

THE AESTHETIC JOY AND REPETITION OF THE EVER
UNPREDICTABLE

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Abstract

The paper reports on an experiment relating personal preferences for aesthetical variation with objective mathematical measurement of variation. The basic hypothesis, that a certain degree of variation is preferable, is confirmed. The investigation is related to previous experiments concerning the relevans of information theory to aesthetics. The results may have some implications for the development of less monotonous, industrialized housing schemes.

1. Part

Sense, aesthetics and art

The aesthetic experience is the pleasant sensing of artifacts or nature, while experience of art evokes our consciousness for history, ideas, morals as well as our personal emotions.

Aesthetic quality stimulates our attention. Tapestry, cloth, tobacco, gatherings of people, flowers, etc., may have aesthetic appeal as a pleasure of a hesitating moment of fulfilment, even if such items do not bear on our outlook on life.

The paper deals only with one aspect of people's preference for aesthetic experience, expectancy and joy of variation. Thus in order to avoid misunderstandings, let me stress that I do not consider the aesthetic quali-

ties as more important than usability or the semantic meanings associated with buildings. It is just an attempt to contribute to an understanding of how we like to perceive.

Information theory

Information theory deals with the technical aspects of communication in its broadest sense, with the form, length and structure of signals. It is a supporting discipline for construction of hardware for edp, pattern recognition and analysis of how much information we can perceive and learn to process.

The central concept is the quantitative measurement of "amount of information" called entropy.

Take for instance a pop-tune: it is constructed as a-a-b-a sequences which are repeated over and over, although it is possible to construct 16 different 4 piece-sequences with a and b, i.e. a-a-a-a, a-b-a-a, a-b-b-a, etc. ! The entropy will more precisely express the ratio of "effective outcomes (a-a-b-a) to the number of theoretically possible outcomes".

Entropy is thus a mathematical measurement of order of variation, ranging from monotony to chaos. Therefore it is a challenge to investigate whether information theory can provide a better understanding of the wellknown aesthetical concept of variation.

Since the war there have been many attempts in order to investigate our perception of auditive and visual messages from an investigatorial outlook stressing that also such messages are composed of a limited vocabular repeated in ever interchanging sequences like morse-signals transferred through a wire. But the difficulties in extending the analysis from a steady flow of signals, spoken sentences or sequences of music to visual presentations are overwhelming. The crucial difference between receiving an auditive and a visual message is - from the sender's point of view - that while he can control the sequence in which the auditive message is received, he cannot control whether the receiver of visual impressions concentrates on certain aspects of the received material, or whether he scans it systematically or at random.

It is therefore not surprising that many investigators have been discouraged to pursue an information theoretical analysis of our perception of visual images.

The many dimensions of perception

But the greatest difficulty for applying information theory, is that simple confrontations, such as reading dials, are exceptions not the rule. We interpret the given, we observe it and relate it purposefully to our aims, past experience or common notations. We perceive, not only the world as it occurs but also as social beings.

We perceive the world, not only as patches of hues and colours in motion, but as items. Our attitude and training determine what we observe. Statistical analysis of our verbal expressions reflect the interest we take in the world as shown by Rikard Küller and others at this conference.

Some of these findings belong already to traditional aesthetical theory and of these, the concepts of complexity and coherence are particularly related to informational theoretical measurements. Thus contributions of information theory to a better understanding of why we appreciate some environments and not others, even we have to live in them, have their obvious limitations, which not at least call for socio-political action.

Contemporary repetitive mass produced apartment blocks have contributed much to the present welfare both directly by providing better accommodations for more people and indirectly by increasing the efficiency of the working force. This is very important. Nevertheless these facts cannot be used to suppress the public critique of the appearance of modern buildings for being dull and depressingly monotonous. It is in this perspective that experiments with measuring an aesthetic factor as variation - if successful - may provide a more rational basis for evaluation and design of industrialized housing. (Fig 1.)

2. Part

An experiment and some results

A panel was asked to look on two types of series of pictures each consisting of four types of pictures A, B, C, D and a, b, c, d. Each of the series A, B, C, D consisted of 9 pictures and each abcd-type of 8 pictures. The idea was that any person P in a panel should select that picture in any of the series that fascinated him most.

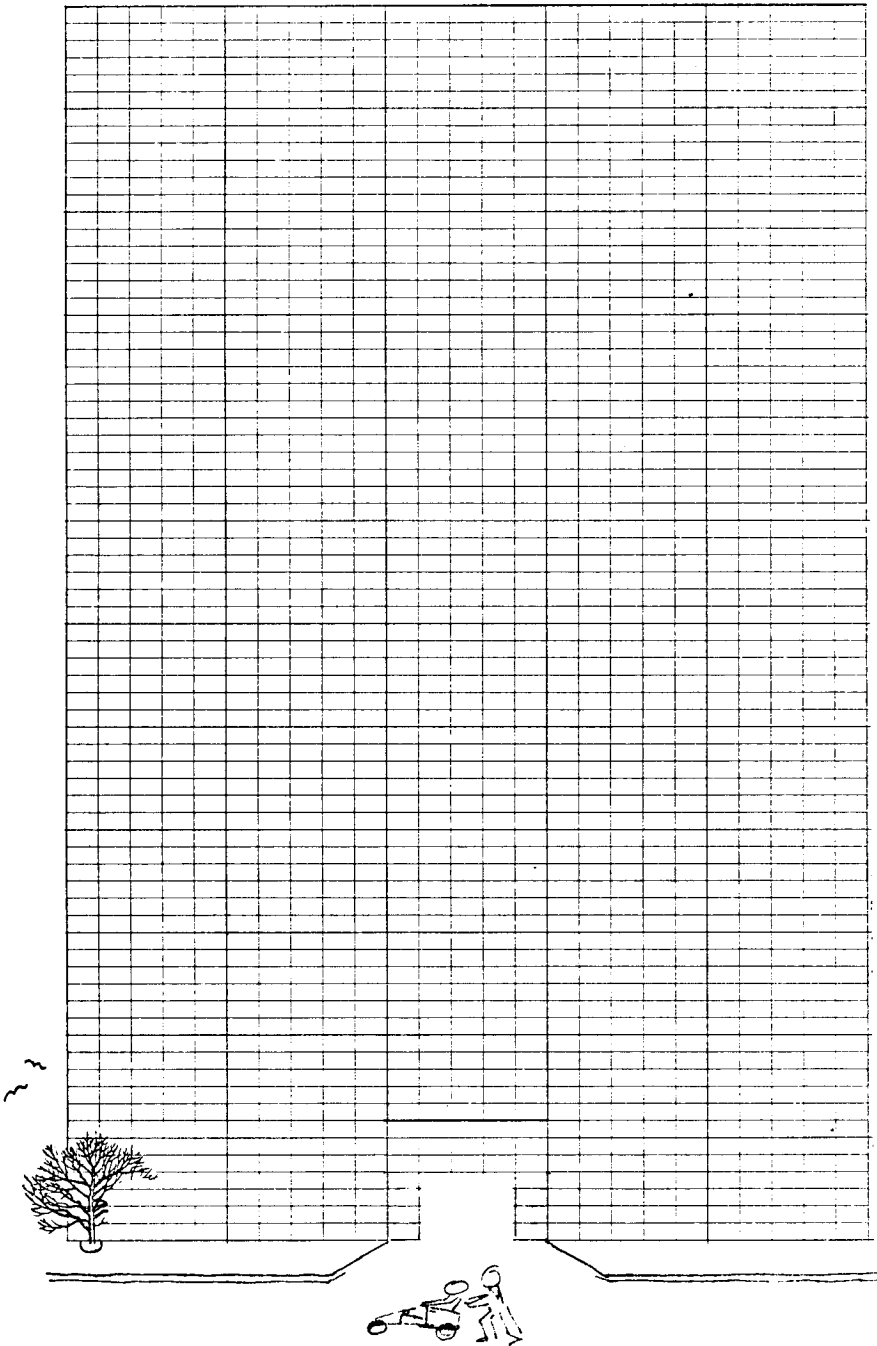


Fig. 1. Modern industrialized housing, a tour de force in monolithic repetitiveness. If you know one fraction of it you know it all

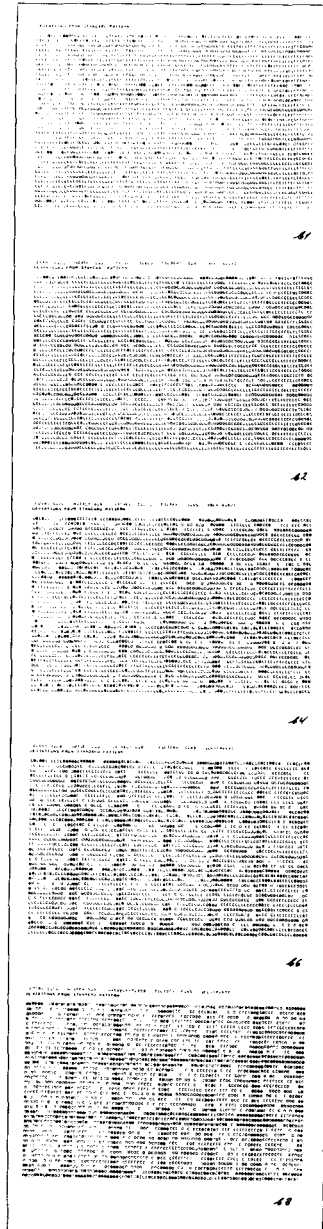
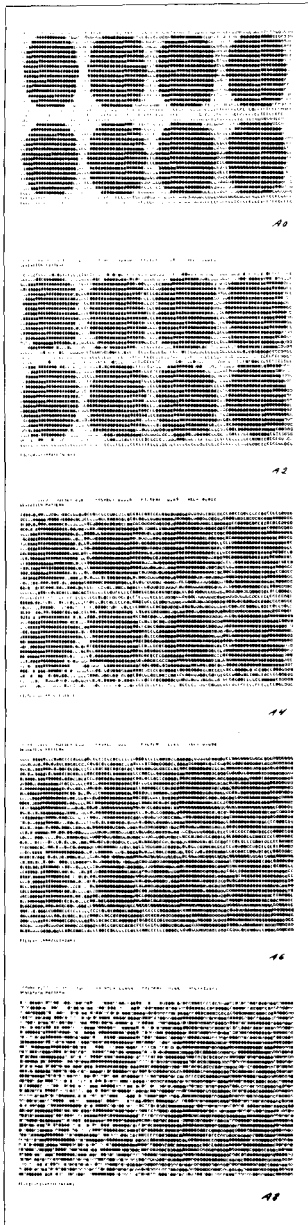


Fig. 2

Five pictures from A pictures reproduced in 1:4. The pictures increase in variation, measured as entropy H from picture 0 to 8. $H(0) = 0$, $H(8) = 26$ bit.

Fig. 3

Five pictures from b pictures. There is no obvious increase in entropy.

	A	B	C	D	a	b	c	d
b	o	o	o	o				
i	1	1	1	1	1	1	1	1
l	2	2	2	2	2	2	2	2
l	3	3	3	3	3	3	3	3
e	4	4	4	4	4	4	4	4
d	5	5	5	5	5	5	5	5
e	6	6	6	6	6	6	6	6
	7	7	7	7	7	7	7	7
	8	8	8	8	8	8	8	8

Fig. 4

Part of set of instructions to the persons involved in the experiment.
 "... the material is composed of eight different sets (A, B, C, D and a, b, c, d) each composed of respectively nine and eight pictures. You have not received all of them, but only those marked with arrows. Draw a circle around that picture in each set you consider the most fascinating, that is the one you appreciate most."

ANTAL AF FORETRUJNE BILLEDER I HVER SERIE									
ABCD-type				abcd-type					
billede	A	B	C	D	billede	a	b	c	d
0-1	•	•	•	•	0-1	•	•	•	•
2-3	•	•	•	•	2-3	•	•	•	•
4-5	•	•	•	•	4-5	•	•	•	•
6-7	•	•	•	•	6-7	•	•	•	•
8					8	•	•	•	•

Fig. 5

Preferences of the panel for each of the eight series.

For the series ABCD there is an obvious preference for the pictures "4-5" and "6-7". In these series the entropy H for the pictures "0" is $H(0) = 0$. For the pictures "4-5" the entropy is respectively 12, 27, 25,

37 bit - for "6-7" respectively 23, 26, 46, 37 bit - for "8" respectively 26, 43, 53, 42 bit. The preferred degree of variation falls in the range 16-28 bit. It may - at present - be haphazardous to take this number for more than it is, but it is at least just within the limits of previous findings for our capacity for receiving visual information (see D. A. Bell, 1969).

The preferences for pictures in abcd series are more random. One must bear in mind that for these series, there is no recognizable increase in a sequence of pictures.

A pilot-study was run previously to the actual experiment. The material of the pilot-study consisted of only 7 pictures. The pilot-panel showed such an overwhelming preference for the most chaotic pictures in these series that the material had to be extended with two additional even more chaotic pictures. In the actual experiments they were numbered "7" and "8".

The investigation consisted of two rounds: First P received (by post) three series of one type, i.e. A, B, D and one of the other type, i.e. c. Preferences for pictures in each of the series were registered and mailed back. Next - about two months later - P received three series of the other type, included the one he already had evaluated plus one from the previously evaluated series, i.e. a, c, d and B. Preferences were compiled and evaluated in toto and person for person.

Please refer to figure 2-4.

Validity of answers

The validity defined as the ability of any person under different circumstances to maintain the same preferences was surprisingly good. The same picture was preferred in 23 cases (35 %) - in 22 cases (34 %) the closest to the previously selected was preferred - in 13 cases (20 %) pictures two distances apart were selected and only in 7 cases (11 % of persons) were different pictures preferred in the same series which were more than two pictures apart.

Answering by mail has some obvious short comings, but also some benefits. We will not deal with this here.

Thus the preferences of the panel must be said to have proved a remarkable consistency. Given the certainty, answers were compiled in five groups for further analysis 0-1, 2-3, 4-5, 6-7 and 8.

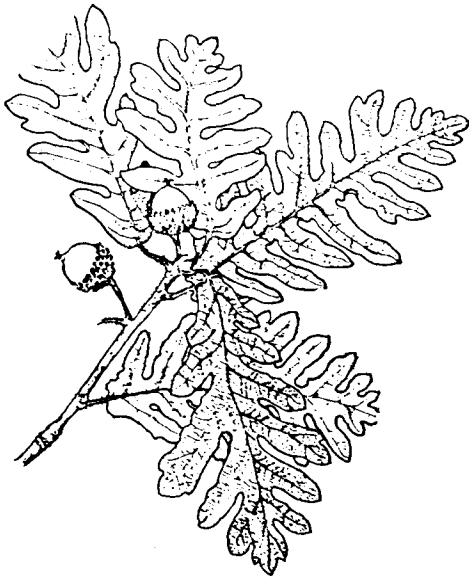


Fig. 6

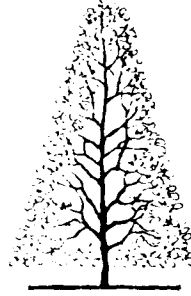


Fig. 7

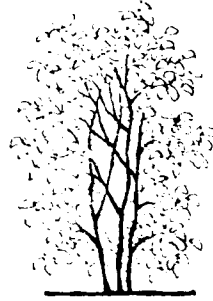


Fig. 8

Fig. 6, 7, and 8

Nature is an abundant source of ever changing variation within limits. Every leaf, every flower is like any other on the same plant and yet a little different in size, form and development of growth as faces of human beings untouched by make up. (Figure 6). Variation occurs on many levels. The movement of a breeze through a corn-field - the early morning hazes before the sun rises - seasonal change, decay and development in silent repetitive ever changing sequences.

Today nature is planned. Hedges have to fit our standard of what is practical. (Figure 7). We fight nature in so many other ways. But the practice of grooming may be of mutual benefit, as shown in figure 8, where growth has been helped by cutting away old outworn branches.

The material of the investigation

There are at least two different manners in which we perceive our surroundings, with or without concentrating on some particular features of interest. Thus the material had to have an appearance that ensured that the panellists got the same impression whether they scanned or looked at it in a more searching fashion.

Secondly the material had to be holistic in character. It had to be judged as a whole, not in parts, just as we perceive a building as such and not as an assemblage of doorknobs, frames, etc. This called for pictures possessing a degree of coherence despite variation or complexity.

Thirdly, if it by any means should be possible to establish a link between preferences for visual variation and a measure hereof, the material had to be as contextfree as possible. This must not be taken as a point of view against the necessity of semiotical research, but as an attitude in accordance with the philosophical theory of aesthetical attitude, which goes beyond our tendencies to perceive in preconceived dimensions.

Fourthly, the material had to be constructed in a way that made sense out of talking of variation as such, and of using the concept of entropy as a measure. You cannot just talk of variation, without setting a standard of variation from what. Thus the material had in itself to establish a frame of reference.

With these items in mind the two series were constructed and printed out by computer at NEUCC. The ABCD-type being the proper material for evaluation

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There is an essential difference between the series of pictures in the ABCD-type and the abcd-type. In ABCD there is an ever increasing entropy for each following picture from "0" to "8". This is not the case for the pictures in the series a, b, c, d.

The importance of the series a, b, c and d is thus to be a possibility for control.

That is: If the measure of entropy is of any relevance for aesthetic fascination, we must expect that any person will show distinct preference for a picture in series with increasing entropy. While - for series where the change in variation is blurred - any person cannot have any frame of reference for preferring one picture in sequences of successive impres-

sions. Thus preference for pictures in abcd could be expected to show up in a more accidental fashion.

Let me repeat; the panellists were never asked to point out the picture which occurred to them to have the "right degree of variation". They were only asked to choose those they found most fascinating. Their choices had to be intuitive. But if entropy is of any importance it will show itself as a marked difference in the pattern of preferences for the two types of series.

And what was what actually happened!

Results in general

As shown in figure 5 the experiment confirms that people - when asked - do express a significant aesthetic preference for impressions of a certain degree of variance, when they have a standard for monotony ("0"-pictures) and chaos ("8"-pictures) in mind or when the frame - as here - is given as part of the material for evaluation.

Results in statistical interpretation

Some daring hypotheses could be presented (5). Let me here only state what statistical analysis immediately show.

1) The belief that a certain degree of variation (entropy) is preferable cannot as a basic hypothesis be rejected. The change of entropy for the ABCD-type pictures were from 0-55 bit. The preferences ranged from 16 to 28 bit (mean + - variance).

2) Each individual may have his own level of preference for variation within the general accepted limits for fascinating variation. At least the preferences of each individual were more consistent than overall consistency.

3. Part

Interpretations and perspectives

Berlyne (1969) suggests that we - according to the time we expose ourselves to impressions - must distinguish between two kinds of fascination, diverse exploration and epistemic curiosity. The former "inclines subjects to seek out patterns that are judged pleasing or beautiful". Such patterns are relatively simple, as for instance geometrical patterns. Epistemic curiosity "occurs when the subject finds himself exposed to novel, surprising, ambiguous problemrising or other conflict-inducing patterns". Such patterns are subtle and fascinating as a challenge. The subjects in the experiment are supposed to have approached the pictures in the latter mood.

It is hardly surprising that the experiment showed that we both reject monotonous and chaotic impressions, because we rather prefer a certain degree of variation. Of course the outcome of the aforementioned pilot-study could have made one wonder whether this is true or not. But any reflection on what people deliberately seek out for visual and auditive enrichment clearly shows that one part of the truth of beauty is an expressed fascination with variation. Nature is for instance an abundant source of variation on a theme. Any garden is a slowly developing drama of both subtle and more dramatic changes in a very constrained setting that always makes it possible for us to recognize its main features and outline (fig 6, 7 and 8).

A curious outcome of the experiment has finally to be mentioned. Two persons were exceptions to the surprising consistency in answering, the high validity. The two most unreliable persons asked, expressed from one round to the next, preference for the most monotonous picture in series and one of the most chaotic in same series. This may very well just be accidental. If some variation is likely to occur, some persons must of course be the most unreliable in their answering. But it may also be taken as an indication of that people who are unstable, for reasons unknown, are more likely to be drawn to extremes. These results were excluded from figure 5.

Distance is most important for perceiving. With the present investigation in mind, it seems fair to assume that items must appear to have some sort of variation at any level, both when seen at distance - as the medieval town on the hill top - when seen within reaching distance, for instance house by house down the street or at closest, brick by brick. This, I think, is the major reason why buildings constructed of natural

materials fascinate us far more than modern industrialized housing. Modern cities not only lack coherence, but they are boring repetitive both when compared with each other, seen at distance and at the closest. This may amplify an uncertain feeling for that these cities in some way are unhuman as they seem to deprive us from the ever fascinating variation of natural phenomena.

Semiotics and information theory

Information theory does not conflict with semiotics. It is two different approaches of research that supplement each other, each concentrating exactly on aspects the other cannot handle.

Semiotics deal - as we all know - with the dimensions which are reflected in our language. It is concerned with the social influence on our perception of the given construction of verbal constructions for communication.

Information theory on the other hand may contribute to an understanding of how much information we can handle and like to handle. It can learn us something about our natural capacities for creating images of what is perceivable, which impressions are too poor to stimulate us, etc.

Thus information theory may even provide us with a better understanding of our ability to develop our abilities.

Allow me, before finishing, to make a wild suggestion I certainly do not know how to defend, but which I nevertheless believe has some truth: Semiotics deal with man as a product of social adaption, tradition and present ideology. Thus research oriented towards man as a natural being may contribute to setting us free from historical and social conventions which today enslave us to an ever unsatisfied pursuit after illusion. It may very well be a complement to more political efforts to educate man more to see and appreciate things in their natural richness than just to observe e.g. "social status". (Maaløe, 1973)

Perspectives

To my knowledge the link between entropy and personal preference for visual impressions has not hitherto been so clearly established.

But, as far as repetitions of the experiment with other visual material, particularly more structured material will support the philosophy, some

previous experiments may be reinterpreted as supplementary proof (Maaløe, 1972).

The present results may be regarded as a promising step towards providing a better background for architectural design. But it must not be forgotten that the critique of modern housing schemes may be expression of a more alarming dissatisfaction than just the nuisance of monotonous facades or chaotic streets of noisy advertizing.

Nevertheless the challenge of methods for measuring aesthetical qualities is the possibility to formulate aesthetical feeling with that degree of precision that will make it a shame to deny that they ought to be respected.

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