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Abstract

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Differences in response times in the recognition of blurred visual stimuli in Repressors and Sensitizers

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Abstract

Repression and sensitization define two cognitive styles for coping with threatening stimuli. In this study differences in reaction times to recognise blurred visual stimuli were investigated. These stimuli were presented on a computer screen in continuously refining grid patterns, which first show totally blurred neutral, pleasant and unpleasant pictures. The person tested is asked to stop the refining, as soon as s/he thinks that they know what is on the picture. This computerized setting was applied to a sample of $N = 183$ persons who also filled out the Mainz Coping Inventory (Krohne & Egloff, 1999). According to differences in reaction time between pleasant and unpleasant stimuli groups of repressors and sensitizers can be identified. No relevant correlations between the differences in perception times and the questionnaire were found. This might be related to the different approaches of the two assessment techniques (perception and reaction modalities). Results are discussed in terms of their practical applicability. Guidelines for further research projects, and further development are given.

Keywords: Repressor vs. Sensitizer; coping style; perception time; computer aided psychological assessment; observational descriptive study
Differences in response times in the recognition of blurred visual stimuli in Repressors and Sensitizers

There is an agreement in literature about the fact that persons confronted with harassment, pressure and fearful situations show different kinds of coping strategies (e.g., Egloff & Hock, 1997). Diverse assessment methods have been designed to measure differences in individual behaviour.

Origins of the concept. The original concept of the repressor-sensitizer construct is closely related to psychoanalytic theories, involving Freud’s (1915, 2001) concept of suppression. Within this theoretical framework, repression is interpreted as a defence-mechanism that works unconsciously to protect the individual from threatening information and therefore from emergence of anxiety. How individuals cope with these stimuli/situations is the main point of the construct. Original conceptions go back to experimental settings. Referring to their work on motivational factors in perception, Bruner and Postman (1947) presented an influential study with a two-phase design. They first conducted an association experiment using 99 emotionally toned five-letter words (like whore, death, penis, crime, or rifle) and neutral words (like apple, glass, table, sugar, or water). After this first draft they chose the six words with the (individually) fastest associative reaction times, the six with the slowest reaction times and the six that were in the midmost of the reaction times. After two weeks, the 18 selected words were presented in a tachistoscopic experiment. The typed words were presented at increasing exposures of .01, .02, and .03 seconds. Bruner and Postman described a defensive strategy with an increase in association time combined with longer recognition time. Additionally, they described a sensitization process that was linked to alertness and speed. Thus, the long reaction times are combined with lowered thresholds for emotionally assigned
words. Derived from experimental verifications of the construct, two extreme poles "Repression vs. Sensitization" were finally described (Gordon, 1957).

In their early conception, they define the construct as a continuum of two different dispositions of coping with anxiety provoking stimuli or situations: Typical repressors try not to take note or even avoid anxiety-provoking (or more general: emotionally negative) situations. Information is not sought after or they rather look for information incompatible with the anxiety provoking stimuli. Weinberger (1990) describes repressors as using a variety of strategies to avoid awareness of affects and impulses that are incompatible with their self-images. According to Weinberger, they mainly use neurotic-level defence-mechanisms. Sensitizers show contradictory behaviour: They expose themselves specifically to these unpleasant stimuli and appear highly sensitised and receptive to them. They show high vigilance towards anxiety provoking stimuli. The construct is defined as a continuously diversifying concept. This means that every location between the extreme poles is a possible trait position. In recent literature repressors are reported to show a positive and optimistic self-image (Furnham, Petrides, Sisterson, & Baluch, 2003) but also tend to be influenced more by authority of a source of information than on argument strength (Debono & Snyder, 1992). Beside other things due to the original conception it was criticised, that there was no general theory or practice concerning cut-off scores or the consequences of having a mean score and not belonging to one of the poles (Chabot, 1973). The original approach has been often criticized. One point of critique is the strong relation to the psychodynamic theory, especially the idea of a dichotomy of "abnormal defence" and "adequate" coping. Additionally, insufficient evidence for the validity of available psychological inventories are criticised (e. g., the R-S-Scale of Byrne, 1961; Byrne, Barry, & Nelson, 1963).
The original approach by Bruner and Postman has further been criticized because the interpretation of the results is often difficult. It is hard to determine the difference between true recognition time and reporting time. Thus, it is unclear whether persons with long reaction times needed longer for the recognition of a negatively assigned stimulus, or whether they recognised the word earlier, and just were socially inhibited of revealing it faster (for an overview see Dixon, 1971). It was suggested that it is more appropriate to speak of a response effect instead of a perceptual defence effect. The idea of the differential effect on the response behaviour was explained within the “stimulus effect hypothesis” (Blum, 1955). In recent research the focus of attention was focused on the time-span for the detection of threatening stimuli in repressors (Caldwell & Newman, 2005).

A unidimensional concept? A further development, the model of coping modes (“Bewältigungsmodi”) from Krohne (1986, 1992) focuses on the orientation of attention. Two central concepts seem to be important in this concept: Vigilance (subjective uncertainty is reduced by the intensive search for stress related information) and cognitive avoidance (repression of threat generating stimuli). Tendencies to prefer one of these options are characterized as “intolerance of uncertainty” and “intolerance of emotional arousal”. Sensitizers are characterised here as persons, who show a (comparatively) consistently high vigilant behaviour and low cognitive avoidance (high intolerance of uncertainty). Repressors try to evade arousal by avoiding the observation of anxiety generating references (high cognitive avoidance, low vigilance). Persons, who do not show any kind of intolerance in either dimension, are supposedly not affected by uncertainty or emotional arousal in aversive situations. These persons are called “Non-defensives”. Low scores in both scales might be a sign of a general deficit in coping resources. The opposite behaviour is found in individuals, who show a high intolerance for
emotional arousal as well as uncertainty. This type of person exhibits particular problems in aversive situations. Krohne and colleagues called this type of person “anxious” and “unsuccessful copers” (see also Schmuckle, Egloff, & Krohne, 2000).

This leads to a further development from the original unidimensional conception towards a multidimensional construction. This framework led Krohne and Egloff to the development of the “Angstbewältigungsinventar” (ABI; Mainz Coping Inventory; 1999), a German language questionnaire distinguishing additionally between threatening situations relating to cognitive (the self-concept, ego involvement; ABI-E) and physical stimuli (ABI-P). This classification is very similar to the four-factor theory of trait anxiety. In using measures of trait anxiety and social desirability Weinberger, Schwartz, and Davidson (1979) proposed a categorization in four groups: Defensive/and high anxious (high on defensiveness and high on anxiety), non-defensive and low anxious (low on defensiveness and anxiety), non-defensive and high anxious (low on defensiveness and high anxiety), and repressors (high on defensiveness and low on anxiety). Krohne and Egloff (1999) report high correspondence when comparing this classification with their own.

Research on the repressor-sensitizer construct has an important impact on practical work within psychological treatment. Early studies (e.g., Schwartz, Krupp, & Byrne, 1971) highlighted that sensitizers suffer more from psychosomatic diseases, while repressors are often more likely to be impaired by organic illnesses. In general, sensitizers show a higher degree of emotional maladjustment in comparison to repressors. Especially in the field of anxiety related disorders, the construct should be kept in mind in order to make intervention more effective. Studies with high practical implications are for example dealing with cancer diseases (e.g., Giese-Davis & Spiegel, 2001; Zachariae, Jensen, Pedersen, Jorgensen, Christensen,
Lassesen, & Lehbrink, 2004), or in preventive health treatment (e. g., Millar & Millar, 1993), or in rehabilitation settings (e. g., Ptacek, Pierce, & Elliot, 2003). Some findings seem to be of practical importance also for the field of organizational psychology, as for example, the tendency to favour group or individual feedback (Varca & Levy, 1984).

However, the construct’s lacking discriminant validity regarding the anxiety-trait that should be mentioned here. It has led not only to the construction of new inventories but also to new strategies: The Social Desirability Scale (SDS) by Crowne and Marlowe (1960) for example has often been used to find out how often unpleasant situations are avoided or denied. A combination of the Social Desirability Scale and a measure for trait anxiety are commonly used to measure repression. As described above, it is concluded that low-anxious people will describe themselves with low anxiety and low SDS-scores, repressors with low anxiety and high SDS-scores, high-anxious persons with high anxiety and low SDS-scores and defensive high-anxious subjects would describe themselves with high anxiety and high SDS-scores. This research strategy is very popular and widely used in literature. Different combinations of measures are used in literature. In Gudjonsson (1981) for example the Eysenck Personality Inventory was used to measure trait anxiety (neuroticism) and defensiveness and in Kline, Schwartz, Fitzpatrick and Hendricks (1993) the L- and N-scale of the Eysenck Personality Questionnaire were used to distinguish between defensive and high-anxious subjects. See Egloff and Hock (1997) for a discussion of different approaches.

The aim of the presented study is to show whether differences in the recognition time of blurred pleasantly or unpleasantly assigned visual stimuli might be used for the research of differences in the perceptions of repressors and sensitizers.
It is expected that repressors and sensitizers will differ in their recognition times. Additionally, the correlations to a well established questionnaire (the Mainz Coping Inventory, ABI) will be explored. The usefulness of differences in the recognition time for diagnostic purposes will be examined.

Study

The study focuses on two main questions:

(1) Is it possible to design a computerized setting that is not based on self-description but closely related to the original experimental setting, which differentiates between persons depending on their perceptual preferences?

Referring to the theory, sensitizers are defined by little time deviations (in comparison between pleasant and unpleasant pictures) and should identify unpleasant pictures the fastest. In contrast, repressors should show high time deviations and take a longer time to identify unpleasant pictures.

(2) Are there relations between types of different recognition times and the Mainz Coping Inventory (ABI)?

Content validity can be assumed for the recognition time of blurred visual stimuli because of their close relation to the original experimental setting. They can be used as an external criterion for the validation of the Mainz Coping Inventory (ABI). Here, the relationship between a self-description questionnaire and the reaction times is of interest.

Method

The blurred visual stimuli were administered in a computerized setting and the Mainz Coping Inventory (ABI) as paper pencil test. The testing was embedded in a standard test-battery used regularly in a personnel selection procedure by a police
task force in Austria. The application of the objective test and the questionnaire took approximately 35 minutes.

Material

*Computerized assessment of recognition time for blurred visual stimuli (CART).* The computerized setting contains 32 pictures, which have to be identified by the persons tested. The pictures are drafts from the International Affective Picture System (IAPS, Centre for the Study of Emotion and Attention – CSEA, 1995; Lang, Bradley, & Cuthbert, 1997; Lang, Öhmann, & Vaitl, 1988). The pictures are divided into pleasant (e. g., sailboat, baby, gymnast in a winner’s pose), unpleasant (e. g., masked man with a knife, injured soldier, severed arm on operating table) and neutral contents (e. g., pizza, jogger, cheeseburger). The pictures have normative ratings regarding their affective valence, arousal and dominance. The Self-assessment Manikin (SAM; Lang & Bradley, 1994) was used for the quantification of the valence and arousal. The pictures were separated into these three groups on the basis of valence and external criteria (image definition, perceptibility of the content).

In the CART, pictures are presented in continuously refining grid patterns on the screen. In the first stage, only blocks of colours can be identified. After 15 stages of refinement of the grid pattern, the picture becomes more and more recognisable. The person tested is asked to stop the refining process, when s/he thinks that they can identify the content. They are then given a multiple-choice form to choose the identified content. For a short period of time five distractors are presented together with the correct answer. If the testee does not answer within 15 seconds (on the first answer attempt) or within 5 second (within the following answer attempts) the test continues automatically in order to avoid any learning (or memorising) of the answer possibilities. If the answer was wrong, the picture continues to be refined and the
testee is again asked to watch the picture carefully until they can identify it. The answer options on the multiple-choice form are varied in order to avoid any bias from memorising the turn before. As soon as the picture is identified correctly the next item is presented with the same instructions. Figure 1 provides screenshots of four different steps in the refining process from a totally blurred to a non-blurred picture (stage 15).

Results showed that most people start to recognise the picture at stage 8. Recognition times for each of the categories, as well as time differences between pleasant and unpleasant stimuli, the amount of errors, and the percentage of recognised pictures for each category are computed. The CART yielded a satisfactory reliability coefficient (split-half) of $r_{tt} = .90$.

*Mainz Coping Inventory (ABI; Krohne & Egloff, 1999).* This is a German language questionnaire for the assessment of anxiety and coping with stress based on the dimensions vigilance and cognitive avoidance. It consists of 40 dichotomous items (ABI-E; self concept threatening stimuli) and is based on the model of the modes of coping (“Bewältigungsmodi”), which was described in the introduction in more detail. The ABI is widely used in research (e. g., Rossmann & Pichler-Janisch, 1998; Schmuckle, Egloff, & Krohne, 2000) and practice, and the manual provides conclusive information on its validity and psychometric properties.

**Sample**

The CART was applied to 187 persons (123 men and 64 women) from 16 to 64 years ($M = 26.9$). 45 were applicants for a special police task force. 59 were executives from the police force and 83 were police academy students, other
students or other employees. 105 people had secondary school degrees, ten had a university degree.

**Results**

Before the data was analysed, testees who had shown adverse behaviour to the instruction were registered: These were testees, who had more than 17 failures (out of 32), identified less than 18 pictures during the first answer attempt and had longer processing times for each picture by 3 to 4 seconds. Accordingly, the data from 14 testees was excluded from further analyses.

*Some general remarks.* The average time until identification of a picture was 48.95 seconds, the longest that non-identified pictures were observed was 73 seconds. Unpleasant pictures were identified, on average, 4.86 seconds later than pleasant stimuli. More than 99% of the pleasant pictures were identified by the tested sample; the unpleasant stimuli were identified in fewer than 97% of the cases. The difference is statistically significant (Wilcoxon, $Z = -5.99; p = 0.00$). A group of people that showed higher-than-average time differences between identification of pleasant and unpleasant pictures was identified. Furthermore, only 94% of the pleasant stimuli on average were identified by this group.

Regarding *sex differences*, significant differences were found across all categories of stimuli ($t$ between -2.65 und -3.85, with $p$ between $p = 0.00$ and $p = 0.01$). Female testees identified pictures from the CART 2-3 seconds faster on average. This difference is given across all categories of pictures, so that the average time difference between identification of pleasant and unpleasant pictures shows no statistical significant difference between the two sexes ($t = -.23, p = .82$). No significant difference between the sexes was found for the number of failures.
It was also shown that police officers and police academy students identified the slides about 0.5 seconds earlier than testees from other professions. However, the average time difference between identification of pleasant and unpleasant pictures shows no difference between these two groups ($t = 0.75, p = 0.45$).

**Identification of repressors and sensitizers.** One of the main questions deals with potential differences between “repressors versus sensitizers” and the identification of the supposed types. As Table 1 shows three groups of testees were identified: The groups differed in the discrepancy between the “average time until identification of unpleasant stimuli” and the “average time until identification of pleasant stimuli”. The average difference between these two variables was 4.86 seconds (SD = 3.31 sec).

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Insert Table 1 about here

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According to Table 1 results for the three groups can be summarized in the following way:

(a) With reference to the total sample, testees with large time differences (“repressors”) statistically need more time to identify the unpleasant slides in comparison to testees with middle or small differences. Testees with small differences are the fastest in this regard (analysis of variance; $F[2, 172] = 11.87; p = 0.00$).

(b) Testees with small differences (“sensitizers”) need significantly more time to identify pleasant slides than others (analysis of variance; $F[2, 172] = 7.99; p = 0.00$).

(c) No significant differences were found between the identification of neutral pictures and the average time for all sorts of pictures within the three groups.
In addition to the described hypothesis, sex differences were investigated. Therefore, when comparing the time for identification between male and female persons, the results disclose two main points:

(a) Male testees (relation of types 14/82/17). Results found for the whole sample group were also shown for this subgroup. Taking all sorts of pictures into account, the average times for identification were about half a second shorter compared to the whole sample.

(b) Female testees (relation of types 10/40/10). The differences in time for identification between the three groups were not found for pleasant pictures. Other results found for the whole sample were also shown here.

Correlations with the Mainz Coping Inventory (ABI). Table 2 summarizes ABI and CART correlation coefficients.

As illustrated in Table 2, only eight of 77 persons identified as repressors according to the ABI were also defined as repressors in the CART. The ABI describes 18 persons from the tested sample as sensitizers, while the CART only confirms four of them. None of the variables from the ABI and the CART show significant correlations (Spearman rank correlation; \( p < .05 \)).

Discussion

Results show that by using the recognition time of blurred visual stimuli a group from the tested people was identified, which behaved as described in literature: According to theory, this group is called “repressors”. They took longer periods of time to identify the content of unpleasant stimuli. Contrary to these persons, another group of people was identified: These persons showed low
differences in time and quickly identified contents of unpleasant pictures and were called – according to theory – “sensitizers”. Sex differences were not found in the interesting variables, although female testees needed a shorter time for identification of the contents throughout all groups of pictures.

More than two third of the tested sample was categorized in a middle range group, as neither repressor nor sensitizer. This leads to the essential question that often occurs when using tests or questionnaires: How can middle range results be interpreted in a practical sense, especially if the criterion of categorization leads to such a huge proportion of persons? On the one hand, it seems possible that a homogenous subgroup of people exists that show signs of flexible coping behaviour. On the other hand, a more heterogeneous subgroup is also possible: According to theory, a division into non-defensive coping types and anxious individuals is then likely. The first analyses of the data from the middle range subgroup give some indications for the second hypothesis of a heterogeneous group.

Since the main focus in the CART was a strong connection to early experimental settings (as described in the introduction), content validity can be assumed. The comparison of results from the CART with those from the application of ABI for reasons of validation failed: The defined types “repressor” and “sensitizer” from the CART were not concurrent with the classification by the ABI. One reason may lie in the different modalities that are used by these assessment instruments. While the CART measures the individual style of vigilance and avoiding strategies on a perception level, the questionnaire uses a self-report technique and focuses on the way in which a person reacts. Of course, the assessment quality of self-description data has been widely discussed. Therefore, another explanation may possibly be traced back to the particular sample used in this study. Since the testees were partly
in a recruitment situation it can be assumed that some of them faked their results in the Mainz Coping Inventory in an assumed socially desired manner. Fakeability always has to be taken into account when working with questionnaires (Kubinger, 2002; Viswesvaran & Ones, 1999). A closer look at the data shows that persons with repressive coping behavior represent the largest group (77 out of 172) in the Mainz Coping Inventory. The sample consisted of applicants for a special police task force. One might assume that a repressive coping style is assumed to be more desirable in this profession. Nevertheless, there are a lot of different explanations which might contribute to an explanation of this result. Amongst others, the basic ability for self-inspection and self-perception could also be taken into account.

Though the computerized setting yielded a satisfactory reliability coefficient (split-half), it is (at the current status of development) a research instrument only. First of all, more data on the stability of the results is needed. In the case of the CART only a long-term interval can be used for the determination of the retest-reliability to exclude memory effects on the test score, or an approach using a parallel version. Second, the rationale of using perception times in the recognition of blurred visual has to be further explored. It was hypothesized that repressors and sensitizers will differ in their recognition times to blurred visual stimuli. The whole setting was based on the idea of early experimental settings. As discussed in the introduction, these settings were criticized in literature as well. However, further validation strategies might include the use of physiological data. Further research with the CART should include validation attempts with extreme groups. This could include testing ambulance drivers or people conducting extreme sports. Studies using classic R-S-scales, SD-scales and trait-anxiety are also needed.
Results from future studies will show whether the technique may be useful and convertible for the construction of an objective personality test for the assessment of repressive or sensitive coping styles (cf. Cattell & Warburton, 1967; Ortner, Proyer, & Kubinger, 2006).

At the moment, a replication of the classic experimental design is planned. Furthermore, the test material needs to be improved: It seems as if the classification into positive, neutral, and negative photographs lacked a global acceptance amongst all subjects in this study. Additionally, the refining process is not at its best at the moment due to technical limitations. Such improvements are possible and planned for the next developmental steps. However, the CART has proven to be an interesting addition to research inventories in the field of psychological assessment.
References


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Figure 1. Screenshots of the refinement process in the CART. Picture 1 = stage 1 (top left); picture 2 = stage 3 (top right); picture 3 = stage 8 (at this stage most of the testees stop the refinement process; bottom left); picture 4 = stage 15 (final stage; bottom right).
Table 1. Categories of differences and defined values, values found in the sample, number per group (N) and average time differences.

<table>
<thead>
<tr>
<th>difference</th>
<th>defined values</th>
<th>sample values</th>
<th>n</th>
<th>atd</th>
</tr>
</thead>
<tbody>
<tr>
<td>low</td>
<td>values &lt; (M - SD)</td>
<td>values &lt; 1.55 sec</td>
<td>24</td>
<td>-0.66</td>
</tr>
<tr>
<td>(„sensitizer“)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>medium</td>
<td>values between ((M - SD)) and ((M + SD))</td>
<td>values between 1.56 and 8.17 sec</td>
<td>122</td>
<td>4.87</td>
</tr>
<tr>
<td>high</td>
<td>values &gt; (M + SD)</td>
<td>values &gt; 8.17 sec</td>
<td>27</td>
<td>9.7</td>
</tr>
<tr>
<td>(„repressor“)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Total sample \(n = 173\); atd = average time difference; \(M\) = mean of identification time, \(SD\) = standard deviation of identification time.
Table 2. Concordance of the categorisations distinct by the Mainz Coping Inventory (ABI) and the CART due to the tested sample.

<table>
<thead>
<tr>
<th>ABI-type</th>
<th>CART low</th>
<th>CART middle</th>
<th>CART high</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>repressor</td>
<td>8(^a)</td>
<td>58</td>
<td>11</td>
<td>77</td>
</tr>
<tr>
<td>sensitizer</td>
<td>4</td>
<td>10</td>
<td>4(^a)</td>
<td>18</td>
</tr>
<tr>
<td>non-defensive</td>
<td>4</td>
<td>22</td>
<td>1</td>
<td>27</td>
</tr>
<tr>
<td>anxious</td>
<td>8</td>
<td>31</td>
<td>11</td>
<td>50</td>
</tr>
<tr>
<td>total</td>
<td>24</td>
<td>121</td>
<td>27</td>
<td>172</td>
</tr>
</tbody>
</table>

*Note. n = 172. Values sharing a superscript are in the predicted directions; i.e. subjects scoring with low time differences in the CART should describe themselves as repressors in the ABI and subjects scoring with high time differences should describe themselves as sensitizers in the ABI.*