

Environmental Perceptions of Residents of a Multifunctional Building

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ABSTRACT.—A multifunctional building in which residents could live, work, and entertain themselves without contact with the surrounding external urban environment is the subject of this study. To what extent do inhabitants of this structure perceive their thermal and acoustical environments within the building to be different from or similar to that outside? To what degree are discrete climatic and sound zones perceived within the structure itself? What factors account for such perceptions? Answers to these questions were provided by an analysis of the responses by 246 residents of the John Hancock Center in Chicago to a mail questionnaire.

THE CONCEPT of a single physical structure serving a multitude of functions is not particularly new. Buildings have long existed that housed a combination of services. Any large city, for example, contains office buildings with stores on the street floor, residential structures built over shops, and hotels with both offices and stores.

These multipurpose buildings owe their existence, mostly to economic considerations. They have been developed in such a manner because it was politically and financially advantageous to do so. Usually, little attention was given to the physical needs or wants of the people who were to inhabit them.

Recently, however, we have begun to see the erection of buildings that are designed to take care of the residents' social as well as economic needs. These structures are intended to be self-contained in the sense that they provide all the services and facilities necessary to sustain life. One could live, work, and be entertained within a single building. Such structures have recently been constructed in Chicago, Minneapolis/St. Paul, and New York City.

A good example of a multipurpose building with potential for self-containment is the John Hancock Center in Chicago. Erected in 1969, this 100-story structure contains 29 floors of office

space, 48 floors of apartment condominiums, and 11 floors of restaurants, lounges, and other residential and recreational services. In theory, it would be possible for residents of this condominium to lead relatively modern lives within the Center without ever coming into contact with outside people or the natural and physical environment of Chicago.

With this in mind, a study was undertaken in May 1975 to determine: (1) the degree to which the inhabitants of 175 East Delaware Place Condominium (the residential portion of the John Hancock Center) actually treated the Center as a self-contained building; and (2) how their residence in it influenced their perceptions of the environment both within and outside the John Hancock Center.

PROCEDURES

The instrument used in the study was a questionnaire mailed to a random sample of the apartments within the condominium. Ten suites on each of the 48 residential floors were surveyed. Of the 480 questionnaires distributed, 246 were returned in time to be analyzed for this study. This represents approximately one-third of the occupants of the condominium in the spring of 1975.

The questionnaire contained 10 questions. The respondent was asked to circle one of four choices given as possible answers. Judging from the relatively high rate of response for such a mail survey, the total lack of critical comments, and the rarity of unanswered questions, it can be inferred that both the questions and the answer choices were clear and readily understandable.

The first four questions were designed to obtain background information pertinent to the projected statistical analyses. They determined in what floor grouping the resident lived, the directional exposure of the apartment, how frequently the subject left the building, and his or her occupation.

The other six questions sought to ascertain the degree to which residents perceived differences in the climatic and acoustical environments present within and outside the John Hancock Center. Residents were asked how often they noticed differences between the outside climate and that within the Center, and between one area of the building and another. Similar questions were asked regarding the acoustical environment. An attempt was also made to determine whether residents tried to alter the thermal environment within their apartments.

The resulting data were subjected to three types of statistical analyses: (1) arrangement according to response percentages; (2) cross-tabulations to observe the nature of the distribution, chi-square technique being applied where appropriate; and (3) Pearson correlation coefficients to ascertain the degree of relationship between paired variables.

FINDINGS

The arrangement of the data according to response percentages yielded the following pertinent results.

1. Ninety-three percent of the residents responding indicated that they left the building at least once a day; 4 per-

cent went outside every other day; and 1 percent left only every third day.

2. Eighty-nine percent of those replying always or sometimes observed a difference between the climate outside and that within the Center. Ten percent rarely or never did.

3. Seventy-one percent of the residents responding observed acoustical differences between the area within the Center and that outside. Twenty-nine percent rarely or never noted such differences.

4. Sixty-three percent of those responding indicated that they rarely or never sensed differences in the Center's internal climate from one area to another. Thirty-seven percent sensed climatic differences sometimes or always.

5. Sixty-eight percent of the residents replying rarely or never noted acoustical differences from one area of the Center to another. Thirty-two percent sometimes or always did.

The data responsible for these percentages were subjected to further statistical analyses to ascertain possible explanations for the perceptions revealed. These analyses yielded the following results:

6. A relationship of 17.94 with 9 degrees of freedom existed between the number of times a respondent left the Center per day and the degree of his or her perception of differences between the outside thermal environment and that within the Center.

7. A correlation of 0.21 existed between residents who perceived differences between the climate within and outside the Center and those who were sensitive to climatic zones within the structure.

8. A correlation of 0.31 existed between residents who perceived differences between the climate within and outside the Center and those who perceived acoustical differences in the same areas.

9. A correlation of 0.47 existed between residents who perceived different

climatic zones within the Center and those who sensed different acoustical areas within the building.

10. A correlation of 0.42 existed between residents who perceived differences between the acoustical environments within and outside the Center and those who sensed similar differences for acoustical zones within the structure.

11. A correlation of 0.31 existed between residents who perceived different climatic zones within the Center and those who sensed differences in the acoustical environments within and outside the Center.

CONCLUSIONS

Several conclusions seem warranted by the findings cited above.

1. Those residents responding did not choose to treat the John Hancock Center as a self-contained building. This can be seen in the overwhelming number (93 percent) of people who feel the need to leave the structure at least once each day.

In addition, the occupational breakdown of those responding indicated jobs that could be performed within the Center. Eighty-one percent of those replying classified themselves as business persons or professionals, while 14 percent said that they were housewives. Thus self-containment was a practical possibility for 95 percent of the respondents.

The most obvious explanation why these residents refused to remain in the Center for long periods of time is its placement in downtown Chicago. Because of the economic and social diversity available on the outside, the city acts like a magnet drawing the Center's inhabitants outward. It is interesting to speculate on whether the residents would behave differently if the Center were located in a medium-size city or small town.

2. Those residents responding were acutely aware of differences between the climate within and outside the Center.

Eighty-nine percent of those replying always or sometimes observed such differences. This result is obviously not surprising.

However, the fact that 10 percent of the respondents rarely or never noted such differences is important. The thermal environment of the Center is an artificial one. One would expect nearly total agreement that such climatic differences always existed. The fact that this is not the case is all the more remarkable in a city like Chicago, which has a wide range in temperatures throughout the year. However, the timing of the survey may have adversely affected the results. May is a relatively temperate month, requiring little if any modification (heat/air-conditioning) of the Center's internal climate.

Nevertheless, there does seem to be some indication here that for a significant minority of Center residents the artificial environment, or the natural one, is not perceived to the degree that would be expected. This is an area in which further research is necessary.

3. A large majority of the respondents perceived acoustical differences between the environment within and outside the Center. Promotional literature for the condominium apartments stress that even the lowest ones, those on the 45th floor, are above street noises. Thus, it is not surprising that 71 percent of those replying perceived such distinct sound environments.

Yet, the fact that 29 percent of the subjects rarely or never noted such differences is remarkable. It is hard to explain how nearly one-third of the population would fail to note differences in the sound-intensity level when leaving or entering the Center, especially with its artificially-created acoustical environment. One possible explanation for the disparity between this figure and that concerned with climatic perception is that the respondents' sensitivity to acoustical differences is less well developed than their thermosensitivity.

This does little, however, to explain the inability of significant numbers of residents to perceive environmental changes.

4. A majority of the respondents did not note significant differences in the Center's internal environment from one area to another. This was true for both climatic and acoustical perceptions. Sixty-three percent and 68 percent respectively of those responding indicated that they rarely or never sensed such zones.

This conclusion is interesting in that it is difficult to believe that identical thermal and sound environments exist in every apartment, in each of the halls leading to them, in the lobby areas, in the supermarket, etc. While it is possible that the climate and acoustics within the Center are *relatively* uniform, this seems an insufficient explanation for the proportionally low level of perception.

It seems more likely that the concepts of climatic and thermal zones within a building may be such new ones that many of the respondents were not conscious of them or could not recognize them for what they were. In this sense, their thermosensitivity was in need of heightening.

5. A significant determinant of the degree of environmental perception for residents of the John Hancock Center was the frequency of trips they took outside the building. The more often a resident left the building, the more likely he or she was to perceive climatic differences between the environments within and outside the building.

It would appear that one's thermosensitivity was heightened or lowered depending on how often one left the building. If this is generally true, one might postulate that a more self-contained structure would lead to a diminution of thermosensitivity on the part of the residents. This is a point that deserves further investigation.

6. Those respondents who perceived differences between the environment

within the Center and that outside also tended to be the ones who noted different environmental zones within the building. This was true for both thermal and acoustical observations. A correlation of 0.21 existed for the former and 0.42 for the latter.

These results indicate that residents sensitive to climatic or acoustical differences maintain this perception regardless of the environment in which they find themselves. In other words, the artificial environment within the Center brought out responses similar to those engendered by the natural and man-made environment of Chicago, or vice versa.

Furthermore, it seems that residents of the Center are twice as likely to have such similar perceptions in the acoustical realm as in the thermal one. Why this disparity should exist is not immediately apparent. Possibly the soundproofing of the Center is more effective than the thermal controls. This, in turn, may tend to make the residents more aware of acoustical changes. However, such a conclusion must remain tentative, pending further descriptive and statistical research.

7. The respondents who perceived thermal differences were more likely to sense acoustical differences as well, and vice versa. Thus there existed a correlation of 0.31 between residents who noted climatic *and* sound differences between the outside environment and that within the Center. Similarly, a correlation of 0.47 was found between subjects sensing discrete thermal *and* acoustical zones within the structure.

Thus it seems that thermosensitivity and audiosensitivity tend to develop together when present to a significant degree.

Why there should be a higher correlation concerning the internal environment is difficult to explain. It may be that such observations require a greater degree of perceptiveness than sensing indoor/outdoor differences, and that

when it is present it is more likely to manifest itself in all sensory areas.

This study was primarily exploratory in nature. Most of the conclusions are tentative, and they point up the need for further research in this field. In addition, the results reported were based on a general analysis of the data generated, rather than a cell-by-cell exploration. It is possible that the latter will provide additional insight into the reasons for the apparent inconsistencies noted in

the conclusions above. In any case, this is an area of investigation that deserves greater attention, particularly in light of the increasing number of multi-functional buildings being constructed in the United States.

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