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Shorter communication

Perseverative and compulsive-like staring causes uncertainty about perception

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ABSTRACT

Earlier studies have found that perseverative checking provokes memory distrust for checked stimuli, suggesting that compulsive checking is a counter-productive strategy to increase memory confidence. Obsessive Compulsive (OC) uncertainty also occurs for functions other than memory, like perception. Uncertainty about perception in OC patients gives rise to prolonged attending to the issues that patients feel uncertain about. In an experiment with 40 healthy volunteers, it was tested whether OC-like, perseverative (visual) attending induces OC-like experiences of dissociation and perceptual uncertainty. Participants had to look at an object (a gas stove or a light bulb) during a pre-test and a post-test. In between these tests, participants in the experimental condition were asked to stare at an object that was the same as the to-be-looked-at object during the pre/post-tests. Participants in the control condition stared at an object that was different from the object they looked at during pre/post-test. Both in the experimental and control conditions, dissociation was observed; the effects were equally strong. Critically, with regards to OC-like perceptual uncertainty, the effects were significantly stronger in the experimental condition. The findings indicate that OC-like perseveration induces distrust, not only about memory, but also about perception. To explain the results, we suggest that perseveration interferes with spreading of activation and that cognitive uncertainty (and possibly derealisation) is the experiential end-product of perseveration. It is suggested that all forms of OC perseveration share such interference and that all undermine confidence in cognitive operations.

Introduction

In the absence of objective memory failure, OCD patients tend to be uncertain about memory performance (Brown, Kosslyn, Breiter, Baer, & Jenike, 1994; Constans, Foa, Franklin, & Matthews, 1995; Dar, 2004; Dar, Rish, Hermesh, Fux, & Taub, 2000; Ecker & Engelkamp, 1995; Hermans et al., 2008; Hermans, Martens, de Cort, Pieters, & Eelen, 2003; Karadag, Oguzhanoglu, Ozdel, Atesci, & Amuk, 2005; MacDonald, Antony, MacLeod, & Richter, 1997; McNally & Kohlbeck, 1993; Sher, Frost, & Otto, 1983; Tuna, Tekcan, & Topçuoğlu, 2005; Zitterl et al., 2001). The majority of OC patients engage in perseverative checking (Tallis, 1995), and interviews with OC patients suggest that memory distrust and checking are related: memory distrust is experienced as a motive for compulsive checking (Reed, 1985).

It may be clinically plausible that memory uncertainty induces checking, but it has been argued that the causal direction may be reversed as well: checking may ironically enhance memory distrust (van den Hout & Kindt, 2003a; Rachman, 2002; Salkovskis & Forrester, 2002). There is strong evidence that this holds true. If healthy individuals engage in OC-like perseverative checking, confidence in memory is reduced (van den Hout & Kindt, 2003a), and participants report similar dissociation-like experiences of ambivalence ('I remember doing it in a way, but it's all fuzzy') that are reported after clinical checking (van den Hout & Kindt, 2003b; Reed, 1985). The effect is robust and replicable (Ashbaugh & Radomsky, 2007; Boschen & Vuksanovic, 2007; Coles, Radomsky, & Horng, 2006; Radomsky, Gilchrist, & Dussault, 2006). Thus, perseverative checking is not just a response to memory becoming unreal and untrustworthy, but the former seems to reinforce the latter.

Note, however, that the uncertainty of OC patients also relates to functions other than memory (e.g., van den Hout, 2007; Nedeljkovic & Kyrios, 2007). Patients may, for example, doubt whether the television is off, even while they are looking at it. Such uncertainty about *perception* and *attention* in OCD has been documented recently by Hermans et al. (2008). Clinical experience indicates that when patients are uncertain about perception, they also engage in perseveration (i.e., prolonged *attending* to the object). One of our patients, for instance, looked at a light switch for minutes without becoming sure that it was really off. Eventually, she wrote a note ('it is really off'), and stuck it next to the switch after having turned it off. After a few days, she started to doubt the self-written message and developed the habit of prolonged looking at the written line. Another patient tried to make sure her hands were really clean by

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holding her hands still in front of her, and intensely looking at them, trying to notice a spot. Such perseverative attending is observed less frequently than compulsive checking. The crucial point, however, is that it does occur, and that current ideas about memory uncertainty and compulsive checking do not cover these clinical observations. The question ensues if, in the realm of OC uncertainty about *perception* and *attention,* perseveration has the same paradoxical effects as perseverative checking. Would perseverative attention render perception 'unreal' and untrustworthy, just like perseverative checking renders memory unreal and untrustworthy?

OC uncertainty about perception often relates to *visual* perception. Empirical indications that 'visual perseveration' breeds OCD-relevant ambivalence and derealisation come from Holmes, Brewin, and Hennessy (2004), Leonard, Telch, and Harrington (1999), and Miller, Brown, DiNardo, and Barlow (1994). All three studies have shown that staring at a dot produced dissociation. While the studies were carried out to study the role of dissociation in the context of PTSD (Holmes et al., 2004) or trait-dissociation (Leonard et al., 1999; Miller et al., 1994), dissociative experiences are common in OC patients as well (Freyberger et al., 1999; Hand, Rufer, Fricke, Held, & Cremer, 2006; Hand, Rufer, Held, et al., 2006; Merckelbach & Wessel, 2000; Versiani et al., 2007), and OCD symptoms statistically predict dissociative tendencies, independent from other anxiety symptoms (Muris, Merckelbach, & Peeters, 2003). A plausible explanation is that self-reports about dissociation by OC patients relate to experiences during episodes of OC uncertainty and ritualising.

The observations by Holmes et al. (2004), Leonard et al. (1999) and Miller et al. (1994) seem to suggest that perseverative visual attention (staring) has effects that are comparable to those of perseverative checking: perseveration may make both memory and perception lose their matter-off-factness and provoke feelings of uncertainty and derealisation. Still, it is far from clear that the 'dot staring' paradigm is relevant for the understanding of OCD. First, OC patients are inclined to attend perseveratively to complex and ecological meaningful configurations rather than a simple dot, such as: are there any blood stains on the car bumper, are the stove lights turned on, etc. Would perseverative staring at such real-life, potentially OC relevant stimuli induce dissociation? Second, while there seems to be some overlap between OC experiences of unreality/ambivalence and dissociation as measured in earlier studies about dot staring (Holmes et al., 2004; Leonard et al., 1999; Miller et al., 1994), it is crucial that the OC experience during perseveration relates to uncertainty. Would perseverative staring induce *uncertainty* about perception?

In sum, we wanted to test if OC-like perseveration of visual attention (staring) affects perception in an ironical way, just like perseverative checking affects memory confidence. It was hypothesised that OC-like staring induces feelings of dissociation and reduces trust in the reliability of the perception of the object that the individual stares at. We used real-life stimuli that are often involved in OC perseveration (a gas stove and light bulb), and we assessed the effects of perseverative attention on both (general) dissociation and (more OCD specific) feelings of uncertainty. As we wanted to test whether prolonged staring ('visual perseveration') is a sufficient condition to induce OC-like experiences, independent of individual peculiarities, the study was carried out with healthy volunteers, who were deliberately not selected on, for example, OC tendencies.

Method

Participants

Forty volunteer undergraduate psychology students from Utrecht University participated (24 females/16 males; mean age 22 years, SD = 4.7). They received a small remuneration.

Design and procedure

The experiment had a $2 \times 2 \times 2$ mixed factorial design. The within-group factor was Time: participants had to look at an object (a gas stove or light bulb) during a pre-test and a post-test. The first between-group factor was Group: in between the pre- and post-test, participants were asked to stare at an object that was either the same object used in the pre/post-tests (relevant perseveration) or a different object (irrelevant perseveration). The second between-group factor was Stimulus: during relevant/irrelevant perseveration, attention was focused on a light bulb or a gas stove.

The experiment had 3 phases: (1) pre-test; (2) perseveration; (3) post-test, and the participants were randomly allocated to one of four conditions: Relevant Perseveration: [gas–gas–gas ($n = 10$) or light–light–light ($n = 10$)] or Irrelevant Perseveration [gas–light–gas ($n = 10$) or light–gas–light ($n = 10$)].

The participants were tested in a dimly lit and sound-attenuated room, and were sitting 200 cm from a desk with a 2-ring gas stove and a lamp with 2 normal light bulbs. The distance between the gas stove and the lamp was 30 cm. Instructions were written on a sheet and were handed out by the experimenter who was sitting behind the participant. Participants were asked not to move their chair during the experiment. At the pre-test, participants were to look at (depending on the condition) the two-ring gas stove or the lamp for 10 s, and then they completed the questionnaires. Next, they were to stare at the centre of the right gas ring or the centre of the left light bulb for 10 min, and were asked not to talk, avert their gaze, or blink their eyes. The instructions stressed the importance of concentrating on the object. After 10 min, the experimenter informed the participant that there were 10 more seconds left to observe the gas stove or lamp, depending on the condition. Finally, participants had to complete the same questionnaires concerning these last 10 s.

Assessments

Dissociation

Dissociation was measured with a translated version of the 19 self-rated items of the 'Clinician-Administered Dissociative State Scale' (CADSS; Bremner et al., 1998; Holmes et al., 2004), which includes depersonalization, derealisation, and amnesia. The CADDS was developed as a measure of state dissociation that can be used in repeated measurement designs. It has excellent reliability and consistency, and adequately discriminates patients with dissociative complaints (Bremner et al., 1998). Examples of items are 'Do things seem to be moving in slow motion?' and 'Do you feel disconnected from your body?' Items are rated on a 5-point scale anchored with 0 (not at all) and 4 (extremely).

Experienced uncertainty

Uncertainty was assessed with the following 5 items, which were scored on 100 mm Visual Analogue Scales.

(1) 'It was as though I saw it, but it wasn't definite enough';
(2) 'I saw it in a way, but it was all fuzzy';
(3) 'I realized that I saw it, but the image was not clear somehow';
(4) 'What I have seen during the last 10 s of observing the gas stove (or light bulb), felt reliable';
(5) 'I felt confident about what I saw during the last 10 s of looking at the gas-stove/light bulb'.

The first three items were taken from van den Hout and Kindt (2003b), and were quotes from OC patients, given by Reed (1985), that related to memory uncertainty during checking. For the purpose of the present experiment, these items were adapted to relate to perception. The fourth item came from the 'Brief Cognitive

Confidence Questionnaire' (BCCQ; Hermans et al., 2008), which has a one-item subscale assessing confidence in perception, and reads: 'What I have seen, is reliable'. The present formulation is an adaptation for the present task. The fifth item was derived from pilot studies, and simply asked for confidence in perception. The combined scale was the average of the 5 items, and ranged from 0 to 100.

Results

Dissociation after perseveration of visual attention

The mean CADSS scores at the pre-test and the post-test were $M = 4.8$ (SD = 3.7) and $M = 18.7$ (SD = 7.4) for the Relevant Perseveration (experimental) groups. For the Irrelevant Perseveration (control) groups, pre-test and post-test scores were $M = 7.2$ (SD = 7.4) and $M = 17.9$ (SD = 11.4). As there were no effects of Stimulus type, a 2 × 2 ANOVA is presented with Time (pre-test vs. post-test) as within-group factor and Group (relevant vs. irrelevant perseveration) as between-group factor.

There was a significant effect of Time [$F(1, 38) = 79.6$; $p < 0.01$], which reflects an increase in dissociation for both groups. There was neither an effect of Group [$F(1, 38) = 0.2$; NS], nor a Time × Group interaction [$F(1, 38) = 1.3$; NS], which shows that the increase was similar for both groups.

Uncertainty about perception

A Principal Component Factor Analysis was carried out using the pre-test scores on the 5 questions. This revealed a one-factor solution. The factor loadings were >0.87 for the 3 Reed (1985) items, 0.59 for the Hermans et al. (2008) item, and 0.48 for our own item. We decided to take the 5 items as one scale, reflecting 'uncertainty about perception', and to calculate total pre-test and post-test scores for each individual.

Again, as there were no effects of Stimulus type, findings from a Time × Group, a 2 way ANOVA are reported. Mean scores are presented in Fig. 1.

Uncertainty increased in both groups, which is reflected in a significant effect of Time [$F(1, 38) = 71.7$; $p < 0.01$]. There was no main effect of Group [$F(1, 38) = 1.6$; NS]. Fig. 1 suggests that the increase in uncertainty was larger in the experimental (relevant perseveration) condition. The crucial Group × Time interaction effect was, indeed, significant [$F(1, 38) = 7.5$; $p < 0.01$].

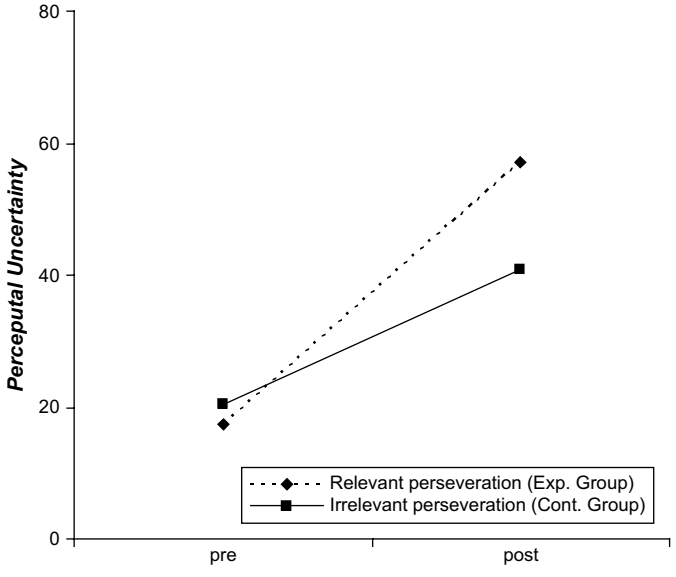

Fig. 1. Perceptual uncertainty before and after relevant (experimental) and irrelevant (control) perseverative visual attending.

Correlational analyses

Correlations between dissociation and uncertainty scores were significant, both at the pre-test ($r = 0.34$; $p < 0.05$) and the post-test ($r = 0.34$; $p < 0.05$). Likewise, the pre-to-post changes in dissociation and uncertainty scores were significantly related ($r = 0.43$; $p < 0.05$).

Discussion

Prolonged visual attention to real-life stimuli provoked feelings of dissociation and uncertainty about perception. This held true for both the experimental group that stared at the same object used in the pre- and post-test, and for the control group that looked at other objects during these tests. The fact that uncertainty and dissociation also occurred in the control group indicates that, for at least a short interval, perseverative visual attending induces effects that outlive the perseveration period. The dissociation effects were equally strong for the experimental and control groups, but with regards to uncertainty, the experimental groups displayed larger effects, and the crucial Time × Group interaction was significant. Why was uncertainty, but not dissociation, more strongly affected in the experimental group?

A plausible explanation relates to the nature of the items involved in the two measures. While all 5 ' uncertainty' items explicitly referred to visual perception of the objects that individuals looked at (see assessments), many of the CADSS items referred to other issues, like the feeling that time is slowing down, that one's body is unusually big or small, the perception of sound, etc. When individuals were asked to concentrate on uncertainty about the object they looked at, the change in object for the control group may have made individuals realize that after the change they were less uncertain than right before, while they were staring for 10 min at the earlier objects. In contrast, the more general and less stimulus-bound nature of dissociation assessed with the CADSS may have made scores insensitive to a change in the perceived object. The increase in uncertainty was correlated with an increase in dissociation ($r = 0.43$), which suggests that uncertainty induced by staring has a dissociative touch to it, comparable to uncertainty induced by checking (van den Hout & Kindt, 2003b; Reed, 1985).

Thus, perseverative checking induces uncertainty in memory (Ashbaugh & Radomsky, 2007; Boschen & Vuksanovic, 2007; Coles et al., 2006; van den Hout & Kindt, 2003a, 2003b; Radomsky et al., 2006), and perseverative attending induces uncertainty in perception (this paper). However, obsessive uncertainty may not only relate to memory or perception, but also, for example, to text comprehension (e.g., "I may misunderstand what is written") and motor control ("I may strangle my baby"). Interestingly, such other OC uncertainties are also typically reacted to in a perseverative way, like re-reading a line over and over again or repeatedly checking one's memory about the baby, et cetera.

It is tempting to speculate that the effects:

Perseverative checking → memory uncertainty

(Ashbaugh & Radomsky, 2007; Boschen & Vuksanovic, 2007; Coles et al., 2006; van den Hout & Kindt, 2003a, 2003b; Radomsky et al., 2006) and

Perseverative attending → perceptual uncertainty

(this study) are special cases of a general principle:

Perseveration → uncertainty

What psychological processes might be involved in such a cognitive-behavioural cascade?

First, clinical observations suggest that OC patients "attempt to monitor closely and take control over processes that would otherwise operate in automatic and well-practised ways. In many situations, this would result in poorer perceived performance, which would sometimes be accompanied by actual performance impairments as well as increased preoccupation" (Salkovskis, 1988, p. 40). There is, indeed, evidence that OC patients use explicit information processing strategies in tasks that require implicit processing for optimal performance (Deckersbach et al., 2002; Joel et al., 2005). However, even when it is acknowledged that OC perseveration relates to routines that are typically carried out automatically (e.g., memory, perception, text comprehension, simple motor movements), and that OC perseveration is an attempt to act with effort, a crucial question remains unanswered. Why does perseveration induce uncertainty and, at least as important, why is this uncertainty so *dissociative*?

Second, there seems to be a parallel between the present and earlier findings (van den Hout & Kindt, 2003a) on the one hand, and research about the effects of effortful memory retrieval on the other. It has been documented that after people have retrieved many childhood memories, they feel that memories are harder to access than when they are asked to retrieve only a few (see Merckelbach, Wiers, Horselenberg, & Wessel, 2001; Wienkelman, Schwarz, & Belli, 1998). Apparently, putting effort into autobiographical memory retrieval raises performance standards. One might argue that perseverative checking (van den Hout & Kindt, 2003a) or staring (this paper) has similar effects, and that raised performance standards explain why perseveration reduces confidence in memory and perception. Still, this too does not seem to account for the peculiar dissociative nature of uncertainty induced by perseveration. There does not seem to be a comparable subjective experience after effortful trying to retrieve nine negative childhood memories (Merckelbach et al., 2001). If there would be, one may speculate that after forced retrieval of many items, the difficulty of retrieval would coincide with the feeling that memories are there, but are somehow inaccessible (e.g., as a result of repression). In fact, the very opposite has been observed. That is, retrieval of many memories made participants report that memories are relatively hard to access, but the credibility of the notion "I have repressed many of my childhood memories" was *less* after retrieval of many items compared to the retrieval of a few items (Merckelbach et al., 2001). In sum, then, explanations of the perseveration → uncertainty association in terms of (a) recruitment of strategic resources for automatic routines and of (b) raised performance standards fail to account for the dissociative nature of uncertainty induced by perseveration.

A third theoretical account, that may be a better explanation of the latter, comes from research on priming and spreading of activation. Immediately after a stimulus is perceived, 'spreading of activation' occurs: concepts that are semantically related to the perceived stimulus become more accessible (Collins & Loftus, 1975). Crucial evidence comes from priming-studies (Koivisto & Revonsuo, 2000), showing that presentation of a word (e.g., 'gun') facilitates the recognition of targets that are presented later and that are semantically related (e.g., 'war'). What are the effects of perseveration on spreading of activation?

Three recent experiments on "un-priming" (Sanbonmatsu, Posavac, Vanous, Ho, & Fazio, 2007) answer this question. The authors presented negative and positive words and confirmed that, initially, these words acted as primes for affectively related words: words like ' bomb' increased accessibility of words like 'hate'. Then the primes were presented 40 times in isolation on a screen, without the context of, for example, a sentence. Participants just had to read the isolated words as they appeared on the screen. The crucial finding was that in all three experiments that were reported, words that were read 40 times without any context lost their initial capacity to facilitate recognition of targets related to primes. Apparently, the repetition of the isolated words blocked the spreading of activation. Note that, obviously, participants in the Sanbonmatsu et al. experiments did not lose the capacity to understand the meaning of prime-related words, like 'bomb'. But this intellectual understanding became disconnected from the automatic spreading of activation involved in the implicit and automatic generation of meaning (Collins & Loftus, 1975).

In the Sanbonmatsu et al. experiments, the 'perseveration' was relatively mild. Forty words were presented without any context, but the presentations were interspersed with other words. If the phenomenon of 'blocked spreading of activation due to repetitive and isolated presentation of words' would explain the experience of dissociation after OC-like perseveration, one should predict that increasing the perseverative nature of the word repetitions would induce such subjective experience. The phenomenon of 'semantic satiation' (Pynte, 1991) suggests that this holds true. If one repeats the word 'bomb' 10 times, one is likely to witness the 'semantic satiation' effect: the meaning is retained on an intellectual level, but the word starts to feel strange and disconnected from its meaning. This semantic ambiguity (knowing what the word means, but experiencing it as strange) is rather reminiscent of the experiential effects of perseverative attending (e.g., 'I realized that I saw it, but the image was not clear somehow'; this study) or perseverative checking ('I realize that I remember it, but the memory is not clear somehow'; van den Hout & Kindt, 2003b; Reed, 1985). Thus, it is suggested here, that the various forms of OC perseveration share the critical effect of interfering with spreading of activation. The dissociative nature of uncertainty induced by perseveration may be the experiential end-point of this blocked spreading of activation.

Obviously, whether or not non-checking and non-staring types of perseveration also reduce certainty and induce dissociative feelings is an empirical issue that awaits testing. The same holds for the question whether blocked spreading of activation is involved in the effects of clinical or experimental perseveration.

Apart from the precise explanation of the effects of perseveration on dissociative distrust, the phenomenon itself seems robust, at least in the realms of memory and perception, and relevant for the understanding of the maintenance of OCD. Perseveration seems to be a counter-productive strategy to obtain confidence. It does not enhance certainty, but it reduces it. The clinical implication is to drop compulsive perseveration. This boils down to Exposure and Ritual Prevention, and obviously this is not a novel therapeutic strategy (Franklin & Foa, 2007). Meanwhile, the experimental analysis may add to the theoretical rationale for this therapy, and clinicians may use the findings as an evidence-based heuristic for devising behavioural experiments in the CBT of OCD.

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