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Journal of Experimental Psychopathology
JEP Volume 3 (2012), Issue 2, 189–208
ISSN 2043-8087 / DOI:10.5127/jep.024211

# Imagery Rescripting as a Therapeutic Technique: Review of Clinical Trials, Basic Studies, and Research Agenda

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## Abstract

Imagery Rescripting (ImRs) is a therapeutic technique addressing specific memories of earlier experiences associated with present problems. By imagining that the course of events is changed in a more desired direction, powerful therapeutic effects have been found. The interest in and applications of ImRs are quickly increasing. This review discusses clinical studies assessing effects of ImRs, as well as possible processes underlying ImRs, and laboratory studies examining these underlying processes. It is concluded that although research into ImRs is still in its infancy, and many studies have their methodological limitations, results are promising. Therefore a research agenda is sketched, suggesting the next steps in both clinical and fundamental research.

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Keywords: Imagery Rescripting, CBT, memory, classical conditioning, cognitive schemas

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Received 17-Mar-2011; received in revised form 14-Sep-2011; accepted 22-Sep-2011

## Table of Contents

Introduction
Treatment studies
  PTSD
  Social Phobia
  Simple Phobia
  OCD
  Depression
  Bulimia Nervosa (BN)
  Nightmares
  Personality Disorders
  Health Psychology
  Conclusions from treatment studies
Studies into mechanisms
  ImRs compared to other emotion regulation techniques
  Does ImRs change the meaning of unconditioned stimuli?
  ImRs, the processing of traumatic events, and effects on intrusions, meaning and memory
Research Agenda
  Research Agenda for Clinical Applications of ImRs
  Research Agenda for Underlying Mechanisms of ImRs
Discussion
References

## Introduction

Although the use of imagery, including forms of rescripting – that is the imagined change of the course of events in memories or fantasies of aversive experiences -, has been used as a therapeutic technique for over 20 000 years (Edwards, 2007; 2011; Edwards & Arntz, 2011), it is only very recently that researchers started to test this technique scientifically. Edwards (2007; 2011) presents a short history of imagery rescripting (ImRs), starting with very old shamanic healing practices involving imagery, via ancient Egyptian and Greek practices, up to the use of imagery in Gestalt therapy and early CBT. For example, Greek priests in the ancient Asclepian temples 'rescripted' by suggesting that deities intervened to bring about a positive change in the mind set of those who came for healing. Nowadays, ImRs is a technique used to change the meaning of emotional memories and images (like intrusions and nightmares). With ImRs, the individual is instructed to imagine the memory or image as vividly as possible, as if it really happens in the here and now, and next to imagine that the sequence of events is changed in a direction that the person desires. With very severe patients, where the patient is incapable of imagining a good outcome, the therapist rescripts the sequence, whilst the patient imagines this. The body of evidence that ImRs is a powerful therapeutic technique increases, but the investigation of the underlying mechanisms has only recently begun.

The use of imagery in exposure and related techniques (e.g., flooding, systematic desensitization) in behavior therapy was of course well known, but there was no systematic use of actively changing scripts of memory representations in behavior therapy, although in counter conditioning imagery change was used. (Counter conditioning is a procedure in which one stimulus is repeatedly paired with another stimulus of a strong affective valence, which leads to a shift of the affective valence of the original stimulus. In imagery, the technique can for instance be applied by repeatedly imagining a stimulus with unwanted negative valence paired with, or followed by a positive stimulus, e.g. imagine repeatedly a spider together with a highly valued rabbit. As counter conditioning does not involve rescripting the

sequence of events, counter conditioning is considered to be a different technique than ImRs.) In the late eighties of the last century imagery techniques mainly derived from Gestalt therapy were known and applied in Beck's cognitive therapy group (e.g., Edwards, 1989, 1990). Nevertheless, it took about another decade before cognitive therapy researchers started to put these techniques formally to the test. The last years interest in ImRs quickly rose (Hackmann, Bennett-Levy & Holmes, 2011), and ImRs got integrated in several well-tested treatment packages, like cognitive therapy for PTSD and social phobia developed by Clark and Ehler's group (Clark et al., 2006; Ehlers & Clark, 2000; Ehlers, Clark, Hackmann, McManus, & Fennell, 2005), CBT for nightmares (Krakow et al., 2001; Davis & Wright, 2007), and cognitive therapy and schema therapy for personality disorders (Layden et al., 1993; Young, Klosko, & Weishaar, 2003; Giesen-Bloo et al., 2006; Arntz & van Genderen, 2009).

It is important to note that the use of ImRs is *not* restricted to intrusions (unwanted images) or memories that are associated with intrusions. The present review therefore focuses on the use of ImRs in all kinds of psychopathological problems, and does not specifically focus on ImRs for treating intrusive images. The review provides an overview and discussion of studies investigating imagery rescripting as a therapeutic technique. Studies addressing possible underlying mechanisms are also discussed. Lastly, a research agenda to further test ImRs and to unravel the underlying mechanisms is proposed.

The present review is partly based on a literature search in PsycINFO and Medline using the search term "imagery rescripting". Studies not retrieved but known to me were added. Case reports and case studies were only included if there was a lack of more advanced studies in the pertinent disorder area. Studies using imagery methods that did not involve rescripting are not discussed. For example, imaginal exposure, compassionate imagery (Gilbert, 2010), and changing perceptual characteristics of images (e.g., Beck, Emery, & Greenberg, 1985) are not the topic of this paper.

## Treatment studies

Table 1 provides an overview of the treatment studies discussed in this section, except the few case studies. Treatment studies are discussed per diagnostic or problem area.

### PTSD

Smucker and coworkers developed an ImRs protocol for incest-related PTSD but to the best of my knowledge the results of the trial testing it were never published (Smucker & Niederee, 1995). However, one open trial investigated whether ImRs is a helpful treatment when imaginal exposure for accident-related PTSD fails (Grunert, Weis, Smucker & Christianson, 2007). Twenty-three patients with PTSD as result from industrial accidents participated, all nonresponders to standard imaginal exposure. Eighteen of the 23 patients showed a full recovery from PTSD. The authors thus report strong effects of ImRs, although it should be kept in mind that the study was uncontrolled: ImRs was not compared to an alternative second treatment. The authors suggest that when fear is not the predominant emotion related to the trauma, but emotions like anger, shame, or guilt dominate, prolonged imaginal exposure is not very helpful and ImRs is a better treatment. In case fear is predominant, exposure would be the optimal treatment. However, more research is needed to test this proposition, as some findings suggest that exposure is also effective for non-fear emotions, and other studies suggest that ImRs is also effective when fear is predominant.

*Table 1: Overview of clinical studies into effectiveness of Imagery Rescripting (single case studies excluded)*

| Study | Disorder | *N* | Design | Comparison Condition(s) | Extensive Cognitive Preparation? | ImRs part of package? |
|---|---|---|---|---|---|---|
| Arntz et al. (2007) | PTSD | 71 | RCT | Imaginal Exposure, Waitlist | No | with exposure |
| Grunert et al. (2007) | PTSD (exposure failures) | 23 | open trial | NA | No | No |
| Duffy et al. (2007) | PTSD | 58 | RCT | Wait List | Yes | with CT |
| Ehlers et al. (2003) | PTSD | 85 | RCT | Self-help, Assessments Only | Yes | with CT |
| Ehlers et al. (2005) | PTSD | 28 | RCT | Wait List | Yes | with CT |
| Kindt et al. (2007) | PTSD | 25 | open trial | NA | No | with exposure |
| Wild et al. (2007) | Social Phobia | 14 | open trial | NA | Yes | No |
| Wild et al. (2008) | Social Phobia | 11 | within subjects | memory exploration | Yes | No |
| Hunt et al (2007) | Snake fear | 60 | RCT | Exposure in Vivo, Relaxation | Yes | No |
| Hunt & Fenton (2007) | Snake fear | 52 | RCT | relaxation, exposure in vivo, exposure & ImRs combined | Yes | No / with exposure |
| Page et al. (2010, 2011) (treatment resistant) | OCD | 8 | case series | attention | No | No |
| Wheatley et al. (2007) and Brewin et al. (2009) | Depression | 10 | case series | NA | No | No |
| Cooper et al. (2007) | Boulima Nervosa | 24 | RCT | discussion of beliefs and memory | ? | No |
| Long and Quevillon (2009) Rehearsal Therapy | Nightmares | NA | review of studies | | No | Imagery |
| Weertman & Arntz (2007) | Personality Disorders (non-Borderline) | 21 | Crossover | exploration, present-focused CBT | No | combined with other experiential techniques |
| Nordahl & Nysaeter (2005) | Borderline PD | 6 | case series | NA | ? | Schema Therapy |
| Giesen-Bloo et al. (2006) | Borderline PD | 86 | RCT | Transference Focused Psychotherapy | No | Schema Therapy |
| Nadort et al. (2009) | Borderline PD | | open trial* | | No | Schema Therapy |
| Farrell et al. (2009) | Borderline PD | 32 | RCT | Treatment as Usual | No | Schema Therapy |
| Bamelis et al. (in preparation) (non-Borderline) | Personality Disorders | 320 | RCT | Treatment as Usual, specialized CCT | No | Schema Therapy |

NA = not applicable. ? = unknown.

*tested in an RCT schema therapy with vs without outside office hours telephone access to therapists; in ImRs context open trial.

Interestingly, Ehlers and Clark integrated ImRs in their cognitive therapy for PTSD (Ehlers & Clark, 2000; Ehlers, Clark, Hackmann, McManus, & Fennell, 2005). On the average three out of 12 sessions involve imagery work (Ehlers et al., 2005). As an example of their use of ImRs, Ehlers et al. (2005) describe a case of a woman that suffered from feeling unattractive as a result of her rapist telling her she was ugly:

*"For example, a woman who had been raped identified a moment when her assailant said she was ugly and turned her over, as the worst ''hot spot''. Ever since the rape she had felt unattractive and, more recently, had been engaging in frequent casual sex in an apparent attempt to convince herself that she was attractive. Socratic questioning was used to identify an alternative appraisal, which was that the rapist had identified her because she is attractive and his comment was because he is unable to become aroused without abusing and humiliating women. During a subsequent imaginal reliving, she introduced the new appraisal into the ''hot spot'' by standing up in the image and saying it to the rapist at the moment that he verbally abused her."*(p. 415).

Results of the RCTs of the Ehlers and Clark group indicate very strong effects of their CT package (Ehlers et al., 2003, 2005; Duffy, Gillespie, Clark, 2007). However, to the best of my knowledge, the effects of the ImRs component were not tested separately. An important difference to some other ImRs applications is that in the Ehlers and Clark kind of application, the rescripting is carefully prepared before imagined, usually on the basis of Socratic questioning of dysfunctional appraisals of the traumatic event. The rescripting is then implemented in a rather directive way, the therapist instructing the patient to imagine the prepared new script. In other approaches, the patient tries out rescripting on the basis of wishes (s)he experiences while imagining the memory; and in still other approaches the therapists develops the script. Apart from how the script is developed, the basic principles are the same (Clark, 2011; Duffy, personal communication; see also the quote above with the patient telling the rapist what she feels about him in an assertive way) and it is an empirical issue what method to develop and imagine the new script is optimal (see research agenda).

The effects of adding ImRs to prolonged imaginal exposure (IE) for PTSD were studied in an RCT by comparing the combined IE-ImRs treatment to IE alone and both to waitlist (Arntz, Tiesema & Kindt, 2007). The mixed trauma sample of 71 chronic PTSD patients had in majority multiple traumas and was highly dysfunctional and chronic, as the waitlist condition showed no evidence of any improvement at all. Active treatment was superior to wait. The study further demonstrated that the addition of ImRs to IE led to a significant reduction of treatment drop-outs, and better effects on anger, anger control, shame and guilt, compared to IE alone. Therapists tended to prefer ImRs above IE as they felt less helpless listening to the trauma relivings and experienced less distress with ImRs.

Lastly, Kindt, Buck, Arntz, & Soeter, (2007) assessed the effects of ImRs combined with imaginal expsoure in an open trial with 25 chronic PTSD patients with a varying trauma background (the majority multiple physical or sexual assault). The study primarily focused on an hypothesized underlying mechanism in treatment of PTSD, that is the activation of perceptual trauma memories, followed by their transformation from a perceptual encoding to a conceptual encoding level. Large effects on PTSD complaints of ImRs were found, as well as evidence for the mechanism.

In sum, although ImRs seems to have been studied most in the context of PTSD, and results are positive – especially when associated emotional problems like anger and shame are considered, there is a lack of studies investigating ImRs alone by comparing it to other effective treatments. At least two such studies in patients with PTSD as result of (repeated) childhood trauma are underway however (Raabe et al., work in progress; de Jong et al., work in progress).

## Social Phobia

Clark at al. (2006) developed a highly effective cognitive therapy package in which ImRs is used to process early memories of negative social experiences in the subset of patients who respond not strongly enough to the standard, present-focused techniques. It is reasoned that in such cases ImRs is needed to revaluate the original early memories of aversive events that gave rise to the social phobia.

The developers speculated that use of the technique contributed to the good overall results observed in the trial. Wild, Hackmann, & Clark, (2007) explored in a sample of 14 social phobic patients whether a single session of ImRs focusing on early memories of aversive events associated with images experienced in the present during social phobic experiences would be effective. Results indicated very strong effects of ImRs on beliefs associated with the images and memories, image and memory distress and vividness immediately and 1 week after the ImRs session. One week after the session, social phobia indices were also reduced with large effect sizes. In a subsequent study in 11 social phobic patients, Wild, Hackmann, & Clark, (2008) tested the specificity of ImRs by comparing one session of ImRs to one session of exploration of the early memories identified by a semi-structured interview to be associated with the patient's idiosyncratic images triggered in social phobic situations. Interestingly, the participants were not selected as to assumed importance of early aversive experiences in the originating and maintenance of their phobia. Although the approach described by Arntz and Weertman (1999) was used, the ImRs was preceded by a rather extensive cognitive preparation, similar to what is done in Ehlers and Clark's CT for PTSD. That is, the new script was first developed on the basis of cognitive restructuring of the appraisals of the original event, before being imagined. Results indicated that the single ImRs session had strong effects on core beliefs, social anxiety, fear of negative evaluation, memory distress, image distress and vividness, maintained at 1 week follow-up. In short, this study demonstrated that ImRs is an effective therapeutic technique for social phobia. Its effects cannot be explained by simply paying attention to the memory. However, the study didn't test whether ImRs could be a complete treatment of social phobia. Another limitation is that the order of the attention-control and the ImRs sessions was fixed and not randomized.

## Simple Phobia

In two studies Hunt and coworkers investigated ImRs (combined with cognitive challenges) as a treatment of simple phobia. In the first study, 60 snake fearful participants were randomized to either ImRs, exposure in vivo, or relaxation control (Hunt et al., 2006). Both active treatments were superior to relaxation, with 78% of ImRs, 60% of exposure and 40% of relaxation participants being able to touch the snake at posttest. Interestingly, ImRs turned out to be more effective than exposure for the more fearful participants on subjective snake fear reduction. The opposite held for exposure in vivo, being more effective for the initially *less* fearful. Highly fearful participants also reported ImRs to be less aversive than exposure in vivo. In a second study, Hunt and Fenton (2007) tested the use of ImRs alone and in combination with exposure in vivo as a treatment of fear of snakes. Fifty-two subclinical participants with a serious fear of snakes were randomized over 4 conditions: relaxation (control condition), exposure in vivo, ImRs, and a combination of exposure and ImRs. Results on an behavioral approach test showed that the relaxation control was ineffective, and the three other conditions highly effective in increasing approach behavior and reducing distress during the approach task. The combined condition tended to be more effective both on the behavioral and the subjective level, but most effects were trends – possibly related to small sample sizes reducing statistical power. After treatment, none of the relaxation, 50% of the ImRs, 57% of the exposure, and 86% of the combined treatment touched the snake with their bare hand. Contrary to expectations, imagery ability did not moderate the effects. Thus, results suggest that even with simple phobia, where exposure in vivo is usually considered to be the best available treatment, ImRS is as effective when applied alone and might enhance the effects of exposure in vivo.

## OCD

Preliminary results of a multiple-baseline case series study indicate that ImRs might also be an effective treatment for therapy-resistent OCD (Page, Veale, & Salkovskis, 2010; Page, 2011). So far, 8 severe and chronic OCD patients that didn't respond well to CBT for OCD were effectively treated with one or two sessions of ImRs, focusing on memories of aversive events associated with the feelings that triggered obsessions and compulsions, using the method described in Arntz and Weertman (1999). There was no formal further CBT, but the investigators report that "what the ImRs seemed to do was allow the participants to drop their compulsions at varying rates so they went on to do their own self directed Exposure with Response Prevention." (Page, personal communication). In the 8 cases, YBOCS scores dropped about 65%, and continued to decline up to 12 months follow-up treatment.

## Depression

Wheatley et al. (2007) and Brewin et al. (2009) tested the use of ImRs in 10 depressed patients with unwanted intrusive memories, using a case series design. With on average 8 sessions of ImRs as a stand-alone treatment, large treatment effects that were well maintained at one year follow-up were demonstrated. Seven patients showed reliable improvement, and six patients clinically significant improvement. The promising results of this pilot study raise the question whether ImRs could also be used as a depression treatment in absence of prominent intrusive memories, and how ImRs would compare to standard CBT, especially on the long term.

## Bulimia Nervosa (BN)

Ohanian (2002) published a case study using ImRs to correct childhood memories of emotional abuse in a patient with BN who only partially responded to traditional CBT. The use of ImRs dramatically reduced the eating disorder problems. Cooper, Todd, & Turner, (2007) tested the effects of ImRs focusing on early memories associated with negative self-beliefs in BN patients, by comparing a single session of ImRs to a control condition that consisted of discussing the beliefs and the associated image. This small scale RCT (two conditions with $n$ = 12 each) indicated that ImRS was superior to the control condition in a number of outcome measures, notably the emotionally felt negative self-beliefs and 'deserves help and protection' ratings. There was no superior effect of ImRs on urges to binge or to restrict. Possibly, the single intervention was not enough to bring about a differential effect on eating disorder symptoms, and/or the sample size was too small, as the data suggest that ImRs might bring about a larger decrease in urges to restrict than the control condition. Unfortunately, only immediate effects and no follow-up data were reported.

## Nightmares

The currently most used treatment of nightmares is imagery rehearsal therapy (IRT), also called Exposure, Relaxation, and Rescripting therapy (ERRT) (Davis & Wright, 2005, 2007; Krakow et al., 2001). An important ingredient in the treatment package is ImRs, where the patient is invited to choose a nightmare and to modify it any way he/she wishes. Next, the patient is instructed to rehearse the modified nightmare for several minutes daily. If there are additional nightmares, they are modified in the same way. Several clinical trials of the package have been published, most of them in samples of patients with nightmares in the context of PTSD. Long and Quevillon (2009) discuss these studies. To the best of my knowledge, the impact of ImRs isolated from the other ingredients of the package has not been assessed in controlled experiments.

## Personality Disorders

Many studies of ImRs in axis-I disorders selected disorders characterized by intrusions, or patients that suffered from intrusive images. ImRs as used in Personality Disorder (PD) treatment does not so much address intrusive images or memories, but childhood memories that are associated with the PD problems. Holmes, Arntz, & Smucker, (2007) refer to the different applications of ImRs as "Type A" (addressing disturbing intrusive images) vs. "Type B" (addressing beliefs, schemas and memories). The rationale to use ImRs in PD is related to the idea that aversive (traumatic) childhood experiences at least partially underlie PDs (Arntz & van Genderen, 2009; Lobbestael, Arntz, & Bernstein, 2010; Young et al., 2003), and that imagery rescripting of episodic memory representations is an effective way to correct dysfunctional information that has led to the formation of schemas underlying PDs. With ImRs, it is possible have the patient experience corrective information on a child level, adapting information to what a child needs. For example, in little children safety is primarily conveyed by bodily contact and a soothing tone of voice. The patient can imagine that this kind of safety information is given to him/herself as a little child in ImRs, whereas this would be rather complicated between an adult therapist and an adult patient. Extended protocols describing the application of ImRs in PDs are available (Young et al., 2003; Arntz & Weertman, 1999; Arntz & van Genderen, 2006; Arntz, 2011).

One study tested the use of ImRs and other experiential techniques focusing on PD patients' childhood memories by comparing them to more classical CBT techniques for PDs that focus on the present (Weertman and Arntz, 2007). Twenty-one PD patients participated in this cross-over trial, where each patient received 24 sessions of the two packages (in two orders: present – past focus vs. pat – present focus). Primary diagnoses were: avoidant, dependent, obsessive-compulsive, paranoid, histrionic and narcissistic PD. Active treatment phase was preceded by a 12 session exploration phase, which made, if anything, patients feel worse. The experiential techniques were, on the short term, as effective as the more common CBT techniques that focused on the present. The total package was very effective, with more experienced therapists doing a better job than less experienced therapists. Although ImRs was a part of the experiential techniques package, it was the technique that was used the most so that we can be fairly certain that ImRs is an effective technique for PD patients.

Other studies involving ImRs applied to PD patients investigated schema therapy (ST). ImRs is an important component of ST, but certainly not the only important component. The studies all found ST to be a highly effective treatment, and the RCTs found ST to be more effective and more cost-effective than the treatments to which ST was compared (Nordahl & Nysaeter, 2005; Giesen-Bloo et al., 2006; van Asselt et al., 2008; Nadort et al., 2009; Farrell, Shaw, & Webber, 2009; Bamelis et al, in preparation). Dismantling studies are necessary to determine the degree to which ImRs contributes to the strong effects ST seems to have.

## Health Psychology

One case study reports the successful use of ImRs in a cancer patient who developed negative feelings after being diagnosed with cancer (Whitaker, Brewin & Watson, 2010). These feelings triggered memories from the past including distressing flashbacks where the patient felt frightened or vulnerable and also where he had acted like a bully. Rescripting the memories by having a nurturing person intervening led to a dramatic reduction of the intrusive images, anxiety and depression.

## Conclusions from treatment studies

From the broad range of applications it can be concluded that ImRs can be successfully applied to many psychological problems and disorders. Several studies showed that one session of ImRs is more

effective than exploring and discussing the memories, although most studies did not randomize the order of the control and the ImRs session, so that it cannot be ruled out that there was a time effect. However, the Cooper et al. (2007) study did use a randomized design and the results of that study suggest superiority of ImRs. Even in areas where straightforward exposure techniques are dominant (simple phobia, PTSD), ImRs seems to be at least as powerful and might enhance exposure. Moreover, ImRs seems to bring about changes in a broader area than exposure. In treatment resistant cases, where an earlier aversive (traumatic) event seems to block the patient from profiting from standard techniques, ImRs appears to be helpful to remove the blockade. Promising as the results are, from a methodological point of view the evidence for the effectiveness of ImRs is still limited. Few studies used randomized designs where ImRs was compared to powerful alternative techniques (e.g., Hunt et al., 2006; Hunt & Fenton, 2007; Arntz et al., 2007; Weertman & Arntz, 2007). Those that did supported however the effectiveness of ImRs.

## Studies into mechanisms

That imagined stimuli might have effects comparable to real stimuli, both with respect to psychological and brain responses, can be considered as an established fact (Holmes & Mathews, 2010). Dadds, Bovbjerg, Redd, & Cutmore, (1997) reviewed imagery in human classical conditioning, and concluded that imagined stimuli can act as conditioned and unconditioned stimuli with effects approaching those of real stimuli. However, Dadds et al. didn't review ImRs in the context of conditioning, an issue that is covered in the present review. Holmes and coworkers extensively investigated and discussed the power of imagery (see Holmes & Mathews, 2010, for a review). One of the most important conclusions is that imagery causes much stronger emotional effects than verbal processing, which holds for both negative and positive emotions; and that changing automatic interpretations is much more effective when the training involves imagery than verbal processing (Holmes et al., 2006). Here the discussion will focus on studies that are relevant not so much for the imagery part of the technique of ImRs, but for the rescripting part.

### ImRs compared to other emotion regulation techniques

Jacob et al. (2010) compared 4 emotion regulation strategies in Borderline Personality Disorder (BPD) patients. The study is relevant for the later phases of ImRs, where people often imagine to be with another person who accepts, reassures, and soothes them. Seventeen BPD patients watched neutral and negative movie fragments. After each fragment, they applied a specific strategy: distraction (continuing number series), self-soothing imagery, imagery of a positive memory, and a non-demanding "vanilla baseline task" as control condition. For the soothing imagery, participants chose another safe person (in one case an animal) soothing them, both verbally and physically. Interestingly, positive memories were interpersonal and quite similar to the soothing imagery (being safe and accepted with an important other). All active strategies were superior the vanilla baseline control condition in reducing negative and increasing positive emotions, but the two imagery conditions produced the highest positive emotions. This study therefore indicates that ImRs has more effects than distraction. Note that the extent of rescripting was rather limited.

### Does ImRs change the meaning of unconditioned stimuli?

I have suggested that one of the mechanisms underlying ImRs might be UCS-revaluation, that is the change in meaning of the representation of the original aversive event (the unconditioned stimulus, UCS; Davey, 1989). For a long time, the prevailing idea was that fear memories once consolidated (e.g., 4-6 hours after the frightening event, or after a night sleep) couldn't change. By generalization, fear

memories (in conditioning terms, UCS representations) tend to be activated in many situations reminding of the original situation, giving rise to the expectancy of a repetition of the threatening event and causing a fear response. Getting rid of the automatic fear response is, according to the theory, a lengthy process, as the subject has to learn for each new context that it is safe. Exposure exercises thus have to be done in many contexts to ensure that the most important contexts for an individual no longer give rise to fear responses. In other words, for each context, an alternative rule has to be learned ("in this context a cue associated with the original UCS does not predict threat") and this rule has to compete with the original rule that the cue predicts the UCS. According to the theory, the original rule remains represented and could therefore always return to govern the subject's automatic responses. However recent insights indicate that fear memories can be changed. There are indications that if a fear memory is reactivated it gets in a labile state in which it can be reduced, strengthened, changed and perhaps even erased (Dudai, 2006; Forcato et al., 2007, Forcato, Argibay, Pedreira, & Maldonado, 2009; Hupbach, Gomez, Hardt, & Nadel, 2007; Kindt et al., 2007, Kindt, Soeter, & Vervliet, 2009; Lee, 2009; Soeter & Kindt, 2011; Strange, Kroes, Fan, & Dolan, 2010). Most of the research in this area has focused on biological mechanisms. But, perhaps ImRs is a psychological way to modify the fear memory so that it is reconsolidated with a different meaning, no longer giving rise to the strong fear responses (Arntz & Weertman, 1999; Arntz, 2011). If so, generalization of what is learned in therapy to new situations should be easier than with classical exposure therapy as the UCS representation itself is changed.

This hypothesis was tested in a laboratory experiment using a trauma analogue slide series (depicting an accident with a car hitting a boy who died from the injuries) to condition fear and experimental manipulations of contexts of extinction (learning that the conditioned stimulus no longer predicted the slide of the dead boy). The final "return of fear" test involved a return to the original context to assess to what degree the fear response to the conditioned stimulus returned; Dibbets, Poort, & Arntz, 2011). Results indicated that adding ImRs (imagining that the subject rescued the boy) to extinction led to less return of fear. This suggests indeed that ImRs changes the meaning of the fear memory, or, in conditioning terms: revaluates the UCS representation. A control imagery condition, imagining a positive event not related to the accident, was less powerful. UCS evaluations at posttest supported the UCS-revaluation interpretation, as ImRs led to the largest reductions in negative valence ratings of the UCS. This was only a first attempt to test a theoretical explanation of ImRs, and more tests are needed.

## ImRs, the processing of traumatic events, and effects on intrusions, meaning and memory

Hagenaars and Arntz (2011) studied the effects of early ImRs after an analogue trauma in a lab experiment in healthy volunteers. Participants viewed a movie depicting a horrible car accident, which usually causes intrusions the week after viewing it. Thirty minutes after viewing the movie, participants either rescripted the parts of the movie they found the most horrible, in a way they could choose themselves, engaged in unrelated positive imagery, or engaged in imaginal exposure. Results indicated that ImRs was superior to the other two conditions in number of intrusions reported the week after the movie. ImRs participants developed less negative world view cognitions than participants in the other 2 conditions, and less self-blame cognitions than the exposure participants. Apart from the intriguing effects on clinical parameters, that suggest that ImRs might be a powerful early intervention after trauma to prevent the development of PTSD, the study is also important as a memory test was taken 1 week after the movie was viewed. The results demonstrated that ImRs and exposure lead to a superior memory of the movie compared to unrelated positive imagery. Thus, ImRs does not lead to forgetting the factual details of the original aversive event – on the contrary, factual memory might be enhanced. The results suggest that ImRs works thru changing the meaning of the original experience, and not thru

replacing or erasing the factual details of the memory representation. An alternative or additional explanation for the intrusion-reducing effects of ImRs is that ImRs enhances contextualization of perceptual memories more than imaginal exposure (although both procedures are believed to cause contextualization, Brewin, Gregory, Lipton, & Burgess, 2010). Note however that this cannot explain the positive effects of ImRs on the posttraumatic cognitions.

## Research Agenda

Given the potentials of ImRs it seems worthwhile to further investigate its effectiveness and underlying processes. An (incomplete) research agenda is suggested, organized along two topics: clinical applications and underlying mechanisms.

### Research Agenda for Clinical Applications of ImRs

Although research so far suggests that ImRs can be applied to a range of disorders, there is a shortage of controlled studies that investigate ImRs as a stand alone treatment. Even if researchers and clinicians don't intend to apply ImRs as a stand-alone treatment for specific clinical problems, documentation of its effects when isolated from other ingredients of a treatment package is necessary. First attempts in PTSD, simple phobia, and depression were successful, so there seems no reason why this shouldn't pursued. Note that one of the limitations of the investigation of only one session of ImRS followed up by other techniques is that we cannot document the long term effects of ImRs. Given the possibly fundamental levels of memory representations ImRs acts on, positive long-term effects are to be expected. This also implies that future clinical studies should have adequate follow-up assessments with relevant clinical outcome measures (and not only process measures, as belief strength and memory vividness).

An important issue is what the control condition should be. Several studies used attentional controls (e.g., exploring and discussing beliefs, images and memories). A next step would be to compare ImRs to other powerful treatments with proven efficacy. For anxiety disorders, exposure would be a good candidate (e.g., Hunt et al., 2006; Hunt & Fenton, 2007; Arntz et al., 2007). For other disorders, like depression, eating disorders, and personality disorders, comparison with standard CBT methods for these disorders would be interesting. The strong effects observed in the pilot studies with these disorders certainly justify such comparisons. One might of course doubt whether ImRs would be enough for such disorders – for instance one might think that well-established specific CBT techniques are necessary for the treatment of BN. In such cases a three arm RCT might be a good design, comparing the established treatment, ImRs alone, and the addition of ImRs to a standard package.

But, given the availability of efficacious treatments for many axis-1 disorders, a focus on testing ImRs for treatment resistant cases seems also legitimate. Several studies suggest that ImRs can be successful when standard CBT fails, but here the methodological problem that comparison treatments (and not placebo's or attention-controls) are lacking is even more prominent. It is important that switches in therapist and method are controlled for in future studies with CBT-treatment failures.

One of the major problems in clinical research is that trials are often underpowered. In case of comparisons of ImRs to established treatments one might not expect a larger differential effect than $d$ = .5 (medium effect size), leading to large sample sizes that are needed (about $N$ = 120). Thus, major investments are needed to make a next step in tests of ImRs.

Another issue that is clinically important is what the type of patients that are selected should be. Some studies selected patients with intrusive memories (or images), others patients that were stuck in standard CBT, and still others patients with clear memories of aversive events related to their present problems. It

is important to systematically test such selection criteria, whether they are justified or not. My guess is that the presence of intrusions is not a necessary or efficacy enhancing variable, although the practical application of ImRs might need to be slightly modified if intrusive images or memories are not clearly present (e.g., Arntz & Weertman, 1999).

Relatedly, some diagnostic categories have not yet been studied. Psychosis and bipolar disorder for instance might be viewed as exclusion criteria. I quite often get questions about this, especially from clinicians treating patients with these disorders that suffer from the sequelae of traumatic experiences. Given the clinical need, it seems important that researchers start to investigate whether ImRs could be helpful for patients from these diagnostic categories, and whether ImRs should be adapted to meet the needs and limitations of these patients.

Another issue on the clinical research agenda is the issue to what degree extensive preparation with cognitive restructuring is helpful. Some of the British studies used such a preparation, whereas the Dutch studies generally did not. An investigation of this issue is important. Result might differ between disorders or samples, as with some patients the important memory to be rescripted and the related dysfunctional interpretation seem rather clear, whereas with other disorders or samples it is quite an explorative expedition to discover these issues. In the latter cases, imagery and ImRs is often used to discover what is needed to be rescripted. Often, the patient has not enough healthiness to be able to rescript, so that the therapist has to do this, at least initially (Arntz & van Genderen, 2009; Arntz 2011).

Lastly, it is unclear what the best explanation to patients for ImRs is. A recent qualitative study discovered that cluster-C PD patients felt not well prepared by their therapists' explanations, and only later in treatment started to understand the technique better (Napels-Schutz et al., 2011). It would be good to investigate a standard introduction of ImRs, as to how well it is understood, and how it affects acceptance of the technique and motivation for treatment.

## Research Agenda for Underlying Mechanisms of ImRs

ImRs, although a powerful technique, seems to be a technique in need of a theory. Fundamental research attempting to unravel what mechanisms play a role in ImRs has just started and there are many questions to be addressed. Some of the major issues are listed here. Some of them could, or should, also be studied in clinical populations, but are probably best first investigated in the laboratory with non-patients.

An important theory explaining the role of imagery in how people form goals and become motivated to achieve them is the Elaborated Intrusion (EI) theory (Andrade, May & Kavanagh, this issue; Blackburn, Thompson, & May, this issue). One thing the theory stresses is that providing the individual with positive associations to an existing memory where the current elaborations are predominantly negative, and vividly imagining these new associations, will help the individual to form new and healthier goals, and increase motivation to achieve them. Although EI theory is primarily a theory about motivation, and not so much about the emotional problems the current review focuses on, increasing motivation for healthier behaviour is obviously important in the disorders that ImRs has been investigated in. For instance, in fear-related problems, motivation to reduce unhealthy avoidance and to try out healthier coping, like assertiveness and conflict resolution, is important. EI theory helps explaining why we sometimes see sudden behavioral changes after ImRs, as for instance in the borderline patient who a few days after ImRs of a childhood memory, with rescipting involving her abusive parents put in jail with help of the police, set limits to her abusive partner by telling him that she would call the police if he dared to hit her (without discussing generalization to the present in the session). But on the level of emotions and

cognitions, whereas it is clear that new meanings are offered with ImRs, the question remains, what exactly happens with the original memory?

Does ImRs change the original memory representation or does it build a new, alternative memory representation? According to recent insights in fear memory research, and in contrasts to prevailing views in clinical psychology, emotional memories can be changed (e.g., Kindt et al., 2009; see 3.2). This does not mean that the memory of the facts is changed or erased, but that the meaning of the experience, and the automatic emotional processes are changed. Whereas I have suggested that ImRs is a psychological means to change the original emotional memory (Arntz & Weertman, 1999; Dibbets et al., 2011), others have suggested that ImRs creates an alternative memory (or schema) that can compete with the original memory (schema) (e.g., Stopa, 2010; Stopa & Jenkins, 2007; Brewin, 2006). Whether ImRs changes the original memory might depend on a number of crucial parameters, such as appropriate reactivation of the emotional memory, and the kind of rescripting that is used. Fundamental research should clarify these issues. One method that can be used to investigate this is the return of fear paradigm from classical fear conditioning, as it is predicted that there will be less return of fear with context change if ImRs changed the UCS-representation itself, instead of forming a competing memory trace.

An alternative (or additional) explanation of ImRs is that it helps the patient to express inhibited action tendencies and get unmet needs met. This is actually the account used in experiential therapies (e.g., see Edwards, 2007). Although it doesn't fit immediately with the current cognitive paradigms of psychopathology, it would be interesting to investigate this hypothesized mechanism.

Still another explanation for the effects of ImRs is counter conditioning: by systematically pairing the original image with a more positive image, the original memory shifts in valence towards the more positive new image. In such an explanation, evaluative conditioning would be the dominant process (Hofmann, de Houwer, Perugini, Baeyens, & Crombez, 2010). The difference between counter conditioning and UCS-revaluation is that in the first the affective shift brought about by the systematic pairing of stimuli does not necessarily involve the subject's awareness, and doesn't involve any other kind of change of meaning, for instance in interpretations, attributions, and beliefs. Thus, there is no need that the new stimulus that is coupled to the old stimulus has any meaningful connection to the old stimulus. Systematically pairing a strongly liked animal (say, a white rabbit), or a favorite food (say chocolate) to a disliked object (say, the face of a perpetrator) should change the valance ratings of the last stimulus. In short, evaluative conditioning is non-cognitive and only leads to changes in affective valence (positive vs. negative). By contrast, ImRs involves many reinterpretations and imagined actions, all processes not involved in evaluative conditioning, in theory changing more meanings than solely the affective valence Thus, if the only active process underlying ImRs would be counter conditioning, the rescripting could be skipped, and repeated and systematic pairing of negative memories with powerful new positive images would suffice. However, two recent lab studies used positive but unrelated imagery as a control condition and found that ImRs had more profound effects (Dibbets et al., 2011; Hagenaar & Arntz, 2011). Nevertheless, it seems important to further investigate these issues, both for theoretical and clinical reasons.

A fascinating issue to further study is that ImRs addresses episodic memory yet seems to quickly lead to changes in schema's, thus on the level of semantic memory. This challenges traditional ideas that these two memory systems are relatively dissociated. Apparently, changing the meaning of a memory of one specific memory of a concrete event can have a strong generalized effect on semantic memory representations of the self, others and the world.

Then there is the question what the optimal way to rescript is. When I started to try out the technique, I took care that the original trauma (aversive event) was not somehow "magicked away". The reasoning was that it would be anti-therapeutic to somehow deny the reality. There are at least two reasons why I started to doubt this and changed practice. First, in applying ImRs with very severe cases we found that many of them didn't tolerate full exposure to the memories of the trauma: patients refused, dissociated, walked away, or got very angry at the therapist. We therefore tried out to start rescripting earlier (e.g., intervene to prevent the perpetrator to abuse the child) and observed good effects from that (e.g., Arntz, 2011). Second, a recent lab experiment discussed earlier discovered that all the participants that prevented the trauma in their rescripting had no intrusions at all during the following week (Hagenaars & Arntz, 2011). It is of obvious theoretical and clinical importance to experimentally test whether early intervention to prevent trauma in rescripting has superior effects. This research line should also address then what the optimal degree of memory activation should be: basic research suggest that at least some activation of the emotional memory is necessary for adequate effects of corrective information (e.g., Kindt et al., 2009).

Another question related to how to do rescripting is whether it is better that the person him/herself (the present self) rescripts, or that a trusted other is imagined to do the rescripting. Of course, this may depend on the type of person and the type of memory to be rescripted. Still another issue pertains to the kind of acts that are fantasized during rescripting. One major discussion focuses on the question whether it is helpful and safe to let people take revenge and act out aggressive impulses in fantasy, or whether this should be prevented as it would increase the risks of actual acting out. This is of obvious importance in forensic samples, where therapists feel reluctant to risk lowering the threshold of violent acting out. On the other hand, one could argue that the need for revenge is a natural need, and that people need to learn to tolerate that they have this wish, and that accepting that the wish is natural helps to better control actually acting it out. In our PTSD trial we allowed patients to take revenge if they wished, and results showed that ImRs brought about *better* anger control and less anger feelings (Arntz et al., 2007). We also allow our non-forensic PD-patients to do this, and so far did not observe an increase in aggressive acting out. Obviously, this important issue should be systematically investigated in basic research. Such a study was just started by Seebauer, Arntz, Holmes, Tuschen-Caffier, & Jacob, (2011).

Lastly, in the context of treatment procedures for intrusive images, like in PTSD, several specific issues need to be addressed. It has been proposed that intrusive images are stored in a specific kind of memory, with high levels of perceptual and emotional representations, and little contextualization in (verbal) meaning networks (Brewin et al., 2010; Ehlers et al., 2005; Kindt et al., 2007). Treatment should thus involve transforming memories from this perceptual (sensory) level to a contextual-conceptual level. It would be interesting to investigate whether ImRs has any extra effect in this process compared to the more passive process of imaginal exposure, which could be the case as new meanings (contexts) are more actively weaved in the activated image with ImRs than with imaginal exposure. An important additional question is, whether the rescripting should bring in positive meanings, or could be neutral (or even negative) to have an effect on reduction of intrusions. Perhaps contextualizing suffices.

To further better understand underlying processes and to find out what the optimal therapeutic method is, ImRs should be compared to methods that seem to rely on taxing visual working memory whilst at the same time reactivating memories of aversive events (Engelhard, van den Hout & Smeets, 2011). Eye movements as used in EMDR seem to rely on this process, but executing other visually demanding tasks seem to involve the same process (e.g., playing Tetris after seeing a trauma analogue movie; Holmes et al., 2009, 2010). Both ImRs and such tasks that require a moderate level of visual working memory seem to lead to a reduction of vividness and negative valence of the original memory, and to reduce intrusions. Possibly, the visually taxing tasks act thru reducing the perceptual details (hence

vividness) of the memory, when it is restored, whereas ImRs acts primarily thru a change in meaning. This is clearly an interesting issue to investigate.

## Discussion

Clinical studies indicate that ImRs has a potentially wide application, ranging from simple phobia to complex personality disorders, and is therefore a transdiagnostical method. ImRs seems to be at least as effective as exposure as treatment for anxiety disorders, and less aversive for patients and therapists. Furthermore, there are indications that ImRs addresses a wider range of problems than exposure, as non-fear emotions seem to improve more with ImRs. ImRs might be especially indicated for patients who fail to respond to regular CBT, perhaps especially when earlier aversive (traumatic) events block these patients to profit from techniques focusing on the present. ImRs might enhance exposure, or stimulate patients to engage in self-directed exposure without further help for therapists. There is also the idea that ImRs is more effective than traditional CBT methods to address implicational meaning or felt beliefs, that is the kind of beliefs that are resistant to rational dispute and are experienced on a feeling level by the patient (Cooper et al., 2007; Edwards, 2007; Arntz, 2011). ImRs has also been integrated in a number of treatment protocols, ranging from treatments for nightmares to schema therapy for PDs.

However, research on ImRs is still in its infancy and the research agenda is quite extensive. Clinical studies should investigate ImRs as a stand-alone treatment, dismantle packages with ImRs as ingredient, and compare ImRs to viable alternatives. Different variants of ImRs should be systematically investigated to explore what the best method is. Fundamental studies should be done to unravel what the underlying processes are and how ImRs can be optimized. The quickly rising interest in ImRs will undoubtedly stimulate such studies and in a decade or so we will understand the technique much better than we do at the moment.

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