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VALENCE AND VISUAL ATTENTION

The relation between perceived artefact rationality, valence and visual attention

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Abstract

The relation between the perceived rational qualities of artefacts, its visual properties, and valence based preference responses was investigated in two experiments. Perceived rationality was approached as a complex of qualities, which could be assessed, in semantic rating scales. Experiment 1 showed that perceived rationality was largely independent of form and colour and participants tended to associate perceived rationality with high prototypicality and a low degree of articulation (i.e. amount of decoration). Experiment 2 investigated which objects participants spontaneously preferred to look at by the means of eye tracking. Participant's fixations were shown to divert from objects with high-perceived rationality. It is suggested that perceived rationality is largely independent of preference in terms of valence but prolonged exposure to an artefact could affect valence. The current results is foremost applicable to choices where emotional and design concerns is of primary importance or to choices between objects of similar quality and price.

Key words: aesthetics, rationality, preference, attention, eye movement

PsycINFO classification: 3920, 2346, 2360, 2323

The capacity to make sense of complex information, weighing multiple options in order to arrive at an adequate decision is a central property of the human cognition. While the potential for human reasoning appears to be high, empirical studies of decision making have shown that there is a strong discrepancy between normative models of decision making and the way people *de facto* reason (Baron, 1994). Various everyday decisions e.g. to take a certain seat or to choose a certain washing powder are hardly operations dependent on formal calculations of probability. Instead, this kind of choices appears to be related to cognitive economy compared to the cognitive load a formal utility calculation may be dependent on. This form of “micro-decisions” could possibly better be described as a form of informal preference responses. Simple visual cues such as size (Silvera, Josephs, & Giesler, 2002) and colour (Camgoz, Yener, & Güvenc, 2002) influence these forms of preference responses. Another factor that may play a role in these forms of “micro-decisions” is the perceived rationality of the object. The objective of this study is to investigate the relation between the perceived rational qualities of artefacts, its visual properties, and valence based preference responses.

BACKGROUND

Rational thinking may in a general sense be defined as “...whatever kind of thinking best helps people achieve their goals” (Baron, 1994, p. 29). With the added requirement “When I argue that certain kinds of thinking are ‘most rational’ I mean that these help people fulfil their goals. Such arguments could be wrong. If so, some other kind of thinking is most rational” (Baron, 1994, p. 29). Consider an agent about to perform a complex arithmetic operation. The goal is here clearly defined and there are formal criteria to determine if the operation was successful, since only one answer could be the correct one according to the established mathematical rules. Faced with the choice of performing the operation by herself or by using a calculator it may be argued that it is more rational to use the calculator. The calculator appears to be better in granting a successful goal fulfilment. Just like the calculator various other artefacts in our environment assist us in achieving our goals without putting the cognition under unnecessary strain. Screwdrivers for example assist us in assembling furniture and machinery while notepads and pencils helps us remember. Assuming that the goal of utility articles (e.g. tools, kitchenware, furniture) is primarily to assist in an effective and successful

operation it appears reasonable to suggest that an artefact that has superior effectiveness in a certain task is more rational than the inferior one. This assumption, however, confines the amount of goals and purposes present to the agent. The agent may not primarily ponder how well the artefact in question performs in an operation. A central concern for the agent might instead be to purchase an artefact that matches the kitchen or perhaps something to impress friends.

From the current account of rationality the notion appears to be rather intangible, merely operating as a criterion if a goal has been accomplished in a preferable way or not. Considering rationality from another perspective, a study by Lakoff & Johnson (1980), on the use of expressions in metaphors, has suggested that rational is “up” (i.e. good) and in control while emotional is associated with uncontrolled and “low” (i.e. bad). This is exemplified in the metaphor “The discussion fell to the emotional level, but I raised it back up to the rational plane.” (Lakoff & Johnson, 1980, p. 17).

When the concept of rationality been applied in semantic rating scales (Gärling 1970, in Küller 1972; Thörn, 2002) has the positive association with the notion as suggested by Lakoff and Johnson only partly been confirmed.

Thörn (2002) showed in an experiment that participants tend to prefer chairs that were considered emotional rather than chairs that were considered rational. Objects considered rational were distinguished by low or moderate evaluation on the semantic scale for “emotional”. The results of the Thörn study suggest that either the concept of “rational”, when used in an experimental context, does not have a positive valence similar to the linguistic evidence presented by Lakoff and Johnson, or the actual objects associated with rationality were not appealing to the participants.

In a study on how workers and architecture students perceived a working environment Gärling (1970, in Küller 1972) found a factor he labelled the “practical evaluation factor”, that appears to be related to the concept of rationality as applied by Thörn. Participants in the Gärling study evaluated an environment from 27 semantic bipolar scales (e.g. “rational – unrational”). By means of factor analysis could the variables from the semantic scales be grouped in five interpretable factors that appeared in slightly different configurations for the architect students (Appendix 1) and the factory workers (Appendix 2). The workers included

a valence aspect in the “practical-evaluation-factor” which was not found for the architect students.

Alike the Gärling and Thörn studies, the current research is concerned with rationality and its relation to artefacts as it appears in semantic rating scales.

A related phenomenon to the association between valence and qualities such as “effective” and “practical” has been observed within the discipline of usability¹ research. Bergling (2001) suggested in an explorative study on the amusement use of digital television interfaces a strong association between comfort, affect² and usability. In the study, Bergling used a specially developed semantic scale. The functionality factor, which consisted of semantic items as for example “rational”, “functional” and “usable”, was shown to have a strong correlation to both affect and comfort. Bergling suggests that this relationship may be stronger in contexts related to “amusement use” than contexts related to “productive use”. Alike the factory workers in the Gärling study, Bergling assessed people that had experience of the artefact of study, since the participants were digital television subscribers that were tested in their own home.

Tractinsky, Katz and Ikar (2001) conducted a study on how participants perceived the aesthetic qualities and usability qualities of different versions of an ATM interface pre- and post- usage. It was concluded that what was perceived as aesthetically pleasing was considered easier to use than the less pleasing interfaces. These results remained stable even after the participants had used the system.

Keinonen (1997) conducted an experiment to investigate the relation between perceived usability³ and preference. In the Keinonen study, participants assessed six heart-rate-monitors⁴ on the basis of six scales related to expected usability and affect. Keinonen’s results suggest that perceived usability show a low explanatory power in predicting consumer preference. In contrast to Tractinsky et al, Keinonen used stimuli, with a larger variance in design than ATM interfaces and seems to be associated with higher subjective importance in terms of its visual properties (design) for the agent. A further strength of the Keinonen study

¹ A products usability is by ISO defined as “the extent to which a product can be used by specified users to achieve specified goals with effectiveness efficiency and satisfaction in a specified context of use” (Keinonen, 1997, p. 199).

² “Affect” and “comfort” seem largely to describe the same quality as valence.

³ This quality is by Keinonen referred to as “expected usability”.

⁴ This is a device that measures heart rate, which helps to get runners an objective measure of their performance.

was the use of scales that were based in established measures (e.g. SAMI, NASA-TLX) in contrast to Tractinsky's employment of single item measures.

Exposure and Preference

Increased exposure to a stimulus enhances the attitude to the stimulus (Söderlind, 2002).

This so called mere exposure effects suggest that extended exposure to a stimulus results in increased liking, given that no previous exposure has resulted in negative responses.

If exposure to the stimulus on the other hand resulted in a negative response in previous encounters a negative attitude increases as a function of exposure. Nevertheless, exposure can change previous less positive attitudes in a positive direction. This matter was observed in a study on how consumers perceive car models (Coughlan & Mashman, 1999). In this study more exposure to an object led to an increased preference although some participants previously held a negative attitude to the car.

The relationship between preference and exposure has lead to the development of aesthetic theories based upon prototypicality, where frequency of exposure is one of the determinants of an object's prototypicality (Whitfield & Slatter, 1979). A preference for e.g. a chair then becomes a positive function of how representative (prototypical) the current chair is for the chair category (Hekkert & Wieringen, 1990). Aesthetic theories based upon prototypicality have received support in studies of colour preference (Martindale & Moore, 1988) furniture selection (Whitfield & Slatter, 1979) and the preferences for simple geometrical forms (Berlyne, 1971). The preference for prototypicality is according to Martindale and Moore (1988) based upon the conception that the more typical an object is - the stronger pleasure it is supposed to evoke in the matching process between the mental image and external stimuli. Similar to how prototypical objects are suggested to evoke stronger activation a wide variety of cognitive processes appear to be governed by this principle - e.g. high frequency words are easier to recognise than low frequency words and questions about prototypical items yield a more rapid response (Martindale & Moore, 1988).

Visual Cues and Preference

Apart from the role of prototypicality, simple visual cues⁵ such as size, colour, texture and rhythm have an important role in constituting preference. Studies have shown that “bigger is better” is a principle applicable to newspaper advertisements (Holmqvist, & Lundqvist, 2000), for geometrical shapes and Chinese Kang Xi characters (Silvera et al, 2002) since participants tended to prefer the larger versions of the same stimuli pattern. The blue colour (hue) when viewed in isolation or placed on various coloured backgrounds has consistently been preferred to other colours of the same saturation and brightness (Camgoz et al, 2002).

Takahashi (1995) investigated if abstract forms expressed in texture and rhythm can convey emotional properties. One group of participants in the Takahashi experiment produced abstract line drawings that were intended to picture specific emotions (e.g. anger, tranquillity, and joy), without using symbols. In the following session a group of participants ranked the drawings on the basis of whether they conveyed expressive properties or not. Considerable concordance among the participants was present. The Takahashi study supports the conception that abstract forms expressed in texture and rhythm can convey emotional properties that may be generalised to a larger population. Takahashi labels these properties of the picture “expressive perception”, suggesting that the structure of a picture may evoke a shared intuition on which meanings that are conveyed.

METHOD

Scale Development

A pilot study was initiated in order to collect items appropriate for the assessment of perceived rationality. Considering the results of previous studies (Gärling, 1970, in Küller 1972; Sorte, 1982; Thörn, 2002) it seemed as if there was a particularly close association between the semantic items⁶ “rational”, “effective”, and “usable”. Consequently, these variables formed the starting point for the search for interrelated items. Synonyms to the key words “rational” “effective” and “usable” were recorded from the most frequently used first

⁵ A simple visual cue (e.g. colour, size) is here a property of the stimulus, which is simple in the sense that it needs little cognitive processing by the agent. Visual cues could also be investigated by direct objective measurement in contrast to for example prototypicality, which is based in a mental representation and only can be submitted to indirect observation.

⁶ The original Swedish adjectives were “rationell”, “effektiv”, and “användbar”.

synonyms in four Swedish thesauruses⁷. In addition synonyms that were converging across the words rational, usable and effective were noted. In total ten adjectives (Appendix 3) were utilised in semantic rating scales. Six persons rated five chairs that had previously been used in the Thörn (2002) study. The five chairs were: The object that was considered most rational, least rational, most emotional, least emotional and one randomly selected object. Based upon the multiple regression results ($R=.86$, $R^2=.75$, NS), where “rational” was treated as the dependent variable, four adjectives⁸ “rational”, “reasonable”, “effective”, and “usable” were used as semantic items to assess perceived rationality. The multiple regression did not yield a significant result, which is explainable considering the small amount of participants. A Cronbach’s alpha test of reliability indicated a high reliability (.94) of the scale.

Hypotheses

H1) High value on the rational factor is inversely correlated to valence (pleasure).

This hypothesis is based upon the results exhibited in the Thörn (2002) study, where it was shown that objects, which carried a low association to rationality were preferred. Yet the suggestions of Lakoff and Johnson (1980) that rationality has positive valence suggest that this relation needs further clarification.

H2) Objects that are considered highly rational are associated with high prototypicality⁹

Sorte (1982) showed that the variable “usable” had a statistical association to the variables “durable” and “permanent” which are a part of the prototypicality factor. Since “usable” was shown to have a strong bond to “rational” in the pilot-study this hypothesis appears plausible.

⁷ Györki, & Sjögren, 1991; Strömberg, 1988; Svenska Akademien 1998; Swedenborg, 1992

⁸ The original Swedish adjectives were “rationell” (rational), “förnuftig” (reasonable), “effektiv” (effective) and “användbar” (usable)

⁹ Sorte (1982) refers to this factor as “meaning”. The meaning factor is defined as “Correspondence between the component’s actual expression and the expectation one has concerning that type of object” (1982, p. 121). The interpretation of the meaning-factor as somewhat synonymous to prototypicality was largely confirmed by Sorte (personal correspondence, 2002). Prototypicality can be described as a form of mental schematic representations which “reflect the features occurring most frequently in category members, or, stated in other words, bear most family resemblance’s to them.” (Hekkert & Wieringen, 1990, p. 1). It seems as the factor “meaning” is an operational scale for measuring the amount of “family resemblance” to the prototype since it appears reasonable to expect “the features occurring most frequently” to be the ones concurring with “the expectation one has concerning that type of object”.

H3) Objects that are considered highly rational are associated with angular forms

In the Sorte (1982) study various groups of objects were compared. A group that contained more utility articles than the other groups was distinguished by significantly more angular forms. Seen to that utility articles appear to be associated with rationality this hypothesis seems plausible.

H4) Objects that are considered highly rational are associated with a low degree of colour.

Considering that machinery, home electronics and tools - artefacts that seem to be associated with high rationality seems to carry low degree of colour this hypothesis seems probable.

H5) Objects that are considered highly rational are associated with low value on the articulation-factor

The articulation factor “concerns the degree of finish and decoration surpassing what is absolutely necessary for the function in question” (Sorte, 1982, p. 121). Based upon the assumption that artefacts considered rational are associated with a transparent form to support action performance, more articulation could possibly conceal the function.

Experiment 1

Stimuli

Participants viewed a computer presentation including fourteen chairs (Appendix 4) from the Thörn (2002) study. Each object was presented separately one after another. Four independent participants had in the Thörn (2002) study selected these objects from a range of 157 chairs on the basis of the instruction “to select the most emotional and the most rational objects”.

Scales

SKB, PAD and the scale developed for the assessment of perceived rationality were used. SKB (Sorte, 1982) is an instrument for the assessment of visually discernible qualities of components (e.g. machinery, chairs, etc) in the built environment. SKB is based upon the hypothesis that the visual perception of environmental components can be assessed in

semantic rating scales (by means of factor analysis) and can be grouped in meaningful systems of dimensions. Eleven factors that independently of each other describes perceptual properties of environmental components is included in the SKB inventory; valence, mass, form, articulation, prototypicality, surface, structure, scale, age, colour and lightness. Four factors, articulation, prototypicality, colour and form were used in this study. Valence (pleasure) and arousal were measured with a translated¹⁰ version of the PAD inventory (Mehrabian & Russell, 1974). The PAD inventory measures emotional response from six bipolar adjectives (e.g. jittery-dull) for each of the three dimensions – Pleasure¹¹ (valence), Arousal¹² and Dominance¹³. On each pair of bipolar adjectives, the participant is instructed to make a check mark closest to the adjective that best describes their feelings on a nine-grade scale.

Participants

18 students, (5 female, 13 male), at the University of Lund participated in the experiment on a voluntary basis. In return for their participation, they had the chance to win tickets to the movies.

Procedure

Participants performed the experiment in a laboratory setting. The participant received written instruction in the presentation and in the forms. A semi-random presentation order was used, whereas participants were assigned to one of five randomly composed stimuli orders. The participants first evaluated all fourteen objects from the PAD scales, and then they continued the evaluation with the SKB and rational scale. Participants changed pictures by the means of self-pace. There was no time limit.

¹⁰ This translation was made with the assistance of a BA English graduate. The PAD-inventory was pre-tested in a focus group to ensure that the translation was adequate.

¹¹ “Pleasure-displeasure is a feeling state that can be assessed readily with self-report, such as semantic differential measures, or with behavioural indicators, such as smiles, laughter, and, in general positive versus negative facial expressions.” (Mehrabian & Russell, 1974, p. 18).

¹² “Arousal” refers to the emotional activation of the agent, from low arousal states e.g. coma to high arousal states e.g. frantic excitement (Mehrabian & Russell, 1974).

¹³ “An individual’s feeling of dominance in a situation is based on the extent to which he feels unrestricted or free to act in a variety of ways. This feeling can be hampered by settings that limit the forms of behaviour and enhanced by settings that facilitate a greater variety of behaviours” (Mehrabian & Russell, 1974, p. 19). This dimension of the PAD inventory was not included in the experiment, since it describes how the person may feel in a certain environment. The current experiments evaluated the emotional response to pictures of the objects, which consequently makes this dimension inadequate.

Data Treatment

In total 7868 individual ratings on the SKB factors, the rational scale and the PAD inventory were collected. The data from one participant's PAD form was discarded since it was incomplete. Since the PAD, SKB instruments are based upon ordinal data the calculation of means could be questioned from a conventional viewpoint. Considering that PAD and SKB as instruments are based on means, it would be inadequate not to calculate means.

Insert Graph 1 about here

Results

H1) High value on the rational factor is inversely related to valence (pleasure).

A t-test of correlated samples comparing the scores on valence for the seven objects considered most rational with the seven objects considered least rational yielded no significant result (4.37 vs. 4.5, $p < .21$). A Spearman rank order correlation (based upon means) of valence and perceived rationality produced no significant correlation ($r = -.02$, $p < .93$).

H2) Objects that are considered highly rational are associated with high prototypicality.

A t-test of correlated samples comparing the scores on the prototypicality factor for the seven objects that were considered most rational with the seven objects considered least rational showed that the objects that were considered most rational were associated with a high mean on the prototypicality factor ($M = 4.83$ vs. $M = 3.96$, $p < .0001$). A moderate positive Spearman rank-order correlation ($r = .32$, $p < .0001$) between the prototypicality factor and the rational factor was found.

H3) Objects that are considered highly rational are associated with angular forms (i.e. low value on form).

A t-test of correlated samples comparing the scores on the form factor for the seven objects that were considered most rational with the seven objects considered least rational produced no significant difference ($M=3.77$ vs. $M=3.85$, $p<.45$). A Spearman rank-order correlation between the rational factor and form factor ($r=-.065$, $p<.04$) yielded a trivial yet significant result.

H4) Objects that are considered highly rational are associated with low degree of colour.

A t-test of correlated samples comparing the scores for the colour factor of the seven objects that were considered most rational with the seven objects considered least rational showed that the objects that were considered highly rational were associated with a low mean on the colour factor ($M=3.5$ vs. $M=4.3$, $p<.0001$). A Spearman rank-order correlation between the colour factor and the rational factor resulted in a trivial yet significant correlation ($r=-.078$, $p<.01$).

H5) Objects that are considered highly rational are associated with low value on the articulation-factor (from SKB).

A t-test of correlated samples comparing the scores on the articulation factor for the seven objects that were considered most rational with the seven objects considered least rational showed that the objects that were considered highly rational were associated with a low mean on the articulation factor ($M=3.5$ vs. $M=4.3$, $p<.0001$). A small yet significant negative Spearman correlation ($r=-.14$, $p<.0001$) between the articulation factor and the rational factor was found.

Scale reliability and validity

A multiple regression of the four items in the scale where “rational” was dependent variable yielded a significant result ($R=.67$, $R^2=.45$, $p<.04$). A Cronbach’s alpha (.87) indicated a high reliability of the scale

Insert Figure 1 about here

Result discussion

The current results suggests that an object' perceived rationality is a quality that is largely independent of colour and form. Colour and form are factors that have a fundamental role in constituting preference to an artefact in terms of visually discernible perceptual properties. The absence of a clear relationship between colour, form and rationality could explain why there was no negative relationship between valence and rationality. Low articulation on the other hand is a valid predictor of rationality. The most stable determinant for the rationality of objects is evidently prototypicality.

The multiple regression results suggest that the current scale can account for 45% of the variance, which is an acceptable level. The Cronbach's alpha measures reliability by assessing the association between the items in the scale. Aron and Aron (1999) states that a test should at least have an alpha of .7 but rather closer to .9 to be useful. In this respect an alpha of .87 must be considered as a sign of a high reliability of the scale. It may be proposed that what currently has been labelled perceived rationality is a complex of related qualities, rather than interchangeable variables, considering the strong alpha and the moderate R^2 .

ATTENTION AND PREFERENCE

Pieters and Warlop (1998) investigated the relationship between visual attention and product preference by measuring eye movements during the presentation of photo slides of shelf displays. Each slide presented six products from four categories rice, shampoo, salad dressing and canned soup. Participants were changing slides by the means of self-pace. Between slides participants were instructed to express which brands they preferred. Results from the study suggest that people tend to look at the brands they prefer. The preferred brand received a mean of 53 ms longer fixations then the others according to the experimental results.

A recent study (Holmqvist & Holsánová, 2001) by the LUCS eye-tracking laboratory and IKEA investigated children's preferences to toys and home interior objects (e.g. cloth,

carpets), by the means of eye-tracking, observation of play behaviour and semi-structured interviews. In the first session children viewed a number of computer screens presenting various objects while their eye movements and verbal comments were recorded. In the subsequent session the children were left to play in a room containing all of the previously presented items. The results of the Holmqvist and Holsánová study show that eye tracking can be a reliable tool for prediction of preference for what objects children play with and then later mention in interviews. The predicative capacity present in the significantly prolonged fixations to objects that were to be favoured in the playroom session is notable.

EXPERIMENT 2

Hypotheses

H6) Objects associated with high arousal will attract more attention than objects with lower arousal.

Level of arousal tends to be lower for consumer products and in advertising than in interpersonal relations (Huang 2001; Richins 1997). Accordingly, arousal seems unlikely to reach intense levels, which in combination with negative valence would lead to strong aversive behaviour. The mild form of arousal activation associated with consumer products is therefore probably more related to objects that are different and nontrivial, which is likely to lead to increased visual interest (Kroeber-Riel, 1984).

H7) Preferred objects will attract significantly more visual attention.

This hypothesis is in line with the results exhibited by Holmqvist and Holsánová (2001) indicating that children tend to talk about and play with what they prefer to look at, and Pieters and Waltrip (1998) results suggesting that people look more at products they prefer. Preference is operationally defined in terms of score on valence (pleasure), from experiment 1.

H8) Objects with high value on the rational factor will be negatively related to attention.

Since objects that were considered highly rational were associated with low valence in the Thörn study (2002), it appears plausible in conjunction with H7 that objects considered highly rational will be negatively related to attention.

Method

Participants

21 undergraduate students, (6 female, 15 male) at the University of Lund, stating normal vision without the aid of glasses or contact lenses participated on a voluntary basis in the experiment. In return for their participation they had the chance to win tickets to the movies.

Stimuli

Each set consisted of two photographs of the stimuli of just about the same size, arranged either side by side or top to bottom, depending on the format of each picture. The pictures were arranged so each picture covered half of the total space on the screen. Each set consisted of one object that was categorised as rational and one that was categorised as emotional in the Thörn (2002) study. The composition of each set was based upon a random order. Two sets of every stimuli pair were produced, so that it was certain that every object had the same probability of being presented to the left or the right to reduce effects related to left-right scanning behaviour. Eye movements were recorded with an SMI iView 50Hz remote set.

Procedure

Participants performed the experiment in a laboratory setting. Each participant was tested individually. The participant was verbally instructed to “just look” while their eye movements were recorded. A semi-random presentation order was used, whereas participants were assigned to one of five randomly composed stimuli orders. Each one of the seven screens was presented for 10 000 ms on a computer monitor.

Insert Figure 2 about here

Results

A t-test of correlated means displayed significant differences in the fixation times of the objects in each set. The participants preferred to look in average 11.43 % i.e. 1143 ms ($p < .0001$) more on one particular object in each set.

H6) Objects associated with high arousal will attract more attention then objects with lower arousal

A t-test of correlated samples of the visual attention scores for the seven objects that evoked the most arousal against the seven objects that evoked the least arousal produced a significant difference ($M=52.12\%$ vs. $M=44.27\%$, $p < .0001$). A Spearman rankorder correlation (ranked on means) between arousal and attention yielded no significant result ($r = -.07$, $p < .8$).

H7) Preferred objects will attract significantly more visual attention.

A t-test of correlated samples of the visual attention scores for the seven objects that had the highest valence against the seven objects that had the least valence produced no significant difference ($M=46.95\%$ vs. $M=49.44\%$, $p < .19$). A Spearman rankorder correlation (ranked on means) between valence and attention yielded no significant result ($r = -.002$, $p < .99$).

Insert Graph 2 about here

H8) Objects with high value on the rational factor will be negatively related to attention.

A t-test of correlated means of the visual attention scores for the seven objects that were considered most rational against the seven objects that were considered least rational produced a significant difference ($M=43.21\%$ vs. $M=53.19\%$, $p < .0001$). A Spearman rankorder correlation (ranked on means) between the rational factor and attention yielded a large and highly significant correlation ($r = -.88$, $p < .00004$).

Result Discussion

The objects had exactly the same probability of being fixated due to their size and placement, nevertheless, highly significant differences were exhibited. The results for H6 and H7 indicate tendencies, yet further research is necessary to clarify these issues. Nevertheless, the results of H6 suggests that people appear to look more at objects that are unconventional rather than preferred. This thesis is supported by the results from experiment 1 (H2), showing that objects associated with high rationality are considered more prototypical. Further support for this explanation is present in the results for H8, suggesting that rationality is negatively related to attention.

It might be speculated that the observed differences would be even larger in a more ecologically valid context. This is due to that authentic spontaneous looking may be disturbed by the experimental situation, which could lead to that all objects being fixated more.

GENERAL DISCUSSION

The current study has shown that there exists no association between perceived rationality and valence. Valence may, however, have a strong bond to rationality in situations where people have some experience of the artefacts as in the Gärling (1970, in Küller 1972) and Bergling (2001) studies. Prolonged exposure to the artefact could be a necessary condition for perceiving an object as containing “rational-qualities” as exceptional or disadvantageous as it affects valence. This mandatory exposure seems to be a condition that the rational factor shares with prototypicality, since prototypicality has shown to partly be determined by the amount of exposure received from a stimulus (Whitfield & Slatter, 1979).

The first experiment showed that perceived rationality may not primarily be dependent on the colour (colourful vs. colourless) and form (round vs. angular) factors. Articulation and prototypicality on the other hand were shown to be valid predictors of perceived rationality.

Evidence indicating that participant attention tends to divert from the objects considered rational was exhibited in experiment 2. Considering the results of the current study in conjunction with the results from Holmqvist and Holsánová (2001) suggesting that attention can be a good predictor of which artefacts that tend to be used it could be speculated that agents tend to select artefacts that has a low perceived rationality.

Although participants were not inclined to look at what they preferred, which contradicts the previous presented results (Holmqvist & Holsánová, 2001; Pietiers & Walthrop, 1999), the current study utilised a different way of measuring preference. Where these studies assessed preference by the means of verbal data, the current study measured preference by a formal test of emotional response (PAD). The obtained difference could be related to that participants answer in a different way in an anonymous self-report than in an interview situation. Another explanation, which perhaps is more probable, is that PAD allows the assessment of more subtle responses, in contrast to explicit verbal responses.

Generalisation of Results

The current study has shown that a) There exist no prima facie association between perceived rationality and preference, instead appears an association between these variables only be able to emerge after exposure. b) Perceived rationality is detected by judging the amount of articulation and prototypicality in the visual properties of the artefact. c) Attention tends to divert from objects associated with high perceived rationality.

The preference responses observed in this study describes how the visual properties of the artefact influence our emotional response. In this respect the current results are foremost applicable to choices where emotional and design concerns is of primary importance (e.g. interior design objects, art) or in choices between objects of similar quality and price (e.g. combs, tooth brushes) – where visual properties and emotional concerns consequently becomes of increased importance.

The current results has demonstrated that agents persist to detect perceived rationality by judging articulation and prototypicality even though they are exposed to radically different designs. These findings suggests that the way perceived rationality are detected in visual properties may be generalised to artefacts of many different designs.

Since participants were engaged in spontaneous looking are the results primarily applicable to contexts where agents are not searching for a specific artefact or according to a specific criterion. Considering agents tend to better remember what they have looked at, however, (Holmqvist & Lundqvist, 2000; Kroeber-Riel, 1979), spontaneous looking indirect restrict future decisions since the options remembered are the options that are available when the

artefacts are not present in the immediate environment. In this respect, research on how the visual properties of artefacts influence attention, can provide us with valuable information on how an agent proceeds from looking to choosing.

ACKNOWLEDGEMENTS

Thanks to my tutor associate professor Kenneth Holmqvist for good advice and support.

Further thanks go to research fellow Constanze Wartenberg, at LUCS, MD Hans Thörn and MD, Ph.D. Åke Thörn for helpful comments on a draft of this paper.

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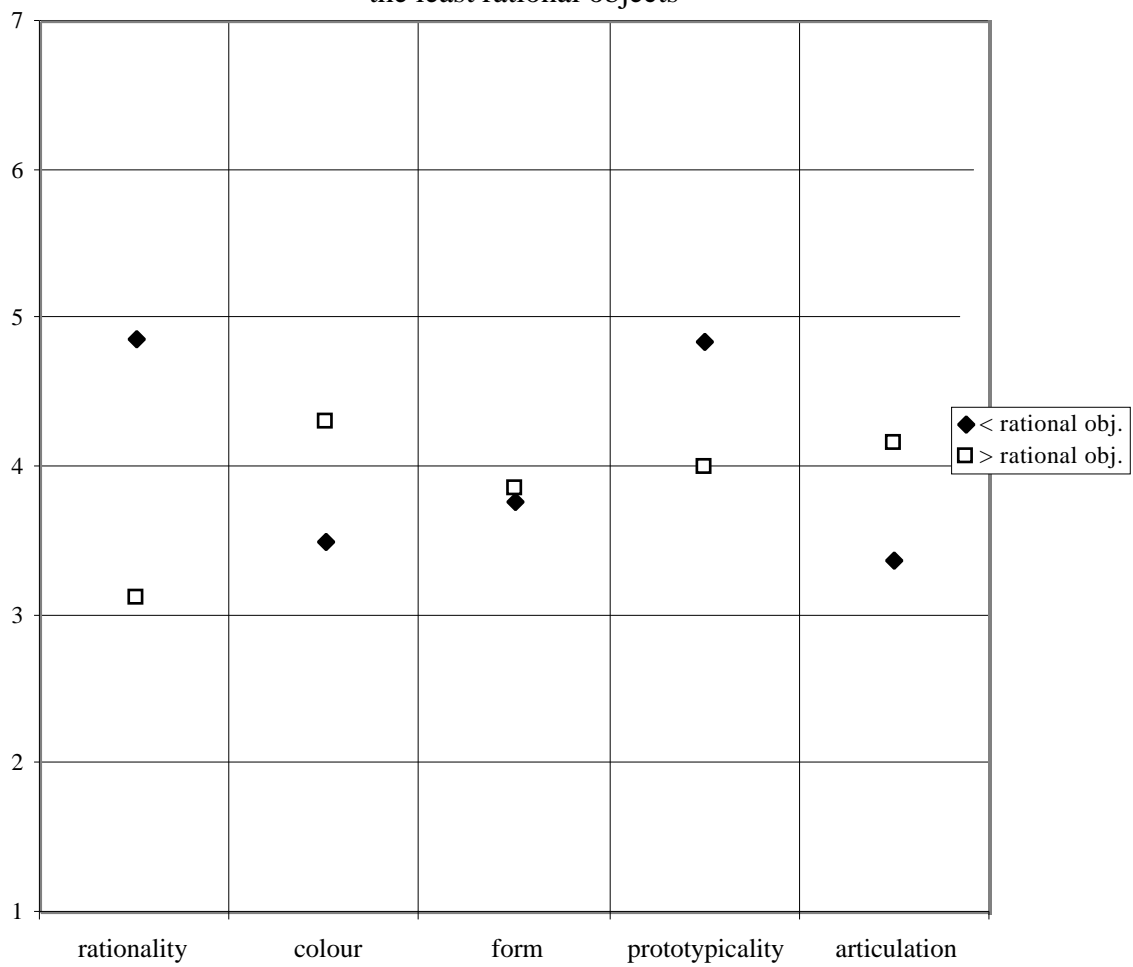
Figure 1.



Figure 2.



Graph 1: Mean results on factors for the most rational and the least rational objects



Graph 2: Mean Attention for the most rational objects
and the least rational objects

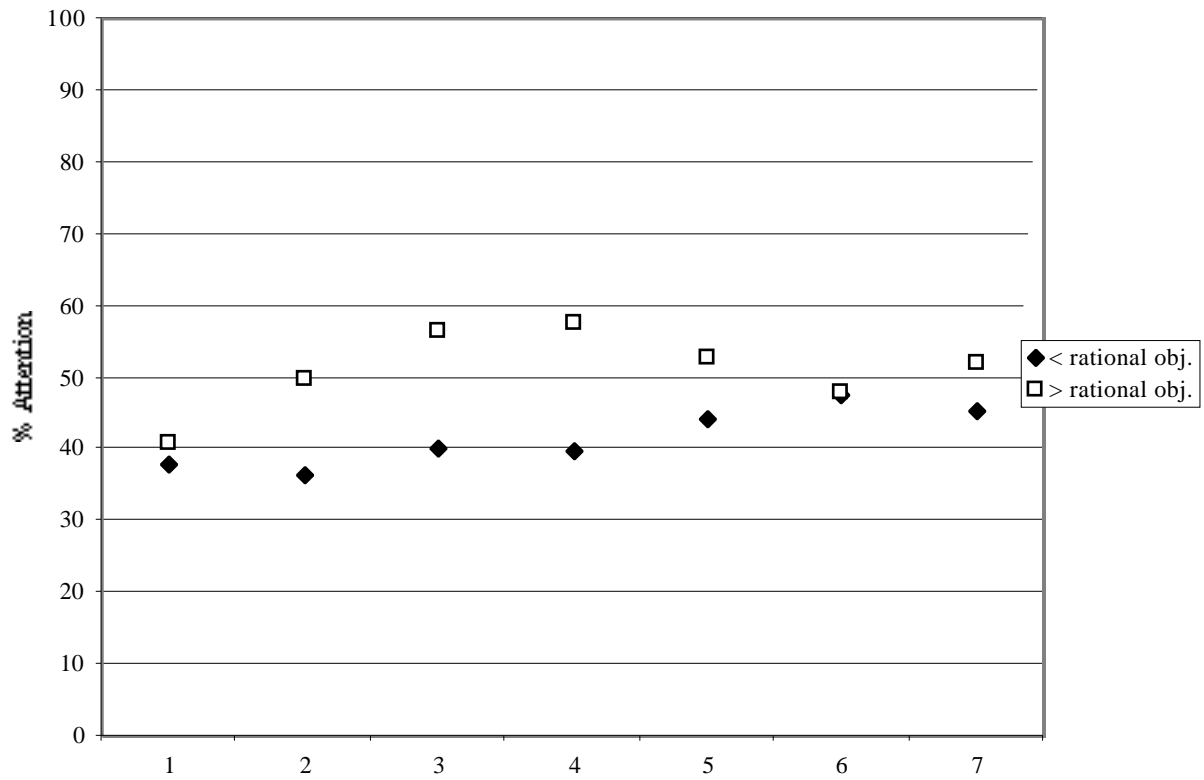


Figure captions

Figure 1. The objects considered most rational, M=5.4, and least rational, M=2.7, (from left)

Figure 2. The objects which received the most attention, M=57.5%, and the least attention, M=36.4%, (from left)

APPENDIX 1

Practical-evaluation-factor for architecture students (Gärling, 1970)

Functions well – Functions badly

Organized – Unorganized

Rational – Unrational

Practical – impractical

Effective – ineffective

APPENDIX 2

Practical-evaluation-factor for factory workers (Gärling, 1970)

Rational – Unrational

Practical – Impractical

Lucid – Confused

Functions well – Functions badly

Organized – Unorganized

Effective – Ineffective

Good – Bad

Spacious – Narrow

APPENDIX 3

“användbar” (usable),

“brukbar” (useful),

“effektiv” (effective),

“funktionsduglig” (servicable),

“fönuftig” (reasonable),
“nyttig” (utilitarian),
“praktisk” (practical),
“rationell” (rational),
“verkningsfull” (efficiency),
“ändamålsenlig” (suitable).

APPENDIX 4

Objects used as stimuli (in Fiell & Fiell, 2000)

“Butterfly”, Jorge Ferrari-Hardoy, Juan Kurchan & Antonio Bonnet, 1938.
“Armchair for the Bauhaus Weimar director’s office” Walter Gropius, 1923.
“Blow”, Giontan De Pas, Donato D’urbino, Paolo Lomazzi & Carla Scolari, 1967.
“Series 7”, Arne Jacobsen, 1955.
“Swan”, Arne Jacobsen, 1957-1958.
“Superleggera” Gio Ponti, 1951-1957.
“Donna”, Gaetano Pesce, 1969.
“Armchair for the Casa Calvet”, 1898-1900.
“Indiana”, D.T. Amat, 1975.
“Model No. B6” Marcel Breuer, 1926-1927.
“Tomato”, Eero Aarnio, 1971.
“Armchair”, Gerald Summers, 1933-1934.
“Kazuki”, Kazuhide Takahama, 1968.
“Chaise longue”, Gregotti, Meneghetti & Stoppino, 1953