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Full Length Article

Inducing dissociation and schizotypal experiences through “vision-deforming” glasses

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ABSTRACT

Derealization, depersonalization and schizotypal experiences are described as separate concepts but they can be hard to distinguish. One way to show the uniqueness of these concepts is by showing a dissociation between these experiences. The aim of this study was to experimentally induce derealization without inducing depersonalization or schizotypal experiences. Healthy participants watched a neutral video in one of four conditions: (1) with stroboscopic light, (2) while wearing deforming glasses, (3) with stroboscopic light and while wearing “vision deforming glasses” or (4) without any manipulation. The results show that the “vision deforming” glasses induced derealization without inducing depersonalization but not without inducing schizotypal experiences. The stroboscopic light showed no significant effect, nor was there a significant interaction between the stroboscopic light and the deforming glasses. The results indicate that using “vision deforming” glasses as a manipulation method can show a single dissociation between derealization and depersonalization but cannot dissociate derealization from state schizotypy. This association between derealization and schizotypal experiences might be helpful in understanding the high comorbidity rate between dissociative disorders and schizophrenia spectrum disorders.

1. Introduction

Dissociative experiences are disruptions in the usually integrated functions of consciousness, memory, emotions, behavior, thoughts, and identity (American Psychiatric Association, 2013). Pathological dissociative experiences are seen as core symptoms of dissociative disorders, such as dissociative identity disorder and depersonalization/derealization disorder, as described in the fifth edition of the Diagnostic and Statistical Manual of mental disorders (DSM-5, American Psychiatric Association, 2013). However, dissociative experiences have also been reported by healthy individuals (Hunter, Sierra, & David, 2004).

Janet (1889) started studying dissociation at the end of the 19th century. However, to this day there is still debate about how dissociation should be conceptualized (Holmes et al., 2005; Nijenhuis & Van der Hart, 2011). Is dissociation, for example, better conceptualized as one construct or as several distinct subtypes of dissociation; such as depersonalization and derealization (Huntjens, Dorahy, & van Wees-Cieraad, 2013)? According to the DSM-5, depersonalization is the experience of being an outside observer, or a sense of unreality towards one's own thoughts, sensations, or actions. An example of depersonalization is feeling like your body is not your own (Bernstein & Putnam, 1986). Derealization is a sense of unreality towards others or the external world (American

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Psychiatric Association, 2013). An example of derealization is: experiencing your friends or family as strange and unfamiliar (Bernstein & Putnam, 1986). Although depersonalization and derealization are conceptualized as different constructs, they often co-occur together (Carlson & Putnam, 1993; Krüger & Mace, 2002).

The lack of distinction between dissociative and schizotypal experiences complicates matters further; these concepts are, in fact, very similar. Schizotypal experience is defined as a dimension of unusual experiences, such as hallucinations, ranging from extreme forms in patients diagnosed with schizophrenia to lesser forms in non-clinical individuals (Claridge & Beech, 1995). The terms schizotypal experiences, psychotic experiences, anomalous experiences, and psychotic like experiences have been used interchangeably (Kwapil & Barrantes-Vidal, 2015). This is in contrast to the categorical view, in which psychosis is considered to be a state that someone either does or does not have (cf., DSM-5). To give a concrete example of the close relation between dissociation and schizotypal experiences: voice hearing is highly prevalent in both (Pilton, Varese, Berry, & Bucci, 2015). Some authors have even argued that hallucinations should be considered as dissociative experiences (Moskowitz et al., 2005). According to DSM 5 (American Psychiatric Association, 2013), dissociative symptoms are defining features of dissociative disorders, while schizophrenia spectrum disorders are characterized by psychotic symptoms. However, in reality, dissociative disorders and schizophrenia spectrum disorders overlap in many of their symptoms. Moreover, comorbidity between these types of disorders is high (Ellason, Ross, & Fuchs, 1996; Haugen & Castillo, 1999; Moise & Lechner, 1996; Ross & Keyes, 2004). This suggests that psychotic symptoms, such as schizotypal experiences, and dissociative symptoms are associated (Renard et al., 2016).

Thus, it is important to examine whether specific dissociative experiences can be distinguished from schizotypal experiences. One way to demonstrate the uniqueness of depersonalization, derealization and schizotypal experiences is by showing a dissociation between these experiences, for example, by experimentally inducing these constructs independently of each other. Furthermore, valid and reliable methods to induce these constructs would be useful within the general field of experimental psychology. Several studies have shown that it is possible to induce dissociation and/or schizotypal experiences in analogue samples: Ketamine has, for example, been used to induce both schizotypal experiences (Moore et al., 2011) and dissociation (Morgan, Mofeez, Brandner, Bromley, & Curran, 2004). The trauma film paradigm has been used to induce dissociation (Holmes & Bourne, 2008). Stimuli deprivation, also known as the Ganzfeld effect, has also been used to induce both dissociation (Leonard, Telch, & Harrington, 1999) and schizotypal experiences (Daniel, Lovatt, & Mason, 2014), and the same holds for the face in the mirror task (Brewin, Ma, & Colson, 2013; Fonseca-Pedrero et al., 2015). None of these studies included measures differentiating between derealization and depersonalization. Neither have the above methods induced derealization without depersonalization and/or schizotypal experiences. One study showed that stroboscopic light was one of the best out of 11 methods at inducing derealization, while keeping depersonalization and anxiety relatively low (Lickel, Nelson, Lickel, & Deacon, 2008). However the power of this study suffers from the number of comparisons made. Furthermore strobe light has also been used to induce schizotypal experiences (Ter Meulen, Tavy, & Jacobs, 2009).

Showing that derealization, depersonalization and schizotypal experiences can be induced in isolation of each other would prove they are independent constructs. Therefore the aims of this study were (1) to induce derealization without inducing depersonalization or schizotypal experiences, and (2) to examine which method works best for inducing derealization. In line with previous research, it was hypothesized that strobe light would induce derealization without inducing depersonalization but not without simultaneously inducing schizotypal experiences. Additionally, in an endeavor to have a strong method to uniquely induce derealization, we also included a new method, namely “vision deforming” glasses. This method was chosen to induce the sense of unreality towards others or the external world (i.e., specifically derealization); the glasses function as a filter of the external world. Thus, we hypothesized that these glasses could induce derealization without inducing depersonalization or schizotypal experiences.

2. Method

2.1. Participants

Seventy-two participants from the general population who reported not having a current mental disorder were recruited for this study through local advertising and advertising on social media, such as Facebook. The sample was composed of 48 females and 24 males with an average age of 22.47 (SD = 8.52) years. Sixty-one of the participants were currently following a university bachelor's or master's program. All participants were fluent in the Dutch language, either as native speakers or by having passed a NT2-II or equivalent language test. People with vision impairments or epilepsy were excluded from the study.

2.2. Instruments

2.2.1. Community Assessment of Psychic Experiences (CAPE; Konings, Bak, Hanssen, van Os, & Krabbendam, 2006)

The Dutch version of the Community Assessment of Psychic Experiences was used to measure trait differences in schizotypal experiences. The CAPE is a 42-item self-report questionnaire that was developed as a screening tool for detecting individuals in the general population who had an elevated risk for developing psychosis. Participants are asked about the frequency of various schizotypal experiences on an everyday basis, with scores ranging from 0 (never experienced) to 3 (all the time). An example of such an experience is: “Have you ever had the feeling that you are being followed for some reason”. In this study the average score of all the items was used, resulting in a mean score between 0 and 3. The CAPE has shown to good reliability and validity (Konings et al., 2006).

2.2.2. The Clinician Administered Dissociative State Scale (CADSS; Bremner et al., 1998)

The Dutch version of the Clinician Administered Dissociative State Scale (version 2014¹) was used to assess the presence of dissociative experiences during and directly after the induction. The CADSS is a self-report scale containing 28-item describing various dissociative experiences. We used the 23 self-report items (5 additional items are observer-items). Participants are asked to report the extent of which these experiences apply to them on a scale ranging from 0 (not at all) to 4 (extremely applicable). The CADSS has three subscales: amnesic dissociation (e.g. presence of memory gaps), depersonalization (e.g. feeling disconnected of one's own body) and derealization (e.g. being in a familiar place but finding it strange and unfamiliar). In this study the mean depersonalization and derealization subscales were used, resulting in scores between 0 and 4.

The original version of the scale has shown high internal consistency across all items in previous research (Cronbach's alpha = .94), significant correlations with other instruments measuring the same construct, and good sensitivity at discriminating patients with dissociative disorders from other patient and non-patient groups (Bremner et al., 1998).

In preliminary psychometric studies, this version of the CADSS was shown to be a reliable and valid instrument for the measurement of dissociative states. Tests of inter-rater reliability showed a high level of agreement, with an intraclass correlation coefficient (ICC) of .99 for the subjective subscale. The CADSS also showed high internal consistency across all subjective items (Cronbach's alpha = .94) and for .82 for depersonalization (.82), and for derealization (.90).

2.2.3. The Schizotypal experiences State Questionnaire (SSQ)

The Schizotypal experiences State Questionnaire was specifically designed to assess current state schizotypal experiences. The SSQ contains 9 items which were derived from the DSM-5 (American Psychiatric Association, 2013) description of psychosis in combination with the Positive and Negative Syndrome Scale (PANSS; Kay, Fiszbein, & Opfer, 1987) and CAPE. The items contain statements such as "I had thoughts or feelings others could find strange or bizarre", "I had difficulties with controlling my own thoughts", "I was unsure whether certain experiences were real or fantasy", and "I felt apathetic" (for a complete description of items see Appendix A). Respondents were asked to indicate to what extent they agree with the statements between 1 (absolutely disagree) and 5 (absolutely agree). The average score of all items was used in this study, resulting in mean scores between 1 and 5. Internal consistency in the current sample of the SSQ was good (Cronbach's alpha = .77).

2.3. Procedures

The procedures of this study were approved by the Psychology Ethical Committee of the University of Groningen (13076-N). After being informed about the procedures, participants signed informed consent. The study has a between subjects design where participants were assigned to one of four groups through stratified randomization, matching on gender. Participants in each group were first asked to answer demographic questions, and fill in the CAPE. Thereafter all participants had to watch a video of an uneventful, ten minute car ride in a darkened room. The video was chosen as a neutral everyday experience. Participants were placed in a central position, in front of the screen at about 50 cm from the screen. The video was without sound.

Participants in the control condition were simply asked to watch the video. Participants in the glasses only condition were asked to watch the video while wearing "vision deforming" glasses. The deforming glasses are shown in Fig. 1. These glasses were commercially available, the central part of the lens was a flat circle of clear glass, leading to clear vision in the center. The decentral parts of the glasses were blurred, such that the peripheral visual field was perceived as deformed. Participants in the strobe only condition were asked to watch the movie with stroboscopic light in the background. The stroboscopic light was produced by a Fenix TK45 at a frequency of 15.6 Hz and was placed 1.5 m behind the participant. Participants in the strobe + glasses condition had to watch the movie while wearing the deforming glasses and having the stroboscopic background light. After watching the movie for ten minutes, the experimenter instructed the participant to stop and subsequently led him or her to a second room, where the questionnaires were administered. The participant was debriefed after finishing the questionnaires.

2.4. Data analysis

The data were analyzed in IBM SPSS version 22. To make sure effects of the manipulation were not the result of preexisting differences between the groups, we first checked whether gender, age, and trait schizotypal experiences predicted derealization, depersonalization, or state schizotypal experiences. Significant predictors were added as covariates for the main analysis. The main analysis was a 2 × 2 Multivariate Analysis of Variance (MANOVA) with glasses (yes, no) and strobe (yes, no) as independent variables and derealization, depersonalization and state schizotypal experiences as dependent variables. The sample gave a power of .80 to find large effect sizes, Cohen's $f^2 = 0.08$; $\alpha = 0.05$; four groups; three response variables. Smaller effects were deemed insufficient for an experimental induction method.

3. Results

The derealization, depersonalization, and state schizotypal experiences scores in the different conditions are presented in Fig. 2. Before performing the MANOVA, we assessed whether trait schizotypal experiences, age and gender had an effect on

¹ Available from the author on request http://www.doug Bremner.com/?escaped_fragment_=instruments/.

Fig. 1. Deforming glasses.

Fig. 2. Mean scores on derealization, depersonalisation, and state schizotypal experiences per condition.

derealization, depersonalization or state schizotypal experiences, and thus whether they should be included in the analysis. Independent samples *t*-tests showed no significant differences between males and females on derealization, $t(70) = 1.92$, $p = .06$, $\eta^2 = .05$, depersonalization, $t(70) = 1.28$, $p = .21$, $\eta^2 = .02$, or state schizotypy, $t(70) = 1.44$, $p = .16$, $\eta^2 = .03$. Table 1 shows the zero-order correlations between trait schizotypal experiences, age and the dependent variables. As can be seen, trait schizotypal experiences significantly correlates with depersonalization, $r(70) = .44$, $p < .001$, and age significantly correlates with derealization, $r(70) = -.26$, $p = .028$, and state schizotypal experiences, $r(70) = -.31$, $p = .009$. As a result both trait schizotypal experiences and age were entered as covariates in the MANOVA, but gender was left out. Table 1 also shows that derealization, depersonalization and state schizotypal experiences significantly correlate with each other.

The Multivariate Analysis of Variance (MANOVA) on derealization, depersonalization and schizotypal experiences show a significant multivariate effect of age, $F(3, 64) = 3.32$, $p = .025$, Wilks' Lambda = .87, partial $\eta^2 = .14$; schizotypal experiences, $F(3,$

Table 1
Correlations between trait schizotypal experiences, age and the dependent variables.

	Age	Derealization	Depersonalization	State schizotypal experiences
Trait schizotypal experiences	–.13	.22	.44***	.19
Age	–	–.26*	–.16	–.31**
Derealization	–	–	.61***	.50***
Depersonalization	–	–	–	.38**

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 2
Univariate results of MANOVA on derealization, depersonalization and schizotypal experiences.

	Derealization			Depersonalization			State schizotypal experiences		
	<i>F</i>	<i>p</i>	Partial η^2	<i>F</i>	<i>p</i>	Partial η^2	<i>F</i>	<i>p</i>	Partial η^2
Age	5.10	.03*	.07	0.68	.41	.01	7.83	.007**	.11
Trait schizotypal experiences	2.02	.16	.03	13.88	< .001***	.17	1.38	.25	.02
Strobe	1.34	.25	.02	1.81	.18	.03	1.62	.21	.02
Glasses	9.56	.003**	.13	1.62	.21	.02	8.48	.005**	.11
Strobe * glasses	0.45	.83	.001	2.10	.15	.03	0.06	.80	.001

Note. *F*-tests with 1 and 66 degrees of freedom.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

64) = 4.74, $p = .005$, Wilks' Lambda = .82, partial $\eta^2 = .18$; and glasses, $F(3, 64) = 4.5$, $p = .006$, Wilks' Lambda = .83, partial $\eta^2 = .17$. The univariate results (see Table 2) show that glasses were able to induce derealization without inducing depersonalization but not without simultaneously inducing schizotypal experiences. This effect occurred over and above the effect of the covariates age and trait schizotypal experiences. No significant main effect was found for the strobe light, $F(3, 64) = 0.89$, $p = .45$, Wilks' Lambda = .96, partial $\eta^2 = .04$; nor were there significant interaction effects between strobe light and glasses, $F(3, 64) = 0.94$, $p = .43$, Wilks' Lambda = .96, partial $\eta^2 = .042$.

4. Discussion

The aim of this study was to test whether derealization could be induced without inducing depersonalization (or schizotypal experiences) through strobe light or “vision deforming” glasses and to establish which of the two induction methods would perform better. The results show that the “vision deforming” glasses were effective at inducing derealization without inducing depersonalization but not without inducing schizotypal experiences. No significant effect of the strobe light was found in inducing derealization, depersonalization or schizotypal experiences, nor was there a significant interaction effect between the strobe light and deforming glasses.

These results have several implications. First, the results indicate that it is more difficult to separate derealization from schizotypal experiences than from depersonalization using the described manipulations. Although derealization and depersonalization correlate ($r = .61$ in the current study) and often go together, this study indicates that they are two different processes. The results also indicate that depersonalization is a unique construct, while there is little evidence that derealization is a separate experience from schizotypal experiences. The latter conclusion is indicated both by the relatively high correlation (large effect size) between the constructs ($r = .50$) but, more importantly, also by the results of the experimental manipulations found in the current study. It is not surprising that these experiences are difficult, if not impossible, to induce separately, given that derealization and schizotypal experiences are conceptually hard to separate.

Contrary to what was hypothesized, the results did not show any significant effect of the strobe light. This was unexpected, as previous research has found strobe light to be an effective method to induce derealization (Lickel et al., 2008). The lack of replication may be due to the sample size, which may not have been large enough to detect an effect of the strobe light. Alternatively, it may be due to the fact that participants had to look at a computer monitor. The light from this might have reduced the effect of the strobe light.

A second major finding is that “vision deforming” glasses emerge as a powerful method to induce derealization in the lab without the use of trauma stimuli (e.g. Holmes & Bourne, 2008). This suggests that “vision deforming” glasses could potentially also be used as part of interoceptive exposure therapies, for example, for anxiety disorders, panic disorders, and post-traumatic stress disorder, in which the patient is exposed to experimentally-induced internal experiences (Lickel et al., 2008; Weiner & McKay, 2013). However, it

is important to first replicate these findings and examine the applicability of this method in clinical samples, since the results of this study are based on an analogue sample. Although the dimensional nature of dissociation suggests that similar effects would be found for clinical populations, there might also be unexpected side effects associated with using the glasses.

It is important to note that the results of this study neither provide definitive evidence that derealization and schizotypal experiences are two distinct constructs, nor that they are two aspects of the same construct. The results are limited to the induction methods used in this study, which did not allow separation of the two. It might be possible to induce the constructs separately from each other through other means, for example, by using the trauma film paradigm (Holmes & Bourne, 2008) or multisensory and/or motor manipulations. However, there are doubts about the value of distinguishing schizotypal experiences and derealization. The two clusters of experiences frequently co-occur; they are conceptually closely-related, and several methods have been shown to induce both dissociation and schizotypal experiences.

A further limitation of the study is that it tested a single dissociation and not a double dissociation. Thus, while we were able to induce derealization without inducing depersonalization, this does not show that it is possible to induce depersonalization without inducing derealization. Future research should therefore also examine if it is possible to induce depersonalization without inducing derealization or schizotypal experiences. One possibility might be to use the mirror staring method, since this has had large effects in previous studies on depersonalization, while derealization remained relatively low (Lickel et al., 2008). However mirror staring was also found to be one of the weaker methods to induce dissociation in general, so trying new experimental methods (as was done with the “vision deforming” glasses in this study) might be a better way to proceed.

In conclusion this study provides evidence for a single dissociation between derealization and depersonalization but not between derealization and schizotypal experiences. The association between schizotypal experiences and derealization might be helpful in understanding the high comorbidity rate between dissociative disorders and schizophrenia spectrum disorders. Furthermore, it demonstrated that “vision deforming” glasses were the strongest manipulation to induce derealization. In our view, the deforming glasses emerge as a useful method for inducing dissociation in experimental studies; further exploration of their use in applied clinical contexts seems justified.

5. Contributors

The study was designed by Renard and Huntjens. Renard performed the data analyses, and wrote the first draft of the manuscript. All authors have contributed to and approved the final manuscript.

6. Conflict of interest

The authors declare there was no conflict of interest.

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Appendix A. Schizotypal experiences State Questionnaire

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1. I had experiences that others may find strange or bizar (hearing strange noises/seeing strange things/having strange tactile sensations).
 2. I had thoughts or feeling that others may find strange or bizarre.
 3. I had worries (eg about my health, my future).
 4. I had paranoid ideations (other than about the study).
 5. I had difficulties in orienting myself.
 6. I found it hard to control my thoughts.
 7. I had doubts about whether certain experiences were real or imagined.
 8. I felt apathic (numb, lack of energy or enthusiasm to do something).
 9. I was emotional.
-

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