

# MONOTONY OF PARTS OF CONTEMPORARY ARCHITECTURE: THE ABSENCE OF SMALL DETAILS AND SEPARATIONS

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## ABSTRACT

In contemporary architecture, a trend can be observed that buildings have a simple rectangular form and façades are composed of a few large elements, all together leading to a monotonous look. Following a proposed list of good design criteria, representative examples of a historical building (from 1900) and a contemporary one are analyzed and confronted. Based on that design criteria an endeavour to criticise certain trends in contemporary architecture can be implemented. To bring the question what makes a façade aesthetic to a more objective basis, the perception mechanism of the human eye is presented. Because of its spherical form, it delivers a sharp vision only in an exceedingly small angle range. Consequently, the eye moves quickly over the object in view producing several sharp spots that are finally completed to a sharp image by the brain. This process can run smoothly if there, where the next eye movement (saccade) strikes on the object, is a new, perceptible element located – the eye's movement is guided, the object is perceived positively and aesthetically. As a precondition, a particularly high number of small-sized elements and few principles of order, what confirms a good part of the list of design criteria, are needed. Based on this, arguments why parts of contemporary architecture may be perceived as monotonous, partly out of human scale and not really aesthetic are formulated as well as conclusions what is missing. In order to involve (future) professionals, a master's course for students of architecture at HafenCity University Hamburg is presented. Architectural ensembles were selected and drawings of the eye's movement scanning the shown objects generated. The students' analysis confirmed well a connection between a good guidance of the eye's movement and a positive, aesthetical perception. Finally, reasons why there is contradiction between the awareness of good design and the practical outcome are sketched.

*Keywords:* contemporary architecture, visual perception, human eye, saccades, design rules for façades, perception of façades, number, distance and size of elements in well appreciated façades.

## 1 INTRODUCTION

Criteria for ecological architecture are of course topics like energy and the selection of materials. Nevertheless, buildings and their design frame as well as the public space between them are part of it. A sustainable city doesn't only have buildings with low impact on the environment. It also motivates people to reduce their environmental impact caused by transportation – to slow down and enjoy walking. What makes an attractive walk is, among other things, the pleasure to observe and study façades of buildings. Whether façades are perceived as positive, inviting and finally aesthetic and beautiful is widely subjective and varies from person to person.

The official understanding of urban development in the city of Hamburg (Germany) is, that its typical historical style are brick buildings and that this brand has to be continued also in contemporary architecture.

Fig. 1 shows typical apartment buildings of two different periods, historical and contemporary. The size and arrangement of design elements of the façades as well as the embedding of the buildings in the urban situation can be analysed and confronted (Table 1). This paper deals with the hypothesis, that the criteria listed in Table 1 in the left column are



correlated with a positive and aesthetic perception of buildings and their façades. To set it on a more objective basis, Section 2 deals with the operation of the human eye, focussing on how it investigates an object in view along with the brain. Based on these findings, Section 3 is an endeavour to criticise certain trends in contemporary architecture while Section 4 sums up arguments why façades may be perceived as monotonous, partly out of human scale and not entirely aesthetic. Section 5 presents a master's course for students of architecture at HafenCity University Hamburg. Here, eye movement drawings scanning the shown objects should be generated. The analysis by which elements and lines the eye movement is attracted and guided confirms a relation to a positive, aesthetical perception of the object in view – students are aware of what good design is. Section 6 tries to find reasons why only few years later the same persons do not succeed in designing satisfying products, a field for further research.



Figure 1: Typical apartment buildings in brick style in Hamburg. (a) A historical one, circa 1900; and (b) A contemporary one, circa 2015 [1]. Both buildings are in the same quarter (Barmbek), just a few hundred meters away from each other.





## 2 EYE AND BRAIN ACTING TOGETHER IN THE VISUAL PERCEPTION

The perception of the human eye is presented here as a short overview, for a more detailed description see Dietrich [2]. The eye is a sphere of a few cm in diameter with one lens in front. The image is opposite of the lens, for physical reasons it can be sharp only in a range of  $1^\circ$  to  $2^\circ$ , the so-called foveal vision (Fig. 2).



Figure 2: The foveal vision of the eye, only here the image is sharp. Only the brain completes it to an extended image (see text) [3].

Table 1: Comparison of size and arrangement of design elements of façades shown in Fig. 1 and the embedding of the buildings in urban situation.

						
<i>Urban situation</i>						
Transition zone to sidewalk		Yes	No			
Entrance door clearly recognizable		Yes	No			
Front side of the building is oriented to the street		Yes (balconies and living rooms to the street, even if north oriented)	No, back side (balconies and living rooms to the south oriented internal court)			
<i>Architecture</i>						
Upper building end modulated		Strongly modulated with roof and gable		Nearly no modulation, one continuous horizontal line		
Use of symmetry		Strong vertical symmetry		No symmetry		
Arrangement of design elements in a way that a group of smaller elements form a bigger element		Yes		No formation of groups of smaller elements. Elements are repeated in regular distances but not summed up by design		
Façade modulated also in 3D		Yes, strong modulation creates a 3D sight		Weak modulation, rests nearly in 2D-sight		
Horizontal and vertical separations		Strong vertical, noticeable horizontal		Nearly imperceptible		
Decoration		Supplementary white/green decorative elements, reinforcing vertical separation		No supplementary decorative elements		
Use of contrast		High, created by green window frames, white decorative elements and red bricks		Low, dark window frames in dark bricks		
Window separation		Symmetrical, down to about 1 x 0.5 m		Asymmetrical, down to about 1.2 x 0.8 m, partly smaller		
Size and number of perceptible elements in a way that there are few big elements (formed by groups of smaller ones), middle number of middle sized and high number of small ones		Yes, big elements (in particular vertically), middle sized (windows, balconies) and small ones (decoration, windowpanes, brickwork)		Few big elements, middle number of middle sized (windows), and very low number of small ones (house number, downpipe)		
Size of smallest perceptible elements that exist in a higher number		0.2 m (decoration), 0.1 m (brickwork), 1 cm (joints between bricks)		1 m (windowpanes)		
Brickwork perceptible			Clear contrast between red bricks and white mortar			Nearly no contrast, bricks and mortar dark.

The image is more and more out of focus the farther away it is from the foveal view. As a consequence, the eye scans with fast, unconscious movements (saccades) the range around the foveal view. From one saccade to the next one is an angle of  $4^{\circ}$  to  $15^{\circ}$ , a movement occurs each 0.2 to 0.6 s [4]. The result is an image composed of several sharp patches. Finally, the brain takes over and adds the missing information out of its experience to a sharp image (Fig. 3).



Figure 3: Two stages of interaction between the eye and the brain. (a) The eye delivers a patchwork of information by the saccades (similar to the collage of David Hockney, *Place Furstenberg Paris, 1985* [5]; and (b) The brain melts it to a complete and sharp image (corresponding to the photography of the place) [6].

If we do not expect something special from the object in view, the movement of saccades is likely haphazardly. However, most often the brain is asking for concrete information, the saccades will be directed accordingly. Conversely, if we look at the object more in a neutral manner, out of curiosity, the object itself will direct the saccades by its offer in details; like we look at a painting, a façade or an architectural ensemble (Fig. 4).

In the case, that there, where the next saccade strikes on, is another, distinct object, the perception is facilitated, guided. The saccades can smoothly explore the object, what will finally be perceived as interesting, balanced, dynamic, and aesthetic.



Figure 4: (a) View to an architectural ensemble; and (b) The human eye scans the sight with saccades that are attracted and guided by different elements in view [7].

But what is the ideal distance between two elements? Because saccades are done in certain angles, it depends on the distance to the observed object (Table 2). For the most frequent position on the “own” or the opposite sidewalk this distance between two elements should be in the range of several cm to several dm. That means that the elements themselves must have a size of less than half of it to be distinguishable, thus from 4 to 5 cm to few dm. Bigger elements of more than 1 m to a few m complete the set of elements to guide well the observer’s eye over the façade.

Table 2: Distance between two nearby objects that are scanned by two consecutive saccades. Saccades occur in angles between 4 and about 15 degrees, the calculated distance depends consequently on the distance to the observed object.

Angle of saccade (°)		4	6	8	12	16
Distance to observed object (m)						
Immediately in front of	1	0.07	0.10	0.14	0.21	0.28
Near on sidewalk	2	0.14	0.21	0.28	0.42	0.56
Midst of sidewalk	3	0.21	0.31	0.42	0.63	0.84
End of sidewalk	5	0.35	0.52	0.70	1.05	1.41
Alley width	10	0.70	1.05	1.40	2.10	2.81
Small street width	15	1.05	1.57	2.10	3.15	4.22
Street width	20	1.40	2.10	2.80	4.20	5.62
Plaza	30	2.10	3.14	4.20	6.31	8.43
View from far	50	3.49	5.24	6.99	10.51	14.05

And another rule can be derived. To guarantee that there always is an element for the (frequent) small saccades of only a few degrees, the number of the smallest elements in the observed object must be remarkably higher than the number of large elements. A detailed investigation of this “frequency rule” shows, that the necessary number of elements and their size follow a Pareto distribution (Fig. 5).

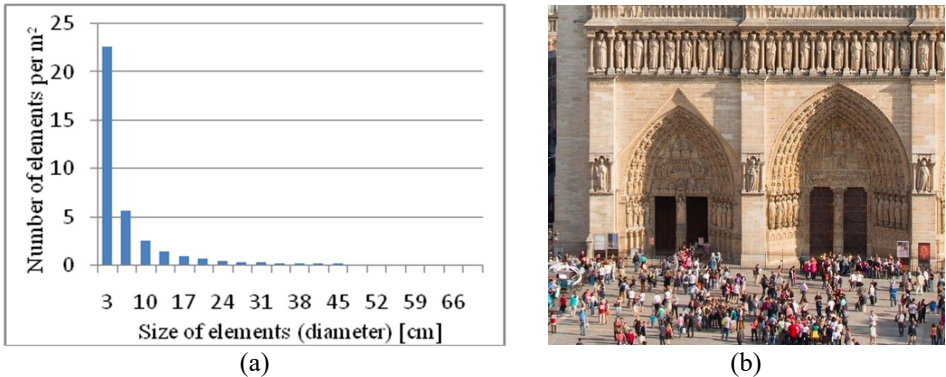


Figure 5: (a) To satisfy saccades scanning an object, the number of elements must increase with its decreasing size. The correlation follows a Pareto distribution; and (b) The photograph of the portal of Notre Dame in Paris shows an extraordinarily high number of small elements, demonstrating the principle down to dimensions of few decimetre or even centimetre [8].



### 3 CRITICISM OF CERTAIN TRENDS IN CONTEMPORARY ARCHITECTURE

First it must be mentioned that not all contemporary architecture gives reason to criticise. This investigation refers to a general trend, not to selected buildings. All buildings shown in the figures are just representatives of it and are not the direct object of discussion.

While in other sectors like energy the transition to a sustainable society is meanwhile quite visible, it seems that the design of urban spaces and the corresponding buildings persists still in a variant of a car-oriented philosophy: to deliver quiet conditions, living rooms and balconies and thus the main façades of buildings are oriented off the streets to inner courts. They are felt as semi-public and serve as communication area for a limited house community but not as a real public space. The street side is formed by the backsides of the buildings, leading to a less attractive sight. Supplementary, the ground floors do not show a distinct design and no or hardly offers for retail, leading to a non-attractive atmosphere for a pedestrian strolling along there. Because life is in the inner courts, transition zones to the sidewalks on the street side are not hold as necessary.

Many buildings are of simple shoe-box shape, hardly formed in the upper building line or in the façades that lack a three-dimensional modulation and show a flat, two-dimensional appearance, only balconies (if existent in the façade) often stick out of it.

Further, in regard to the “frequency rule” discussed in Section 2, the arrangement of elements in the façades (especially windows) is not done with the target that a group of smaller elements form a bigger one, two methods are generally used, leading also to a lack of horizontal and vertical separations or axes of symmetry (Fig. 6):

- (a) Windows are repeated regularly horizontally and vertically. Windows are of big size and dominate in window to wall ratio, the remaining small parts of the wall between the windows is of the same width horizontally and vertically. Both together form a grid without preferences.
- (b) Windows are arranged in a chaotic manner (that demonstrates well that the façade does not belong furthermore to the load bearing system, behind the façade is a concrete structure, the façade can be designed and filled freely).

The number of differentiated perceptible elements is low in all sizes. Especially, the size of the smallest ones is hardly below 0.5 m, the number of these elements is very low (house numbers, down pipes, personal extras of the inhabitants, partly modulation in brickwork).



Figure 6: Design of façades in a way that a group of smaller elements does not form a bigger element. Realized by arranging windows: (a) In identical size in identical distances; or (b) in a chaotic manner [1].

Contrasts within the façade are widely reduced. Often possibilities to generate a contrast are consciously not applied. The use of dark window frames in a dark brick façade is common, the mortar between the bricks has a dark colour, too (Fig. 7).



Figure 7: (a) Contrasts in façades reduced by the choice of dark frames in dark brick wall; and (b) White frames and a white plastered staircase form a stronger contrast to the bricks. Both buildings are just opposite each other in the same street [1].

Table 2 shows that for a person that is near to the façade (on the sidewalk) smaller elements would still be necessary to guide the saccades. Besides modulations in the façade and the application of decorative elements the window separation offers the highest potential to create a high number of small sized elements (Fig. 8). From a physical point of view, frames have a worse U-value than present glazing's. As a consequence, a window with many sub separations has higher thermal losses than a window with only few big panes. Advantage and disadvantage should be reflected well before the final design decision – there are also other possibilities to reach a high number of small sized elements.



Figure 8: Use of window separations to reach a high number of small sized elements. Both are historical buildings, one with (likely) the original window separation (b), delivering a diversity of small elements, also in the brick wall), the other one lost a lot of its character through subsequent interventions; windows were replaced by big panes, supplementary not identical on the ground floor, only the door on the right remembers to the original design (a) [1].

Also, the other part of the façades, the walls between the windows, should show separations and elements. Firstly, they should exist, secondly, they should be distinguishable by contrast or (three dimensional) modulation. Bricks in historical buildings have a red, warm colour; bricks in contemporary façades look darker, browner with an admixture of blue, delivering a cooler sight (Table 1, last row). The colour of the mortar was historically chosen in contrast to the bricks, contemporary often in a similar colour avoiding contrasts and perceptible bricks as smallest elements. Modern industries allow the production of colourless, grey bricks.

Historical brick walls were load bearing, the brick had also the function to act as thermal separation between inside and outside. The thickness of 36 cm bricks and more allowed a highly developed art of brickwork, enriched by further decorative elements (Fig. 8(b)). Contemporary walls need a thermal insulation that exceeds for nearly zero energy buildings 24 cm. Because of physical reasons a full brick layer as outer finish would become too heavy to be fixed through the insulation on the massive wall behind. The last layer is consequently a lighter cladding or a plaster. In case that a brick optic should be kept, thin brick slips or (worse) plastic imitations are glued on the insulation. That could lead to the question if a brick-like sight of contemporary buildings is really consequent or if today's architecture should not be more self-conscious and express that the walls have thermal insulation finished by plaster or cladding.

Finally, it has to be mentioned that the application of thick layers of thermal insulation has the tendency to turn the finish of the wall into a flat, two-dimensional area. It becomes difficult to add here a well three-dimensional modulated sight of the façade – but it is not impossible and is asking for the creativity of planners (Fig. 9).



Figure 9: Examples of art of brickwork in contemporary architecture. In both cases real bricks were included in the standard brick slips creating a three-dimensional modulation of the façade or accentuating the entrance [1].

#### 4 RÉSUMÉ ON CERTAIN TRENDS IN CONTEMPORARY ARCHITECTURE

Section 2 collected arguments that an object in view like a façade is perceived as positive and aesthetic if the saccades exploring it are easily guided. Accepting that concept, the analysis of Section 3 leads to the conclusion that certain trends in contemporary architecture do not fulfil the described rules. That holds especially for:

- the lack or too low number of small sized elements in the façades (window separations and decorative elements)
- missing or reduced contrasts
- missing or reduced principles of order like symmetry, horizontal and vertical separations, three-dimensional modulation.



Therefore, a saccade starting from one element not striking on another element each time is not guided well. The eye movement scanning the façade will search for a continuation and wander around the motif or even fall out of it. The façade is not observed with pleasure and will not be perceived as positive or aesthetic but rather as monotonous and, in that sense, as out of human scale.

To solve that problem, architecture shall not go back to a historical style! But of course the historical style may serve as a rich source of suggestions for the development of a real modern and human (and in that sense sustainable) architecture. Another source of suggestion could be the knowledge about the processes of human perception. Both together should allow to overcome these trends in contemporary architecture and to pave the way to a human and modern architecture.

## 5 ARE (FUTURE) ARCHITECTS AWARE OF THESE CERTAIN TRENDS IN ARCHITECTURE?

### 5.1 Task of a master's course "Human scale and architectural drawing" at HafenCity University Hamburg

Students (of architecture) were asked to have a look at urban architectural ensembles that they like or dislike. The motif should be presented with a photograph. Then, the first task was to create an architectural drawing of it (to study the construction of the perspective). The second task was to observe the motif again and to internalize the corresponding eye movement and finally create a second drawing showing the movement of the saccades (Fig. 10).

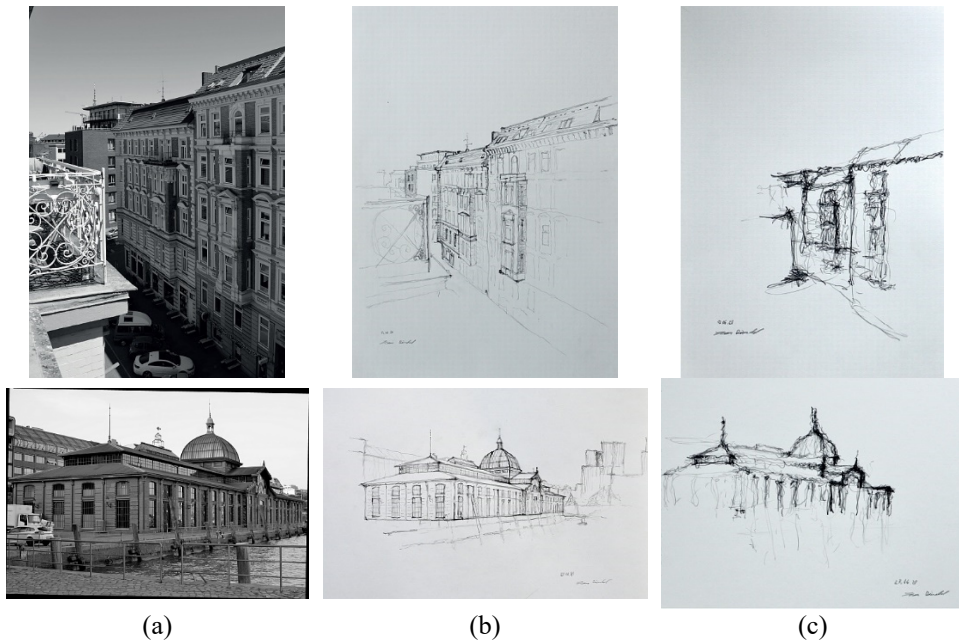


Figure 10: Examples of a student's work showing selected (positively perceived) architectural ensembles as: (a) Photograph; (b) Architectural drawings; and (c) Drawing of the eye's movement (saccades) [9].

In the next step students analysed the eye movement and described by which parts of the architecture the eye's view is attracted and how it is moving over the observed object, differentiated according to the positive and negative examples. Further, it should be analysed:

- Number and size of elements, are the smallest elements the most frequent?
- What kind of order single elements in the field of view form (like symmetry, three-dimensional modulation, horizontal and vertical sequences or separations, etc.)?
- What kind of contrasts do exist?

Finally, a statement should be given if the students see a connection between eye movement and aesthetic sensibility when looking at façades, buildings, artworks and if architecture should support the movement of the eye.

## 5.2 Findings of the students

In total the course had over 100 participants within two semesters, the findings showed that there is a nearly complete compliance between all.

The first finding was that the architectural drawing follows the big, clear lines of the shape of the buildings, big elements of façades, etc. – the drawing shall display the character of the architecture. To general surprise, the drawings of the eye's movement were different. They did nearly not show the big, clear lines but particularly the small and special elements. The saccades continued partly along recognizable principles of order and partly they jumped to the next detail. The guidance of the saccades by different, small elements showed up as something more or less independent of the “frame” of the surrounding big lines.

The positively perceived architectural ensembles showed a big number of small sized elements and several principles of order like symmetry, three-dimensional modulation, a number of smaller elements form a bigger one, horizontal and vertical sequences and separations while the negative ones showed here remarkable deficits. As a criterion of central importance contrasts were recognized, in colour as well as in brightness.

All students confirmed that they see well a connection between a good “guidance” of the eye movement and the positive perception of an object and its contribution to aesthetics. Architectural design should integrate that. Students also expressed that they want to applicate these concepts in their own, future projects.

## 6 POSSIBLE REASONS FOR THE CONTRADICTION BETWEEN THE AWARENESS OF STUDENTS OF ARCHITECTURE AND THEIR LATER PRODUCTS AS PROFESSIONALS

All in all, it seems that students of architecture are absolutely aware about what aesthetic architectural design is. But why do practical results often show monotonous architecture? What could cause this contradiction?

Architects, as only one part in the group of stakeholders, might be too weak and isolated to fight successfully against these tendencies.

A more sarcastic argument could be that it is very easy to do copy and paste with a design software – et, voila! The building's design is done!

In an interview with a stakeholder of architecture [10] financial reasons are mentioned as responsible. There are so (too) many other cost intensive requirements like energy, fire and sound protection etc. that for cultural aspects like the final aesthetic design is no budget remaining. That statement could have a portion of trueness but also sounds a bit like comfortable excuse. Monotonous architecture is also found in expansive sectors like condominiums (Fig. 6(a), “70 percent sold”). Further, in developed countries societies are

richer than all generations before. The former planners had for sure the same problem to construct cheap as possible, but the outcome was often rich and aesthetic – it should be possible today more than ever.

But, in fact, it could well be that they simply deliver what the market is asking for. The students report that they are trained to design buildings that are in first priority different from the others, monumental, representing a status symbol. Buildings are designed isolated of each other, not shaping an urban entity that shows a high grade of diversity at the same time.

..... Present societies in rich countries show a strongly developed individualism. That alone would be a positive fact but in parallel there is a loss in the sense of community. We do not care enough about things and values that we can enjoy only if we act together. The position of space planning and a common sense how to design a quarter or a street has become very weak. At the end it becomes car-oriented because it is common and most simple. Exactly the design of cars expresses an equivalent tendency to a reduced, plump and snobbish design (Fig. 11), confirming that we need a transition in several fields of our society.



Figure 11: Design of cars. (a) 1970; and (b) 2020. Both are “high-end” versions, held as the most representative and express well the spirit of the time [11].

It seems that the general crisis of climate, resource depletion and overuse, etc., also causes a general loss in cultural understanding. That assertion is related with the way to come out of that crisis and the hope that we are able to realise it and to hand over to the coming generations a planet where it is a pleasure to live on: the transition to a sustainable kind of living.

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