HENDO SEMANTIC MEASUREMENT

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Abstract
Semantic measurement is used more frequently but at the same time criticism is getting stronger. Instead of doing too many independent studies it now seems to be time to find out what some of the well-established factors stand for. One way of doing this is to validate semantic measurement against other methods, e.g. neurophysiological and health records. Another way is to use the semantic dimensions as a theoretical framework. As bricks in this framework are suggested: The concepts of ideal, expected and perceived profile, the concept of neutral zone, of critical limits and of critical factors.

Introduction
Semantic measurement has been used for many years as a systematic way of getting verbal response. It took it's most well-known form, The Semantic Differential, in the famous work of Osgood et al in 1957 and has been used in many recent studies e.g. on aesthetics and on perception of environment. Semantic measurement data is often treated by the powerful methods for statistical analysis, factor or component analysis. You can of course treat many kinds of data with factor analysis. This is done e.g. with different types of ability measurements but it is almost legio to treat semantic responses this way. The reason for this is partly the tradition build up by Osgood and his associates in trying to establish a semantic space, but the most important reason is probably a practical one. While most measurement only concerns one or a few variables, when using semantic scales you end up with as many variables as you have words or word-pairs. Most psychophysical measurement gives responses in one dimension at a time, e.g. size, weight or lightness, neurophysiological measurement, e.g. of heart rate, gives beats per second and stability of beat, behavioural measurement goes more often than not along only a few dimensions, amount of aggressive behaviour, degree of approach or withdrawal, etc, but the semantic scales regularly occur in a battery such as: unique-typical, unusual-usual, extrovert-introvert, tense-relaxed, emotional-unemotional, extrovert-introvert, tough-tender, insensitive-sensitive, proud-humble, deliberate-casual etc. It then seems almost like a necessity for the
scientist to analyse all his semantic responses to find a few main dimensions along which he can order his material. It was with the aid of factor analysis that Ogden et al found their three famous dimensions Evaluation, Activity and Potency.

A distrust for words

Today there seems to be a change in attitude towards semantic measurement. Although it is being used more and more frequently a lot of criticism is raised against it. The old distrust against verbal response is peeping up especially in psychological circles. Critics are disappointed over all the semantic factors turning up with almost a new factor name in every experiment. The mass of factor analysed data seems to lead nowhere except maybe back to semantic chaos, once defined by Ogden. The day will soon be here, when nobody dare admit using semantic measurement. There is therefore ample reason to find out how fruitful the method really is.

My intention with this article is to point to a few openings, to look a bit beyond semantic measurement. But before I do this, I want to comment on two of the most vulgar objections against semantic methods. The first objection is that you can not measure everything with semantic scales. Many architects claim that most of the things that are of interest to them are lost in the scales, not only because treatment includes the calculation of averages, but also because every word means different things to different people. The designer, nowadays, takes a great interest in the total situation and if I do not measure the total situation I might as well "go home". It therefore seems to be necessary to point out that semantic measurement is just one of many possible methods. The type of measurement it gives is of course dependent on the method used, as every measurement will ever be. When the physicist measures temperature, this dimension is certainly dependent on his choice of thermometer, when the physiologist attaches electrodes to somebody, his graphs will depend on where he places the electrodes, what type of instrument he uses etc. (And not only is his measurement depending on the measuring instrument but of course also on the total situation including the scientist's own conceptual framework. But this is a philosophical point which should not be elaborated here.) It is therefore pure nonsense when people criticize the semantic method because it does not measure everything, the totality. It is like telling a physicist that his thermometer can not measure length, weight or heart beat, it is of course true, but it is nonsense. The semantic method is one of many methods. It might be useful in certain situations, then use it. Where it can not be used, try something else.
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The second objection against semantic measurement is a more serious one. Experimenters end up with a lot of factors or dimensions. They give them different names and might eventually by able to state, to take my own field as an example, that housing area A scores higher in Pleasantness than housing area B. It might also score higher in Complexity and Enclosedness but lower in, say Unity. So what does it mean? Is area A to be preferred to area B? Or will people adjust to area B in just a few years time and then find it even more pleasant than A? The question is thus, how to use semantic measurement in practice. Does it reflect fundamental needs or superfluous attitudes? Is it affected by cultural settings and the passing of time? Is it in fact worth anything at all? An honest answer to these questions would be: We do not exactly know. But it would be much wiser to reply that these questions were much too general. If we specify them a bit we would be able to give at least a few meaningful answers which would imply that some of the factors seem to meaningful in a scientific sense. I will return to this later, but let me dwell a bit longer on the general questions. Why are they asked? The reason is probably that so many investigators after using semantic response methods end up by doing a factor analysis, which might be complicated enough, name the factors, draw conclusions and then stop. This is wrong, they should not stop there, they have made only a start, nothing more, and will of course be open to the criticism, that the factor analysis was just a sorting out of all the scales put into it.

Suppose that a factor analysis gives four stable factors, No. I, II, III and IV, which account for most of the variance in the initial, say 50 scales. What can be said is that four different dimensions was enough to account for the 50 more or less related verbal responses. But what do these four dimensions stand for? The intuitive interpretation one can make by looking at the loadings for each dimension used to be called face validity in the good old handbooks. Face validity means, that the dimensions look as if they were measuring this or that, but do they? Face validity has not been very popular in other branches of measurement. Scientists are not usually satisfied, when they seem to be measuring this or that, they want to be sure, or at least as sure as possible. If an experimenter interprets his first factor as an evaluative one, he should then go on to validate it against some criterion. Are people generally more pleased, more well-adjusted, more healthy in housing areas with high evaluation than in such with low evaluation. If he found this, he would know a bit more about what his first factor stood for and could then go on with other experiments, using other methods, observation, health scores, neurophysiological data, etc and check his dimensions against these other types of
measurement. This is done by some, of course, but it is a cumbersome, slow process of research. As it is today, most experimenters seem to prefer to select their own semantic scales, invent their own factor names and maybe test the stability of the measurement by split half or retest procedure. Instead of doing this, I believe it would be wiser to accept some of the dimensions that have been found, and try to find out what they stand for.

Osgood’s three general factors, Evaluation, Activity and Potency, are too general to give a sufficient coverage to all areas. Although they turn up again and again, there seem to be specific factors involved in areas as architecture, others in art, others in describing textures and so on. It therefore seems like a good idea to open a field of research by using semantic measurement and factor analysis but then the different factors should be regarded as hypotheses for continued work.

I will now go into the specific field of architecture, and first compare some work we have done in Lund with some other results.

Semantic factors in architecture

To find a systematic method for measuring and describing perception of human environment groups of subjects rated various environments with descriptive words, which were given the form of single word rating scales. Data was processed by means of factor analysis (Keller 1972). The descriptive words were sampled from a Swedish Academy Dictionary. Several studies were made using altogether approximately 200 different words and covering the following types of environment: 15 living rooms presented as colour slides, one living room in full scale, one actual housing area, 15 landscapes presented as colour slides, one actual working environment (Gärking 1970) and finally 15 environments of a more heterogeneous character presented as colour slides. The following eight factors were found and named accordingly:

Pleasantsness (UGLY, STIMULATING, SECURE, BORING, IDYLLIC, GOOD, PLEASANT, BRUTAL) Amount of pleasantsness and security that an individual perceives. The factor parallels Osgood’s Evaluations factor and also the Descriptive Evaluative factor reported by Bonkmen 1970, the Evaluation factor found by Cans and Norevaeger 1973 and Canter’s Friendliness factor (1969). Though Canter claims that the three major dimensions found by him do not appear to relate to Osgood’s three major dimensions. In his studies on aesthetics Berryman identified a corresponding factor which he named Hedonic Value. Despite Canter’s doubts there seems to be quite enough indication for accepting this factor as a hypothesis for further work.

Complexity (MOSAIC, SUBJUDED, COMPOSITE, LIVELY) Liveliness and complexity of the environment. It parallels Osgood’s Activity
and is also identified as Activity by Canter as well as by Cass and Hershberger, while Berlyne calls it Complexity-Uncertainty.

Unity (FUNCTIONAL, OF PURE STYLE, CONSISTENT, WHOLE) How well the different parts of the environment fit together. The most common name for this factor is probably Coherence, which is used among others by Canter.

Enclosedness (CLOSED, OPEN, DEMARCATED, AIRY) Closedness or spaciousness, tightness and spacing of the environment. This space factor is frequently reported, for instance by Cass and Hershberger but also by Honkimäki, who calls it Spatial Quality.

Potency (MASCULINE, FRAGILE, POTENT, FEMININE) Potential powerfulness of the environment and also a clear aspect of sex, which means that the environment is more or less associated with one sex or the other. Same as Dégond’s Potency and also found by Cass and Hershberger and by Honkimäki. Berlyne with his very interesting approach has identified it but calls it Cortical Arousal.

Social status (EXPENSIVE, SIMPLE, LAVISH, WELL-KEPT) Economical and social measurement.

Attraction (MODERN, TIMELESS, AGED, NEW) Age of an environment but also a feeling for the old and genuine.

Originality (CURIOS, ORDINARY, SURPRISING, SPECIAL) Measure of the unusual and surprising in the environment. It might correspond to Dégond’s Novelty and also to the Aesthetic or Novelty factor found by Cass and Hershberger. It is also possible that the name Mystery used by some writers has to do with this aspect.

Now it is willingly agreed, that one does not find these eight factors in every analysis. From time to time they also seem to be mixed in a way that might give rise to different interpretations and other names. Finally one now and then finds spurious factors, a factor of warmth, a factor of light, a factor of tidiness, etc. There are many reasons for this. One reason is that if initially several synonyms and opposites are selected, e.g. clean, dirty, tidy, untidy, they are bound to correlate highly and then turn out as a separate factor. But this is not really interesting and can be avoided by careful selection of words. Confusion of factors might occur if the stimuli are of a very homogenous type, e.g. when doing experiments on housing areas we have found that Pleasantness and Social status very often go together, which means that the Social status and Pleasantness scales turn out in the same factor. This does not mean that the two dimensions are not useful as concepts but only that Social status and Pleasantness are closely related when people think about housing areas. An expensive area is for them very often a pleasant area. It is only
through a very careful sampling of both semantic scales, environments and experimental subjects and by using large samples as well, that many clear factors will appear. If on the other hand by unhappy circumstances scales of a certain factor have been omitted or the environments do not vary very much in the same certain respect that factor will of course not appear.

It is, finally, very important to realize, that the eight factors mentioned above do not represent "truth" in any absolute sense. The factors can be used for descriptive purpose to compare different environments, different colourings of an interior room for instance, or to compare different groups of people, such as architects and a normal population. Any other set of factors may be used in the same sense. In fact, all the separate semantic scales can be used directly for such comparisons. But there is of course a certain economy in using eight dimensions instead of maybe fifty or even hundreds of scales. Evidently it is a question not of truth but of economy.

Why do some factors do appear?

Is it then mere chance that some factors like Evaluation, Activity and Potency keep on turning up in one experiment after another? This is basically a question of why some words correlate, and others do not. Why do people seem to use words groupwise. Take Evaluation as an example. Most words seem to have a positive or negative overtone. A light and open room e.g. also means a nice room, although LIGHT and OPEN should really belong to the Enclosedness dimension. This overtone is of course the reason why so many words turn out in the Evaluation factor, which therefore usually appears as the first and strongest factor in the analysis. But very many words like STIMULATING, BORING, PLEASANT, GOOD, BAD, are so purely evaluative that they can be regarded almost as synonyms. And they seem to express almost the same thing. But what is it they really express? We have earlier on said that the eight dimensions constitute a very economic descriptive system, but do they also contain any deeper psychological meaning. Miron and Osgood speculate over this in a now seven years old article (in Catell 1966). They say: "We are left with the question of why the dimensions of primitive affect should be Evaluation, Potency and Activity. The organism's earliest, most persisting, and most significant interactions with it's environment can be characterized as varying between the dicotomous states of physiological satisfaction and dissatisfaction - and this applies to the only talking organism as well. In the earliest stages, these states are induced directly by the properties of stimulus complexes encountered, but later they become associated with signs of such originally adequate stimuli. Still later these states come under the control of social signs produced by other, particularly linguistic signs. But in addition to this satisfaction - dissatisfaction dicotomy (which we may
identify with the Evaluation factor), stimulus complexes, and therefore their signs, can vary in at least two other respects: the amount of effort or work they demand from the organism (Potency factor) and the degree to which they arouse the organism (Activity factor). This last sentence reminds about the name that Ber-tyne gave to the Potency factor, which he called Cortical Arousal, although there is some confusion here between Potency and Activity. It is also pertinent to some experiments that are at present going on in land and will be described later on. This leads us, however, to the next point.

The problem of validity

Any study in which a semantic dimension is related to some other type of measurement can be considered as an attempt at validation. To find, for instance, that one-family houses score higher in Pleasantness than blocks of flats, does of course imply that semantic Pleasantness has some relevance in a real life situation. The criterion used is then the well known preference for one-family houses among people in general (Acker and Kùller 1973). Thus, in a way almost every study using semantic dimensions will throw some light on the question of validity even if this is not the conscious intent of the writer. But it is taken together that all the carefully carried through and reported studies can be really informative and fruitful for future research. Reading some dozen of semantic studies is like looking at a gigantic jigsaw puzzle, getting one hint here and one there.

There are also many examples of conscious attempts at validation. In our own experiments we have been able to show that Complexity is related to number of units in the environment and to saturation of interior colouring. Unity seems to mean a lack of disturbing units, especially of permanent character. Enclosedness shows negative correlation with lightness of interiors. Potency and social status correlate with colouring. Certain individual and group differences have also been found. Architects seem to deviate from a normal population what concerns ratings of Pleasantness (Acker and Küller 1972, Küller 1971, 1972, Sorte in these proceedings).

The hypothesis of arousal

As mentioned above we are just now carrying out an experiment where perceptual and neurophysiological responses to different types of interiors are compared. It is well known that stimuli have specific projection areas in the cortex. It might be less well known that stimuli also have a general arousal effect on the nervous system. They modify the rhythm of the brain. This can be registered by means of EEG (brain waves). We believe that the degree of Complexity and Unity (Coherence) in the environment
are of vital importance for the arousal level that this environment will give rise to. When a subject stays in an environment, which he perceives as very complex and of very low Unity he is overflowed by a stream of impulses which leads to constant activation and he has no possibility to rest or recover. Even if the subject stays for a long time in such a situation, he will not get used to it, and the arousal level will remain too high. The organism is forced to constant readiness, as in situations of emergency and this will result in stress and psychosomatic symptoms. In environments with very low Complexity and very high Unity on the other hand, the individual will face too low activation. He will experience monotony, and as has been shown in experiments on sensory deprivation, he might start to day dream, hallucinate, or even fall asleep.

By placing experimental subjects in full scale rooms of different visual character we are now studying the relationship between how the subject perceives the room and how his organism reacts physiologically. We hope in this experiment to be able to determine the highest and lowest acceptable limit of the arousal level for a specific environmental situation. We think that it will be possible to predict, with the semantic method, the neurophysiological arousal effect of different architectural environments. It would be invaluable to be able to predict already when planning an environment, the average activating influence it will have. If this influence shows to be too high or too low it may then be easily changed. I will later on return to the concept of limits. But before that I would like to refer to a study by Berylne 1972, which shows that he is working along similar lines in the field of aesthetics.

Berylne points out that one of the most urgent needs is to exploit nonverbal methods more fully, but goes on to say that verbal scaling procedures must form a prominent proportion of our instruments at least in the near future. He is using the term collective variables on such dimensions as familiar - novel, expected - surprising, simple-complex and clear-ambiguous, which seem to describe the relations between elements of a work of art or between a work of art as a whole and some part of the world outside it. His experiments on complexity he sums up in the following way: 'When we and other investigators have carried out scaling experiments, subjective or judged complexity has regularly been found to reflect the determinant of uncertainty - it goes up with the number of independently selected elements and with the number of alternatives from which each element is chosen, and it varies inversely with similarities or mutual dependencies.' It seems very promising indeed, that Berylne in his work on aesthetics and our group in the field of architectural environment have been able to validate the semantic dimension of Complexity in such similar ways. Berylne has also tried, and with great success, to relate semantic dimensions to
exploratory behaviour such as looking time and has systematically tried to find out whether collective properties could affect the intensity of the orientation reaction. He summarizes this work in the following way: "All studies produced a Hedonic Value factor, apparently close to Osgood's Evaluative factor, associated with judgements of pleasantness, goodness and beauty. Another principal factor is usually connected with complexity, uncertainty, autonomic measures of arousal, and power to induce attention or exploration. It seems close to Osgood's Activity factor. In the last study, verbal measures suggestive of cortical arousal indicated an additional factor oblique to this one. The Weak/Powerful scale had a high loading on it. In the other four studies, Weak/Powerful or Weak/Strong scales pointed to a third, orthogonal factor, apparently identifiable with Osgood's Potency."

I believe that Berlyne has found within his field a very fruitful way to get beyond semantic measurement.

**Semantic dimensions and theoretical models**

A theoretical model is in some respect a conceptual analogy to our experience of the real world. The model is thus a kind of mental construction with the help of which we try to understand some of the things we find around us or in ourselves. Of course the model contains only those aspects, those dimensions or those concepts which we put into it. And again, the question whether they are an existing reality in the so-called physical world, is without meaning to natural science. If we prefer, we can believe this, if not, we can leave it.

Why do we then use models? The reason is, that the model helps us to bring order in all our different experiences. The model is a way to think about things, and also a way to put order to one's thoughts. In natural science the accepted reason for using theoretical models is that they give us an ability to order and predict. We can take as an example the Natural Colour System presented in the papers by Härd and Sivik (in these proceedings). Its dimensions of Whiteness, Blackness and Chromatic amount are of great help when sorting out all the colour experiences one has. The model is also useful when relating physical, physiological and psychological facts.

We can now start to think about the semantic dimensions as a kind of model, which can be used as a framework for people's descriptions of environment. By ordering our eight dimensions along the baseline and using the seven step scale along the vertical axis, our research group has got such a framework, see Figure 1. I have intentionally omitted our factor names and replaced them by the numbers I through VIII. This will make it easier for me.
to keep to a discussion of principles instead of involving our special names of factors.

![Graph](image)

**Figure 1.** A framework built up by semantic dimensions, showing a profile for a housing area.

In the figure I have drawn the average ratings for a housing area as small spots. And although it is not correct to do so, I have combined the small spots with a line. The reason to combine the spots with a line is to make the graph more easy to read, but it is important to note that if we e.g. change place between the factors III and VII the profile will look quite different. And of course the order between the factors along the baseline is arbitrary. Anyhow, once one has decided to put the factors in a certain specific order and to draw such profiles one has created a scientific tool which I would like to call the concept of the semantic profile. On condition that one has access to a set of standard semantic scales, with specific scales for each factor, it is now possible to compare different environments, different groups etc, by means of semantic profiles (in Lund we have developed such a standardized test, containing altogether 36 scales giving measurement in eight dimensions, see Külker 1972)

As I have pointed out before, the semantic profiles mainly represent some kind of face validity and therefore their main advantage in the near future will be to form a basis for validation experiments and a way to think about environment. I will now try to point out how this semantic framework can be used.
Perceptual contra cognitive profiles

In most of our work with semantic methods we have asked our experimental subjects to look at real or photographed environments, and rate what they see. They have in other words been rating their perceptions, or put in another way, they have been rating a concrete situation. It is from this kind of data that we have made our analyses and been able to draw perceptual profiles. The graph in Figure 1 is an example of such a perceptual profile for a housing area. When studying this profile one of course begins to wonder what it really ought to look like, supposing we had the best of all possible housing areas. Would it be possible to find a graph for 'the best housing area'? I would suggest that we call this the ideal profile. Together with Sorte I have made a few experiments, where we asked our subjects to imagine ideal environments and rate these ideals with semantic scales. It turned out that every type of idealized environment seems to obtain a typical profile and that these profiles differ significantly from each other (see Ackling and Sorte 1973). It is thus possible to obtain profiles based on cognition instead of on perception. Now it is important to state that the ideal profile is burdened with face validity just as much as the perceptual profile is. There is no guarantee whatsoever that the ideal semantic profile for a housing area corresponds to the best of all possible realities. But it is still very interesting that people do not seem to have any difficulty to rate their ideals with the semantic method and that the measures obtained are quite stable. By using the ideal profile we can now start comparing for instance the ideals of architects with the ideals of a normal population. When we do this we might find some interesting discrepancies.

I will now proceed to a third type of graph that we have been using in one recent experiment. First we asked our subjects to imagine an ideal art studio and rate it. We then told them: "We are now going to have a look at the studio, but before we do that, what do you expect it will look like? How do you think it looks in reality?" and we then had them to rate their expectations. Finally we went into the studio and rated it in reality. So we obtained three graphs, one of the ideal, one of the expected and one of the real studio. And the three graphs were significantly different. Although expectations were quite close to reality they differed in a few dimensions and both these graphs deviated clearly from the ideal graph. In this way we established the concept of the expected profile which also has a cognitive basis. (As yet unpublished study by Müller and Sorte).
It is possible to obtain profiles not only for groups but also for single individuals. Such a profile is shown in Figure 2.

Figure 2. Three different profiles for the same individual.

The ideal art studio
The expected art studio
The perceived art studio

We can now start to study this individual in some detail and try to understand him. Whatever his ideal art studio looks like it must be related to his past experiences, to his cultural background but also to his ability to think about and imagine things, to his personality and his view of life. (It would be very interesting in itself to compare the ideal environments of different people). The expected profile depends probably to a large extent
on his past and recent experiences, on what he knows about reality and expects from it. With those two graphs as references we can begin to study his perceptual profile. Does it look more like his ideal or more like his expectations. Is reality in some dimension even further away from the ideal than he expected.

I will stop this line of reasoning here because as yet our experimental work has not taken us beyond this point. But there is still another way in which the semantic rating scales can be used. Instead of asking the subject to score in one of the seven squares in the scale we can ask him to mark all the squares which would correspond to an environment that he would be willing to accept. Figure 3 shows an example.

![Graph with shaded and thick lines indicating perceptual profile](image)

Figure 3. One subject's profile for the ideal housing area (thin line), surrounded by the neutral zone (shaded) and critical limits (thick lines).
I made myself think about a housing area which I would be willing to accept. In this way we obtain something I would like to call a neutral zone. The ideal profile should for the sake of consequence be situated within this neutral zone, probably close to its centre. It is indicated on Figure 3 as a thin line. The two thick lines, one on top and one on bottom of the zone represent what can be called the critical limits and they represent maximum and minimum that will be accepted in each dimension for the specified environment. We have not as yet made any experiments trying to find neutral zones, but they do seem possible to establish experimentally. (Another way to obtain neutral zones would obviously be to ask the subjects to check all squares they would not be ready to accept.) The neutral zone has one obvious property that I would like to discuss in the next section.

The concept of critical factors

As could be seen in Figure 3 the width of the zone varies for different factors. In Pleasantness it goes from top to middle, covering 4 steps. There is in other words no upper limit, but the three lower squares seem unacceptable. In Potency five central squares are accepted but in Enclosedness only three. It might be argued that those dimensions where one is prepared to accept only a few steps would be more critical than those where one accepts five or six or even all seven squares. To take an example, Social status is probably more critical for the housing area one lives in than for a place one visits more temporarily. Complexity might be more critical for a sick room than for a restaurant. Therefore, while the ideal profile might be an expression for the most desired level of the different dimensions, the critical factors are those factors which are most important for the specific environmental situation.

Independence of factors or dependence

It has not been mentioned before, but when doing factor analysis one can choose between a technique, where all the factors that come out will be uncorrelated i.e. orthogonal factors, or another technique leading to correlated, so called oblique factors. Most experimenters, including ourselves, have been using the orthogonal technique, mainly because it is the most economical way to describe data. But if one goes beyond economy and starts looking for some meaning in the factors, as has been indicated above, it is quite obvious that such factors might be better described by an oblique model because of biological or psychological reasons. Using orthogonal factors one must sooner or later ask the following question: How is it possible to start with a lot of correlated words or scales and end up with a set of independent dimensions? Does not e.g. Complexity or Social status
affect Pleasantness and Unity? Now we must remember that when factor analysing a correlation matrix one is all the time using linear transformations. As a matter of fact linearity is a condition for the calculation of product-moment correlations.

So the independence of factors is a linear independence, which means that they are not directly or inversely related, but they might of course be and probably very often are related in a non-linear way. Maybe both extremely high and extremely low Complexity will give rise to low Pleasantness (see Acking and Sorte 1973).

But is there not any purely linear relationship whatsoever? I have myself said that I believe Social status and Pleasantness to go together for housing areas. How does this agree with the concept of independent factors? To dissolve this problem I believe it is necessary to distinguish between the general and the specific case. The general case is the model or the way to think about reality. This case is most closely approximated by an experiment where one has a large random sample of environments, all possible types of small rooms, big rooms, housing areas, landscapes etc. In some of these environments high Complexity will go together with high Pleasantness, in others an average degree of Complexity will go together with high Pleasantness and in others, finally, there must be low Complexity for high Pleasantness etc. In this large sample one may expect to find many independent dimensions, because there are few simple linear relationships, which will hold for every type of environment.

But for a specific kind of environment the conditions might be more simple, and if as for housing areas Social status and Pleasantness go together those two factors can in this case be regarded as correlated. If one then used only housing areas for making a factor analysis, the two factors would actually mix into one. It is a matter of taste whether one wants to use one fixed set of factors as a theoretical framework to describe all types of architectural environment, or rather try to find different factor structures for different environments. Our own experience shows that the above eight dimensions function very well for such a homogeneous sample as living rooms but also for a heterogeneous sample of colour slides of a fairly new housing development, a small church, a farm, some bungalows, a larger industry, a section of landscape with forest and lake, a central city picture and a new development of holiday homes, a station hall, the editing office of a newspaper, the interior of a home, a large super market, a hospital corridor, a cement factory and a restaurant. In both cases the eight dimensions took care of more than 95% of the total variance between environments.

If one is willing to accept that the dimensions are independent for the general case but might be correlated for the specific, one can start to think about how the different dimensions...
influence each other. When we walk around in an old well-known place, let us say the town, where we were born, and suddenly find that they are tearing down a whole block of old houses which we liked very much, our feeling of Affection will get a hard blow and we will start to feel unpleasant. When, later on, the old buildings are replaced by new ones, Originality may get more important than Affection and eventually influences us in a positive way. We will again find the situation a bit more pleasant. And as time goes by and we get used to the new buildings we might again develop a feeling of Affection for them. Well, this face validity example was a happy one. But unfortunately, when we look around the unhappy examples are too easily found. If there is still time for careful scientific work, some of it ought to be spent in looking beyond semantic measurement.

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