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A study on spatial perception and eye-level relationships

ABSTRACT

The visual medium is one of the most dominant feature for most of the human population when perceiving spaces. Since humans vary in height (physical length) as well as assuming different eye-levels throughout one's day (Standing, sitting, lying down), whether conscious or not, space would be perceived from different angles. Yet little attention has been given to study the effects of how these eye-levels influences our spacial awareness - Which could pose potential problems to the architect responsible for the designing good usable spaces for its users.

The study was conducted using the *experimental research strategy* (Groat, L. and Wang, D. 2002. *Architectural Research Methods*. John Wiley & Sons, Inc, New York. p 313-348) where test subjects were invited to make quick sketches of given test areas in order to observe their intuitive spatial perception.

The conclusion that the study arrived at was: Due to the eye-level, our sightline will be affected, which in turn, affects what we are able to see in the environment and thus also determines our level of comfort within a certain space. This influences the overall usability of certain spaces. With this in mind, considering and being aware of the user's eye-level when designing a space should be a crucial tool for the architect.

Eye-Level, Spacial Perception, Design tool, Architectural Design, Experimental Research Study

INTRODUCTION

Most of the human population perceive space mainly using the visual medium through the eyes. This means that the location of the eyes in relation to space will make a difference in the perception on certain aspects within the space.

The aim of this study was to identify how different human eye-levels could affect human perception of space. The study proceeded from the assumption that eye-level has an influence on the architectural design and therefore ought to be implemented as knowledge and a tool in the architectural practice.

Since the eye-level will vary depending on individual height most people experience space in a different way. Some are sitting on a bench or wheelchair, others are lying in bed or a lounge-chair), considering different eye-levels while designing a space becomes an important part. Yet the act of taking different eye-levels are often overlooked in the practice.

In short, architects must understand the mechanism of eye-level and perception of space in order to design it in a proper manner for its different users - *A space which will be perceived as intended*.

RESEARCH QUESTIONS

The study was conducted with the focus of exploring the relationship between eye-levels and spatial perception. In further detail, the questions below will be used as the scope of this study.

- How will space be perceived depending on the position one's eye-level?
- How could the perception of space affect us in the way we interact with the space?
- What conclusion could be made in regards to this study? Is the eye-level of importance when conceiving universal architecture?

HYPOTHESIS

The hypothesis is that the position of the eye-level influences how a space will be perceived and thus have an effect on the spatial decisions the architects make when designing universal architecture.

THEORY

The Eye-Levels

Three different *eye-levels* will be used in the study. These have been narrowed down and selected in order to represent three different kinds of common positions.

The eye-levels used are:

- 1600 mm (Standing)
- 1200 mm (Sitting, wheelchair)
- 900 mm (Crouching, child)

The Focus point and View Range

In this research, the *focus point* will be assumed to be a straight line perpendicular to where the eye is looking. In reality, the question of how well we see depending on the distance between the object and our focus point is far more complex.

METHODOLOGY

This study will be conducted using the *experimental research strategy* (Groat, L. and Wang, D. 2002. *Architectural Research Methods*. John Wiley & Sons, Inc, New York. p 313-348).

Architecture students (1 female, 3 male subjects) were invited to participate in the study of previously laid-out physical spaces as test areas.

The test areas chosen are at the KTH School of Architecture. More specifically three areas chosen are in the studio spaces on floor three to five. The three levels are identical in plan but differ in arrangements, the reason is to give the subjects a "fresh start" after each session, thus

lowering the risk of previous observations of a specific arrangement affecting the following sketches.

The subjects were placed on the same spot, facing the same direction for each level. On level 3 the subjects were in a crouching position. On level 4 they were in a sitting position, whereas on level 5 they were standing.

The subjects were then instructed to sketch one fast line drawing of the space within three minutes for each level. In this way they will have to submit to quick spontaneous impressions and will therefore have no time to carefully examine the space in detail. The reason is to get the initial reactions to a space before the continuous mind begin to analyse the environment.

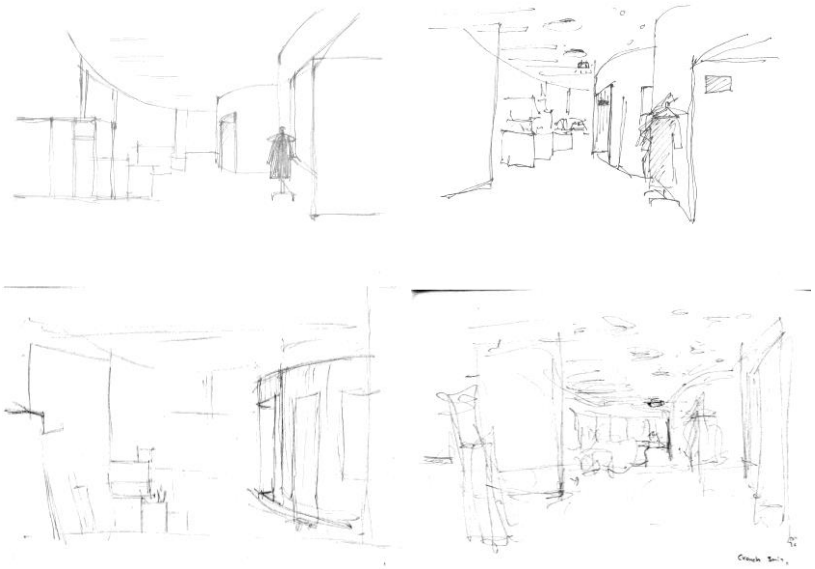
From left to right: Crouching, Sitting and standing height.

After each session, several Questions was asked regarding the space and the content recorded in their sketches.

- What did you draw?
- What made you take the decisions of drawing that particular object?
- How does the space make you feel on the different levels?
- Did the different eye-levels contribute to a different perception of that space?

RESULTS

Crouching sketches (approx 900mm height)

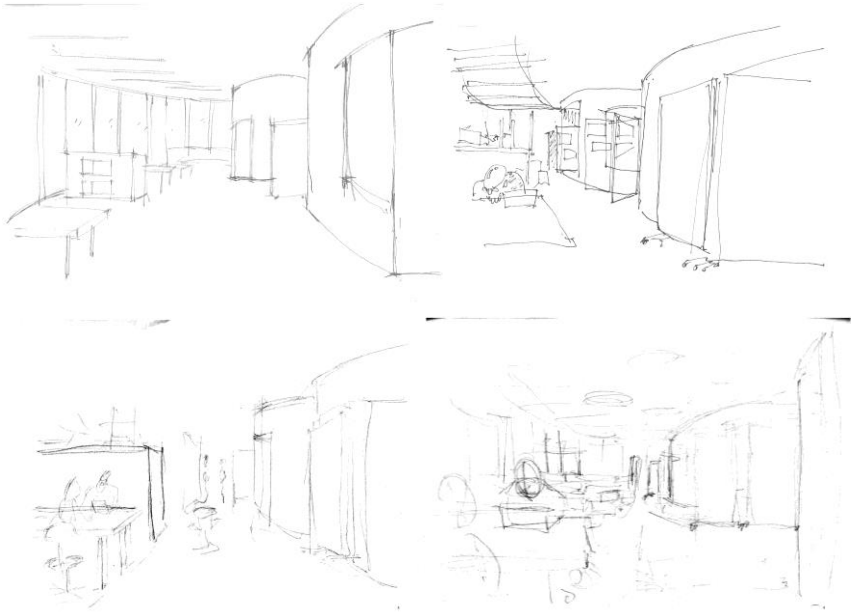


3-minute-sketches from subjects 1-4 (Left to right, top to bottom), crouching.

The sketches made in a crouching stance tends to focus on the immediate objects closer to the subjects although all the subjects have sketched the boundaries of the space. This holds true especially for subject 1 and 3 who seemed to be focusing on sketching the objects in the front rather than the background.

The subjects reported feeling a little bit smaller physically (one even slightly insecure about the surrounding) and tending to look upwards toward the “mid-level” of the space (As seen in the sketch of subject 2 where the person seems to document the details of the ceiling while not having done so in the later two sketches).

Sitting sketches (approx 1200 mm height)

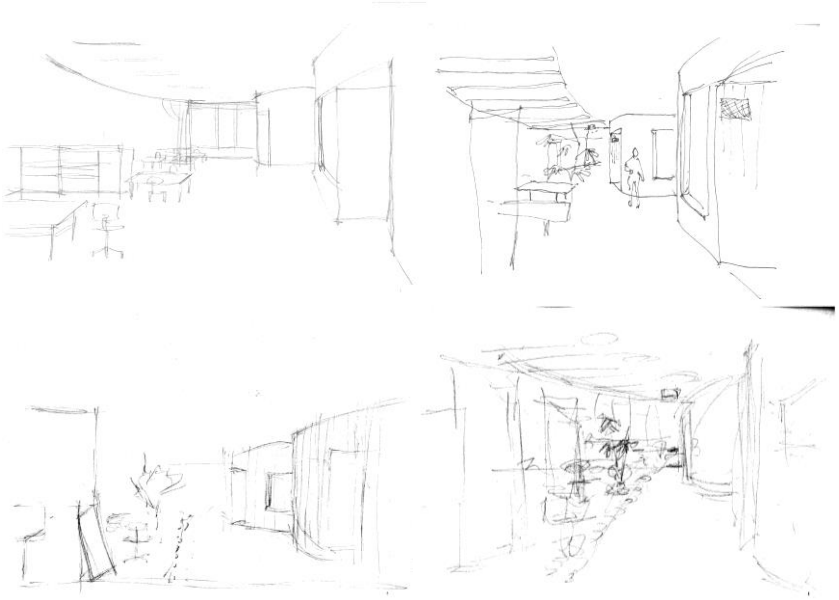


3-minute-sketches from subjects 1-4 (Left to right, top to bottom), sitting.

The sketches made in a sitting position describes slightly more details in the space than the previous one. The subjects have documented the boundaries of the space, this time with slightly more detail such as the window frames. Closer objects did not seem to matter as much since much of the focus tended to lean toward documenting elements slightly further away.

The subjects reported that they felt less small compared to the previous (crouching) position and that they felt comfortable since this was a position and eye-level they were more used to.

Standing Sketches (approx 1600 mm height)



3-minute-sketches from subjects 1-4 (Left to right, top to bottom), standing.

The sketches made in a standing eye-level tended to empathize more on objects slightly further away than the two previous drawings. Closer details did not get as much attention compared to the sketches made in the crouching position (although there seem to be an exception for subject 3).

The subjects reported that they felt slightly more in control of the space since they had the possibility to visually survey a wider range of the surrounding environment.

Preliminary conclusions based on the findings of the experiment:

- While in a crouching/child position the sightline tends to be shorter, seeing less made some subjects feel less comfortable and in control.
- While in a sitting position the sightline increased, thus inducing the level of comfort in the subject since they now can see more of the environment.
- While in a standing position the subjects reported being in control since the sightline increased which made it possible to survey a larger area of the surroundings.

CONCLUSION

Based on the findings one possible conclusion could be that the eye-level dictates what is seen immediately at first glance tends to be the objects straight in front of you. Also, depending on where the subjects' eye-levels are situated they will gain different amount of overview of the environment:

- The higher the eye-level the less obstacles tend to clog the sightlines.

- A lower eye-level makes the beholder take on a role as an observer of the immediate details in the environment.

DISCUSSION

One has to be aware of external variables that could have caused potential disturbances to the experiment. To mention a few examples, such disturbances could be the drawing style and skill of the subjects, their preconceptions of the space as well as the quantity of drawings gathered to verify a consistent pattern.

With the conclusion written above one could recommend that the architect should consider the various effects gain by utilizing different eye-levels. Being conscious about whether the user is a child, sitting in a wheelchair, having a coffee or tend to move quickly in a space could give the architect insights about how to design and arrange a space in order to create an environment that will be used as intended.

Further investigations could be made to enhance the understanding of the relationship between eye-level and perception of space through similar experiments in a more controlled environment or different approached using interviews and photography as mediums.

REFERENCES

Groat, L. and Wang, D. 2002. *Architectural Research Methods*. John Wiley & Sons, Inc, New York. p 313-348