate conflicts between factors.

Potential conflicts between the building's physical environment and its symbolism deserve particular concern. Designers and managers are expected to understand that 'how people feel about their workplace matters as much as how they use it' [3], and that the symbolism of an office design may be just as important as the physical conditions in that office. Yet without further research, designers will lack techniques to counteract conflicts between the two. Here, potential conflicts between the physical and symbolic attributes of architectural enclosure are addressed using survey data. This paper compares the effect of two physical attributes and two symbolic attributes of architectural enclosure on worker performance. The two physical attributes of interest are speech privacy and visual privacy. The symbolic attributes analyzed are feelings of a home-like atmosphere and workplace pride. The amount of enclosure is determined by the height of workspace dividers. These comparisons provide the background for discussing the spatial implications of deploying workspace dividers in offices.

2. Background

2.1. Definitions

The four workspace divider types presented in this paper and described below reflect variations in layout as defined by Vos [4]. The layout variations are classified by type of divider [5] and the degree of enclosure that divider offers. As the height of the divider decreases, so does the amount of enclosure. Thus in this paper, offices with full height walls are described as enclosed. Cubicles with high partitions are offices with dividers over 5 feet tall, but that are not full height. Cubicles with low partitions are offices with dividers less than 5 feet tall. An open office has no partitions.

This study discusses the association between the level of enclosure offered by the different dividers and two physical and

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two symbolic attributes of enclosure. Both physical attributes relate to privacy, which is a 'sense of control over access to oneself or one's group' [6]. Thus, speech privacy is the ability to control access to your conversations and those of your neighbors. Visual privacy is the ability to control access to the sight of you or your coworkers. Speech and visual privacy survey responses rate the building's success at offering such control as necessary. Environmental stimuli with discrete magnitudes can be measured in relation to both speech and visual privacy. For example, it is possible to accurately measure sound, light and occupant density.

Symbolic attributes relate to a building element's ability to invoke an idea. A common connotation of 'home' is a place of refuge or sanctuary. Thus, we take occupants' ratings of a home-like atmosphere to reflect how well the building's components invoke or symbolize refuge or sanctuary for workers. A common connotation of pride is to take pleasure in something believed to reflect credit upon oneself. Thus, we take ratings of workplace pride to reflect how well the building's components reflect prestige upon its occupants. In contrast to the physical attributes, only relative magnitudes can be attached to the symbolic attributes.

As is described in Section 3.2, the physical and symbolic attributes are easily comparable because they are measured on the same relative scale. From these data we glean occupants' satisfaction with the amount of physical or symbolic stimulus the building facilitates or prevents. We cannot compare however, the quantities of associated stimuli directly since the exact magnitudes of the symbolic stimuli are unknown. Precise methods of measuring symbolic stimuli have not been developed.

Long-term exposure to the building's stimuli – physical or symbolic – can affect worker performance [7]. When conditions inhibit work, extra cognitive or emotional effort is required to overcome deficiencies in work performance [8]. The opposite is also true; a building can support work performance with its stimuli. Worker performance responses rate whether a building's physical and symbolic stimuli compel extra effort to produce work.

2.2. Architectural enclosure's physical and symbolic attributes

Numerous studies show that an occupant's sense of visual privacy and speech privacy are correlated with the degree of enclosure offered by their workspace divider [9–15]. Workers in enclosed configurations rate both their visual and speech privacy higher than those in open configurations. Further, workers that are moved from closed to open configurations show decreased satisfaction and motivation [14,16]. This is logical as the degree of enclosure decreases, so does an occupant's ability to prevent intrusions from sound or other occupants' movements.

While there is a great deal of research about associations between office configurations and privacy, there is very little written about the association of enclosure with the symbolic attributes analyzed in this study. Krohe [3] speculates that enclosed work spaces feel 'more like home' to occupants. Two additional studies suggest that the absence of a home-like feeling makes occupants feel threatened or vulnerable [16,17]. Yet, no study has directly investigated the association between feelings of a home-like atmosphere and the degree of enclosure a particular office configuration offers.

Konar's [18] study implies a relationship between workplace pride and enclosure via status. This study suggests a relationship between the status associated with an enclosed office and an overall workspace indicator that included pride. Ferguson [19] found a statistically significant correlation between indicators of material permanence and workplace pride. Occupants saw enclosed offices as more permanent than cubicles; thus workers in enclosed offices exhibited higher levels of workplace pride than their counterparts in cubicles. Konar and Ferguson found a correlation between pride and degree of enclosure, but each through a different intervening variable. Notwithstanding the intervening variable, the literature suggests that degree of enclosure is associated with workplace pride; thus it is plausible that workers experience a sense of pleasure from the possession of more architectural enclosure.

2.3. Architectural enclosure and worker performance

Many studies have found a positive association between decreased speech and visual privacy and increased cognitive workload [13,14,20,21]. This increased cognitive workload, in turn decreases worker performance. In contrast to the physical attributes, the relationship between the symbolic attributes and worker performance has not been widely studied. Greenberg's [22] study is perhaps a more relevant one, having researched the association between status and worker performance. A direct relationship to pride however, was not investigated. We earlier described a relationship between status and workplace pride, one of the symbolic attributes in this study. Still very few, if any studies exist that relate the symbolic variables of interest to worker performance directly. This study is the first of its kind in this regard.

2.4. State of the literature

Studies of the physical attributes are plentiful while studies of the symbolic attributes are sparse. Further, in many studies of both the physical attributes, population sizes are small and effects of age and gender are not included. Additionally, most of the literature focuses on discreet physical or symbolic attributes and rarely looks at potential conflicts between both. This paper compares the physical attributes of speech privacy and visual privacy and the symbolic attributes of a home-like feeling and workplace pride. It first describes the effect of architectural enclosure on the two physical and two symbolic variables of interest. It next compares the effect of these variables on worker performance. The comparisons are made with models that include demographic factors, including age and gender (Fig. 1).

3. CBE database

The Center for the Built Environment (CBE) operates a survey that provides an opportunity to make such comparisons. Its database includes subjective perceptions including occupant's self-reported work performance, occupants' rating of the physical and symbolic attributes, and information about the building's physical components – such as workspace divider height. In short, the database permits the analysis of the subjective parameters along with the physical parameters.

Data are gathered through research collaborations with building owners, managers and designers that are interested in their building's performance. CBE provides individual building performance information to collaborators, while using the aggregate data to investigate broad trends. The data are gathered via a web-based survey with a standard set of questions that allows comparison across sets of buildings. In addition, the standard question set may

	Physical attributes : Symbolic attributes
architectural enclosure	Comparison 1
worker performance	Comparison 2

Fig. 1. Matrix of comparisons made in this paper.