



## UvA-DARE (Digital Academic Repository)

### A plea for more attention to mental representations

Arntz, A.

**DOI**

[10.1016/j.jbtep.2019.101510](https://doi.org/10.1016/j.jbtep.2019.101510)

**Publication date**

2020

**Document Version**

Final published version

**Published in**

Journal of Behavior Therapy and Experimental Psychiatry

**License**

Article 25fa Dutch Copyright Act

[Link to publication](#)

**Citation for published version (APA):**

Arntz, A. (2020). A plea for more attention to mental representations. *Journal of Behavior Therapy and Experimental Psychiatry*, 67, [101510].  
<https://doi.org/10.1016/j.jbtep.2019.101510>

**General rights**

It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

**Disclaimer/Complaints regulations**

If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: <https://uba.uva.nl/en/contact>, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.



# A plea for more attention to mental representations

Arnoud Arntz

Department of Clinical Psychology, University of Amsterdam, PO Box 15933, 1001 NK, Amsterdam, the Netherlands

## ARTICLE INFO

### Keywords:

Mental representation  
Schema  
Conditioning theory  
Cognitive-behavior therapy  
Imagery rescripting  
Cognitive bias

## ABSTRACT

In this invited essay I plead for a renewed attention to mental representations in research into psychopathology and its treatment. With the cognitive revolution in the second half of the previous century most psychological models of psychopathology were based on people's capacity to form mental representations of the world. However, much research effort was put into investigating cognitive biases instead of investigating mental representations, and attention shifted towards such biases, including claims that they are causal in psychopathology. Similar claims were made about emotion regulation difficulties. Moreover, in many treatment models that were developed the focus was more on cognitive biases and emotion regulation, than on underlying representations. In this essay I argue that the causal status of cognitive biases, emotion regulation, and similar phenomena is overestimated, and that in clinical reality such phenomena can be best conceptualized as output of activated mental representations. Moreover, I argue that the disappointing effectiveness and protection to relapse of many current psychological treatments are related to not addressing the underlying mental representation. Next I discuss aspects of mental representations that are important for understanding and treating psychopathology, after which I discuss the clinical implications. I sketch how better understanding the specificities of mental representations can help us to improve psychological treatments, and I make some suggestions for future research.

## 1. Introduction

In this invited essay I plead for the importance of mental representations in psychopathology and its psychological treatment. When cognitive models of psychopathology became popular, the focus of these models shifted more and more towards cognitive biases, at the cost of a focus on underlying mental representations. Claims were made that these cognitive biases are causal in originating and/or maintaining the disorder, and it was suggested that treatments should focus on changing these biases – with as most clear example computerized bias training. I argue that the evidence for this causal status of cognitive biases is limited, and that in many cases addressing cognitive biases only has limited effects on expression of psychopathology when underlying mental representations are left unchanged. Moreover, I argue that cognitive biases can be best understood as stemming from mental representations instead of the other way around. In other words, I argue that mental representations are the core issue in many forms of psychopathology, with cognitive biases being a “natural” consequence of them, sometimes but not always playing a role in maintaining the disorder. For similar reasons, I argue that a focus on emotion regulation difficulties as underlying psychopathology, and being an effective focus of treatment, is not convincing. Addressing emotion regulation seems

most effective when reappraisal of the representation of the stimulus is involved, and treatments that directly address mental representations seem more effective than treatments focusing on emotion regulation. Similarly, I will argue that treatment focusing on “outputs” of underlying mental representations, such as cognitive therapy (CT) addressing reasoning errors and behavior therapy (BT) changing dysfunctional coping behaviors has limited effects if the underlying representation is not addressed. I will next focus on the implications that research into mental representations has for understanding psychopathology and change processes. The essay ends with a discussion on methods to change mental representations underlying psychopathology.

In this essay I mean with *mental representation* any model of external or internal stimuli (including complex stimulus constellations and sequences) formed by the organisms' mind. By forming models of the world, the organism can better deal with challenges. Responses of the organism are often governed by the mental representation. In essence mental representation is a *cognitive* construct. It should be noted that cognitive here doesn't have the same meaning as it has in clinical treatment protocols, where cognitive is often reserved to verbal conscious thinking. The capacity to form mental representations is not restricted to humans (hence, I sometimes use “organism” when I refer to living creatures in general), and are not necessarily verbal or conscious.

E-mail address: [a.r.arntz@uva.nl](mailto:a.r.arntz@uva.nl).

<https://doi.org/10.1016/j.jbtep.2019.101510>

Received 10 April 2019; Received in revised form 7 August 2019; Accepted 19 August 2019

Available online 27 August 2019

0005-7916/ © 2019 Elsevier Ltd. All rights reserved.

Moreover, some mental representations are stored in memory and are activated by relevant stimuli. Others are created on the spot. In this essay, when I use the term “mental representation” I refer to the first type. Further discussion of the construct will be offered later.

In this essay I formulate my view on the field. For some statements there are ample empirical arguments, for others little or none – these represent my personal views at the moment. Some statements may form the basis of hypotheses that can be empirically tested. In other words, this essay is not a statement about how things are, but it is about my view on the direction I feel would be fruitful to take in our field.

## 2. Cognitive models of psychopathology

At least two developments contributed to the “cognitive revolution” in the field of experimental psychopathology and (cognitive) behavior therapy. First, there was the necessity to use cognitive constructs to fill the hitherto black box in learning theory. Constructs like representations and expectations were introduced to understand the learning processes. Even in the study of perhaps the most simple learning process, habituation (the decreasing responses to a repeated unconditioned stimulus (US), where the responses are not learned, i.e. unconditioned), the theoretical constructs of a representation (and expectation) of the US were introduced. This was necessary to explain the effects of dishabituation (the increased responding to the US after habituation when an event takes place that was not part of the US-repetition context so far; Gray, 1975; Mackintosh, 1987; Wagner, 1979). For example, the omission of an US that was presented at regular times creates a return of the high levels of responses to a next US, similar to the initial responses. The formation of an US representation including the context and timing is hypothesized to create an inhibitory force on response expression. Similarly, conditioning theories were formulated that used the construct of US-representation to explain how post conditioning information could change conditioned responses, that is, this information is hypothesized to lead to a re-evaluation of the US-representation, causing changes in responding to CSi (Davey, 1989). Phenomena like renewal and reinstatement lead to the formulation of extinction of classically conditioned responses as an inhibitory process that is strongly dependent on context (Bouton, 2002). Processes involved were described in terms of two competing memory traces, one of the original fear memory, the other of the (context-dependent) absence of the US.<sup>1</sup> Thus, whereas reduced responding to the CS during extinction is observed, the memory representation of the CS predicting the US remains intact – while a new representation inhibits the activation of the first representation, leading to extinction. Furthermore, formal models were introduced that described (complex) learning processes as being dependent on the difference between expectation and experience. Rescorla (1988, p.151) contrasted the new to the old view of conditioning as follows: “*Instead, conditioning is now described as the learning of relations among events so as to allow the organism to represent its environment.*” (bold by present author). In other words, *mental representation* became central in modern learning theory.

A second factor was the development of cognitive psychology, influencing virtually every branch of psychology, including clinical psychology. It was ironically a psychiatrist, Aaron Beck, and not a psychologist, who was most influential in introducing the cognitive paradigm in our field (Beck, 1967). Two groups of constructs became

<sup>1</sup> Recent research suggests that the emotional meaning of the nonoccurrence of the signaled US (i.e., relief in case of an aversive US, frustration in case of an appetitive US) are essential in extinction learning. In other words, what might be learned is (in human emotional terms) hope or frustration conditioned by contextual cues (Felsenberg et al., 2018). Thus, a new representation is learned, in case of a negative US: “in this context the CS is likely to be no longer followed by the US – thus hope for the absence of the US”. Interestingly, if so, there might be no difference with counterconditioning.

central in cognitive theories of psychopathology: schemas and biased information processing. Schemas refer to representations of the self, and the world that govern information processing and help people to make sense of stimuli. Schemas are typically formed on the basis of early experiences in childhood, but their constitution is not restricted to this developmental phase. Biased information processing refers to preferential processing of specific aspects of available information, and is typically distinguished in attentional processes (which stimuli are selected, which are ignored? Which information is internally attended to for further processing, which not?), interpretational processes (how is the incoming information interpreted, i.e. what meaning is it given?), and memory processes (what is stored in long-term memory? what is retrieved from long-term memory?). In clinical practice, the branch of therapy that was most directly related to this model, cognitive therapy, developed for some time in a direction that contributed to the misunderstanding that cognitive psychology is about verbal thoughts and ideas that people are aware of, and that rational reasoning should be used to influence dysfunctional cognitions that were claimed to cause psychopathology. To summarize, in cognitive models of psychopathology schemas, that is mental representations of the self and the world, as well as biased information processing became central constructs. Simplified versions of the theory as ‘sold’ in some forms of cognitive therapy reduced complex constructs to thoughts and ideas that people are aware of, ignoring the fact that most psychological processes take place outside awareness.

Interestingly, cognitive models were also developed in other schools than experimental psychopathology, learning theory, and CBT. In psychodynamic thinking object-relation theories became dominant, that stress the role that mental representations of the self and others (and the way they are organized) play in psychopathology. Compatible with Freudian thinking, early development was still believed to be important in psychopathology, but now the emphasis was laid on the formation of representations on the basis of early relationships with caregivers (‘object’ refers to the other). Although the primary drives of libido and aggression still play a role in object-relation theories, compared to Freudian theories there is more recognition of the role of mental representations. Another example is attachment theory, describing how children form mental representations (“attachment representations”) on the basis of their attachment to caregivers, which continue to influence their adult relationships and how they cope with stressful experiences (e.g., Main, Kaplan, & Cassidy, 1985, pp. 66–104).

To summarize, in the 1980’s cognitive constructs that refer to the organism’s capacity to form mental representations had become central in many prominent psychological theories of psychopathology. These theoretical constructs played a central role in theories ranging from fundamental learning processes to complex clinical phenomena. However, we will see that from then on clinical research and theories started to focus more on cognitive biases than on mental representations.

### 2.1. Cognitive biases: a popular topic

In 1988 an influential book, *Cognitive psychology and emotional disorders* (Williams, Watts, MacLeod, & Mathews, 1988) was published, stating in its abstract that “*abnormalities in cognitive processing (with which this book is concerned) are still not well understood*”. Perhaps this worked as an effective call, as the last decade hundreds of studies were published into cognitive processes in most forms of psychopathology. Especially the study of attentional bias became popular. In 2007, a meta-analysis already included 172 studies on attentional bias in anxiety (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & Van Ijzendoorn, 2007). Why did such a surge take place? Perhaps the relatively simple experimental paradigms and their scientific status (e.g., measuring response times with their connotation of objectivity) contributed to the popularity of research into attentional bias. Another explanation is that the suggestion or even claim that cognitive biases

are *causal* might have contributed to the popularity. In most cases, this assumption was taken for granted, despite the fact that most studies showing (often medium effect sized, Bar-Haim et al., 2007) associations between psychopathology and attentional bias used a correlational design.

The jump from cognitive biases seen as manifestations of information processes governed by an activated schema to viewing these biases as causal in themselves is rather strange. Let us dwell on this for a moment, starting with situations where biases are functional.

#### Thought experiment 1

Let us say you are a 15th century European seaman hired by Columbus to find a western route to Asia. You have always thought that the world is flat.<sup>2</sup> What would you expect what could happen when you sail to the west? Asia lies to the east! The fear to fall of the world is understandable, and functional in your view of the world. An attentional bias to the western horizon, scanning whether a sudden end of the world shows up, is functional.

#### Thought experiment 2

You take a guided walking tour through a jungle, but lost your group. You know there are dangerous animals that attack people, especially during the night. The night falls, but you try to find the path. You are hypervigilant for sounds that might signal dangerous animals – you remember you better stay put and be silent in case you would encounter one.

These examples indicate that attentional bias is a normal and potentially functional mechanism that follows from situations where it can be helpful to act immediately. This is not restricted to threat. For example, hunger causes attentional bias to food (Lavy & van den Hout, 1993a; Mogg, Bradley, Hyare, & Lee, 1998; Pool et al., 2016) and addiction is characterized by an attentional bias to addiction-relevant stimuli (e.g., images of beer or beer-brands for alcoholics, Field & Cox, 2008). Attentional bias is thus related to a motivational state and preparation for immediate action.

When applied to psychopathology, one way to understand attentional bias is that it is the mental representation that gives the stimulus a meaning triggering a motivational state to act immediately. Would the mental representation be correct, the attentional bias would be functional. However, with dysfunctional mental representations, the bias also becomes dysfunctional. (The same line of reasoning holds for interpretation: if based on functional mental representations, the interpretation is functional; if based on dysfunctional mental representations, it is dysfunctional). In sum, if we assume that people form mental representations, cognitive biases are a natural consequence when these representations are not adequately reflecting the actual state of the world. Nevertheless, one could still maintain that cognitive biases might develop for other reasons than because of an underlying mental representation, and have a causal effect on psychopathology. Let us therefore have a look at what the empirical evidence says about the causal status of cognitive biases.

#### 2.1.1. *Intermezzo: the causal status of cognitive biases*

Leading researchers in the field of cognitive biases developed experimental paradigms to test whether induced biases could cause analogue forms of psychopathology, and whether reducing biases would lead to reduction of psychopathology. Despite the development of experimental paradigms to induce or reduce cognitive biases (Mathews & MacLeod, 2002), the causal status of such biases is far from clear (Van Bockstaele et al., 2014; McNally, 2019) and meta-analyses show small and unstable effects of experimentally manipulated cognitive biases (e.g., Hallion & Ruscio, 2011; Cristea et al., 2015).

<sup>2</sup> The story that seamen at that time believed the earth was flat appears to be incorrect. Most seamen believed the earth to be a sphere. But this is not essential for this thought experiment (see [https://en.wikipedia.org/wiki/Christopher\\_Columbus#Flat\\_Earth\\_mythology](https://en.wikipedia.org/wiki/Christopher_Columbus#Flat_Earth_mythology)).

As to the induction of cognitive biases in participants not suffering from psychopathology, the findings indicate that not so much elevated levels of anxiety or depression are induced, but instead heightened reactivity to stress (Mathews & MacLeod, 2002). Despite the fact that experiments are essential for demonstrating causality, Van Bockstaele et al. (2014) identified only 6 studies aiming to induce increased stress sensitivity via training of attentional bias to threat (or not away of threat), with one study failing to yield evidence. Apart from the small number of studies (making meta-analysis and checks on possible publication bias problematic), the question remains whether trained biases can lead to real long-lived forms of (subclinical) psychopathology. Van Bockstaele et al. 2014, p. 709 therefore conclude that “(...) the absence of large-scale longitudinal studies, in which attentional bias at Time 1 is used to predict fear or anxiety disorders at Time 2, constitutes a major gap in the current state of the literature.” Still another problem is that even if it would be possible to create (relatively long-lasting) (pseudo) psychopathology through induction of a cognitive bias, this does not prove that most of the common forms of psychopathology are caused in a similar way. In fact, given our knowledge about how the organism learns about emotionally important events,<sup>3</sup> that is by forming mental representations, it seems more likely that biases are parts of or consequences of the representations that the organism forms of the world. Acquiring a cognitive bias isolated from a meaningful framework (i.e., without referring to something emotionally important) would be a very unusual pathway to psychopathology. Indeed, a recent longitudinal study found evidence for both the child's and the parent's anxiety leading to later attentional bias in the child, and not for the opposite process, attentional bias leading to later anxiety (Aktar, Bockstaele, Perez-Edgar, Wiers, & Bögels, 2019).

Next to the hypothesis that cognitive biases can cause psychopathology, is the hypothesis that cognitive biases maintain psychopathology and should therefore be targeted in treatment. To investigate this in psychopathological samples, computerized bias modification (CBM) paradigms have been developed. In such training programs, participants are trained to reduce their bias, for example to avoid paying attention to threatening stimuli. The direct manipulation of attentional and interpretational biases by CBM in anxiety, depression and addiction boomed the last decades. However, the clinical effects are disputed. A meta-analysis by Cristea et al. (2015) reported no evidence for clinical effects, that is effects of CBM on clinically relevant outcomes such as level of anxiety symptoms or depression.<sup>4</sup> This meta-analytic study was heavily criticized, most importantly with the argument that the meta-analysis did not select only the studies that were successful in changing the bias focused on (Grafton et al., 2017). The problem with the latter argument is however, that if bias and psychopathology are intrinsically associated (directly, or as argued above, through the representation involved), and a selection of studies with positive effects is made, than this is at the cost of causal proof (one thinks one selects studies with successful bias modification, but in fact one is selecting positive outcomes). Of course, it is possible that CBM paradigms are not yet developed enough to yield stable results over studies, and the future will learn whether stable replications will be made of positive effects of CBM.<sup>5</sup> Without going into the details of the debate, it seems clear that it

<sup>3</sup> In humans by direct experience, vicariously (seeing the experience in another person), and by information (e.g., Rachman, 1991). Note that I focus here on learning relevant to psychopathology.

<sup>4</sup> Note that there is similarly no convincing evidence across studies for CBM as treatment for addiction (Boffo et al., 2019; based on patient-level analysis of 14 studies). (Patient-level analysis means that the original data of all participants of the 14 studies were combined and analyzed in one overall analysis).

<sup>5</sup> See however Price et al. (2016) for a meta-analysis on 13 studies (N = 773) with (sub)clinically anxious patients, which found evidence that attentional bias modification (ABM) training was related to loss of diagnostic status, though no evidence was found for effectiveness of ABM with self-report measures. Note that the number of studies is considerably smaller than in Cristea

is far from decided yet whether CBM is an effective treatment for psychopathology, and thus whether cognitive biases truly maintain the disorder. In other words, biases might also just reveal cognitive operations that serve the underlying motivational state of the organism, which is, in my view, in many cases of psychopathology based on mental representations.

### 2.1.2. Why is it (perhaps) not enough to change cognitive biases?

It is clear that if cognitive biases block the correction of mental representations, their reduction is necessary. However, just training them away does not necessarily lead to corrective information. For example, training Columbus' seaman to look at the eastern horizon and not to focus on the West does not in itself change the representation that the world is flat, and therefore does not correct the source of the fear. Thus, the prediction follows that reducing cognitive biases has only an effect on psychopathology if correction of the underlying mental representation follows. This correction does not take place automatically by changes in cognitive biases. Instead, there should be corrective (disconfirmatory) information available that with the reduction of cognitive biases has a larger impact than with the biases still being there.

More importantly, this analysis indicates that if we can help patients change their representations to more functional ones, it is not necessary to address cognitive biases. Instead, biases will reduce as the result of successful treatment (as several studies have reported in various disorders, e.g. Lavy & van den Hout, 1993b; Lundh & Öst, 2001; Mathews, Mogg, Kentish, & Eysenck, 1995; Mattia, Heimberg, & Hope, 1993; Sieswerda, Arntz, & Kindt, 2007; Shafraan, Lee, Cooper, Palmer, & Fairburn, 2008; Waters, Wharton, Zimmer-Gembeck, & Craske, 2008; for further discussion: Van Bockstaele et al., 2014).

In sum, when psychopathology is based on dysfunctional mental representations, reducing cognitive biases does not guarantee that this psychopathology reduces. Conversely, if the dysfunctional mental representation is corrected, cognitive biases will disappear.

### 2.2. Another popular topic: emotion regulation

Another currently popular topic in the field of psychopathology research is *emotion regulation*. Deficits in emotion regulation capacities are hypothesized to underlie many forms of psychopathology, and treatments have been developed to train patients in adaptive forms of emotion regulation skills. Interestingly, a meta-analysis indicated that the most effective emotion regulation strategy is cognitive change, and within this (global) category, reappraisal of the emotional stimulus (but not reappraisal of the emotional response), and perspective taking, were the most effective (Webb, Miles, & Sheeran, 2012). Considering perspective taking as a method of reappraisal of the emotional stimulus,<sup>6</sup> it follows that stimulus reappraisal is the most effective strategy. What is interesting in the present context is that this fits with the central thesis of this essay, that is that the mental representation (in this case of the stimulus triggering the emotion) is central to (dysfunctional) emotional responses. Distraction and suppressing the expression of emotion, are the two second best emotion regulation options according to Webb et al. (2012). They might be helpful to (temporarily) deal with the evoked emotions. However, stimulus reappraisal seems not only more effective in the short term, but probably is also more

(footnote continued)

et al. though on the other hand patient-level meta-analysis is considered to be superior to conventional meta-analysis.

<sup>6</sup> In perspective taking participants are instructed "to alter the impact of the emotional stimulus by adopting a more or a less objective perspective. For example, participants may be asked to imagine themselves in the situation depicted or may be asked to be objective or to view the stimulus as detached observers." (Webb et al., 2012, p. 778). Perspective taking can thus be considered as a form of reappraisal of the stimulus.

effective in the long term, as it helps to change the meaning of the stimulus, i.e. the mental representing of the stimulus.

What do clinical studies tell us in this respect? Although training emotion regulation skills is helpful for reducing psychopathology, the effects should not be overstated. In the treatment of (complex) PTSD related to childhood trauma, there is evidence that trauma-focused treatments are superior to non-trauma-focused treatments, the last consisting of different forms of increasing coping skills, which include emotion regulation skills (Ehring et al., 2014). Interestingly, a recent RCT observed that imagery rescripting, a treatment focusing on changing the meaning of trauma memories, was even superior in improving emotional regulation skills compared to STAIR, a treatment developed to improve emotional regulation and interpersonal skills (Raabe, Ehring, Arntz, Marquenie, & Kindt, 2018). In other words, dysfunctional emotion regulation improved more by addressing the trauma representations than by directly addressing emotional regulation with a skills training.

In sum, although *emotion regulation* suggests that there is something wrong with the emotion regulation capacities in various forms of psychopathology, the most effective form of improving emotion regulation focuses on the representation of the meaning of the stimulus that triggers the emotion. Furthermore, PTSD treatment studies suggest that addressing the mental representations (i.e., the trauma memory) underlying the disorder is more effective than training emotion regulation skills.

### 3. Problems with (many) current psychological treatments: limited response and relapse after treatment

Among the major problems of current treatments, pharmacological as well as psychological, are substantial numbers that do not respond, and the relapse among those that do respond (e.g., Durham, Higgins, Chambers, Swan, & Dow, 2012; DeRubeis et al., 2008). Although in depression CBT offers relative protection to relapse compared to medication (when tapered off), the relapse rates at two years after end of treatment are still alarming. A meta-analysis found a 54% relapse rate of initially successfully treated depressed patients at 2 years after the acute phase of treatment (Vittengl, Clark, Dunn, & Jarrett, 2007).<sup>7</sup> For example, the study by DeRubeis et al. (2008) found more than 50% relapse 24 months after active CBT, compared to more than 75% relapse after pharmacotherapy. Despite that the interpretation was that CBT was protecting against relapse compared to medication, the alternative, that medication sensitizes brain systems to stress after being tapered off cannot be excluded with the designs used (see Hollon, Cohen, Singla, & Andrews, 2019, for a similar line of reasoning). And although relapse prevention programs have been developed and found to reduce the chance of relapse with 22% compared to inactive control conditions one year (Clarke, Mayo-Wilson, Kenny, & Pilling, 2015), this would lead to a limited improvement from 54% to 42% relapse after CBT, leaving ample room for further improvement. Moreover, it is puzzling why the primary psychological treatment of depression (CBT) has only a limited effect on preventing relapse – apparently it does not successfully change factors responsible for relapse. One clue why this might be the case is offered by a meta-analysis by Buckman et al. (2018), that found that childhood maltreatment, residual symptoms and history of prior depression episodes as the predictors of relapse risk

<sup>7</sup> Studies published after this meta-analysis with longer follow-up periods assessing relapse report similar relapse percentages (e.g., 48% for CT and 54% relapse in 2 years for behavioral activation, superior to pharmacological treatment; Dobson et al., 2008), or somewhat smaller percentage though still alarmingly high (e.g., at 17 months 29% for CT and 37.5% for IPT – extrapolated to 24 months: 38% for CT and 48% for IPT, Lemmens et al., 2018) (Extrapolation by relapse proportion at 24 months = 1 - survival at 24 months = 1 - (survival at 17 months)<sup>24/17</sup>).

with the best evidence (see also Nanni, Uher, & Danese, 2012, for the negative effects of childhood maltreatment on depression treatment). Such factors might point to a weakness of many of the current treatments for depression, and that is that the mental representations that underlie the (vulnerability for) depression are not well enough addressed, i.e. mental representations related to childhood maltreatment experienced by so many who are vulnerable for recurrent depression.<sup>8</sup> Similar arguments hold for most other disorders where substantial proportions don't respond to treatment, and relapse after treatment is considerable.

Remarkably, studies into the treatment of personality disorders do often observe further improvement after treatment stopped (e.g., Fig. 1; see also Bamelis, Evers, Spinhoven, & Arntz, 2014), and very low relapse in those who recovered (e.g., none during the follow-up in the samples depicted in Fig. 1). Apparently, such treatments brought about changes in the functioning of the person that made participants resilient to relapse, and that lead to further growth. Psychological treatments of personality disorders are usually much longer than those for anxiety or depression, and focus more on the mental representations underlying the personality problems, such as self- and other-views, and associated early adverse experiences.

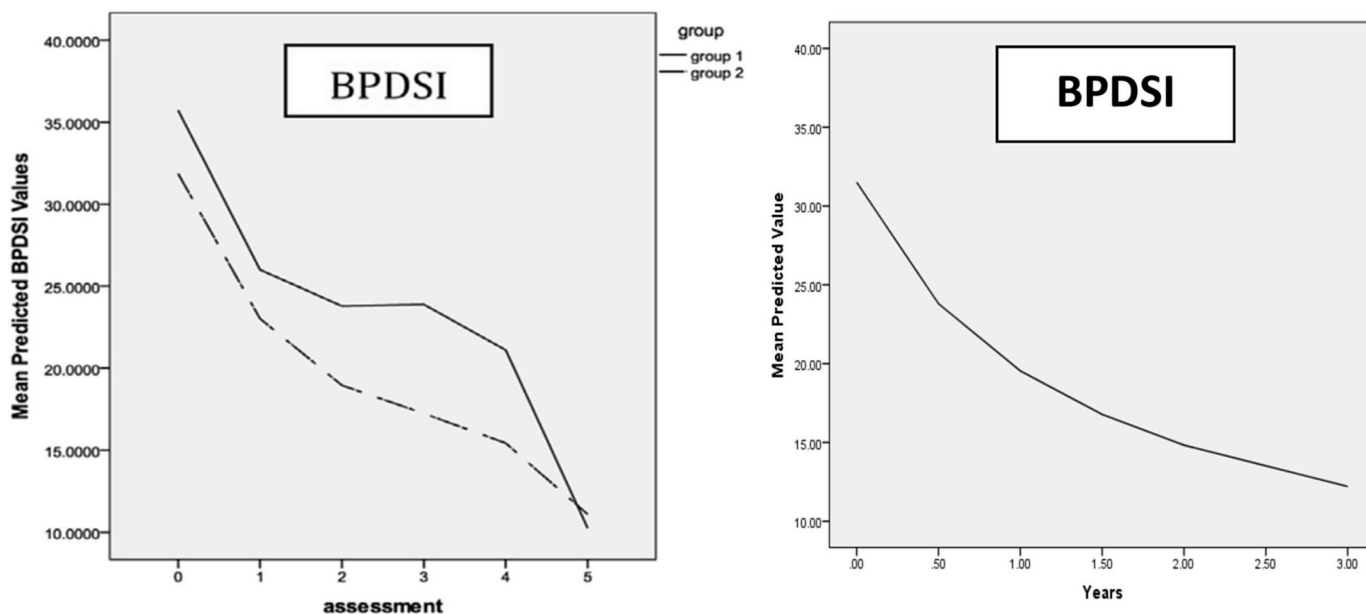


Fig. 1. Improvements on the BPDSI, assessing manifestations of borderline personality disorder (BPD), continues in year 3, during which no treatment was offered. To the left: results from a pilot study into group schema therapy (year 3 starts after assessment 4; Dickhaut & Arntz, 2012). To the right: preliminary results from a trial investigating group schema therapy for BPD (Wetzelaer et al., 2014).

Dialectical Behavior Therapy (DBT) might be an exception to this, with its strong focus on emotion regulation skills, and little attention to addressing the mental representations of self, others and the world. Indeed, a large trial on DBT indicated no substantial further improvements over a 2 year follow-up period after one year of DBT (McMain, Guimond, Streiner, Cardish, & Links, 2012). In defense of DBT, the one-year DBT program was originally not intended to offer a complete treatment of borderline personality disorder (BPD), but a stage 1 to reduce the most problematic manifestations of BPD, so that further treatment would be possible, for instance of (childhood) traumas that are so prevalent in BPD (Linehan, 1993).

<sup>8</sup> Whether or not recent new treatments such as imagery rescripting (Brewin et al., 2009; Yuen-Ting, 2019) and schema therapy (Malogiannis et al., 2014; Renner et al., 2016) that focus more on such mental representation offer better prevention of relapse waits for empirical tests.

Returning to the syndromal disorders, there might be one exception to the general finding that relapse is common after shorter treatments: PTSD. Meta-analyses indeed indicate some further improvement and post-traumatic growth after the end of trauma-focused treatment (Ehring et al., 2014; Kline, Cooper, Rytwinski, & Feeny, 2018; Roepke, 2015). Although studies of PTSD treatments generally do not report relapse proportions in those that initially recovered, data from recent RCTs into the treatment of PTSD due to childhood abuse show very low relapse on the CAPS 12 months after treatment (6.25%, Raabe et al., in preparation; 11%, Boterhoven-de Haan et al. (2017), preliminary data), which compares favorably with the approximately 30% at 1 year after psychological treatment for depression.<sup>9</sup> If true, this suggests that addressing and processing trauma-representations in trauma-focused therapy has a more stable (and often growing) effect than for instance depression treatments.

### 3.1. Misunderstandings about trauma and PTSD

The introduction of PTSD as a separate diagnosis may have contributed to several misunderstandings about trauma and diagnosis. The

diagnosis of PTSD suggests that there is a restricted set of stimuli (those that form a direct threat to the integrity of the body) that lead to a unique set of symptoms (defining PTSD), and relatedly, that if there is no diagnosis of PTSD, there is no trauma playing a role in the genesis or maintenance of psychopathology. Contradicting the idea that only experiences that are a direct threat to the bodily integrity cause PTSD symptoms, studies found that psychological trauma, notably interpersonal, like the experience of interpersonal betrayal, cause PTSD symptoms, including intrusions and other forms of re-experiencing the trauma (Larsen & Pacella, 2016; Mol et al., 2005; Rosen & Lilienfeld, 2008).

<sup>9</sup> The relapse at 1 year is 29% in the Vittengl et al. meta-analysis (2007). If we average the relapse percentages at 1 year reported by studies published after the Vittengl et al. meta-analysis, a comparable relapse is found: 34.2% (average of relapse of CT, BA and IPT at year 1 from Dobson et al. (2008), DeRubeis et al. (2008) and Lemmens et al. (2018)).

2008; van den Berg, Tollenaar, Spinhoven, Penninx, & Elzinga, 2017). Moreover, traumas, whether or not fulfilling the criterion of immediate threat to bodily integrity, can lead to various forms of psychopathology, not only PTSD. For instance, childhood sexual abuse has been found to be associated with a wide range of psychopathology: anxiety disorders, depression, eating disorders, PTSD, sleep disorders and suicide attempts (Chen et al., 2010), personality disorders (in particular BPD, Lobbestael, Arntz, & Bernstein, 2010), and psychosis (Matheson, Shepherd, Pinchbeck, Laurens, & Carr, 2013). Childhood adversity, including emotional abuse and emotional neglect, is in general related to psychopathology, especially the more chronic and complex forms (e.g., chronic and treatment-resistant depression, Nanni et al., 2012; Nelson, Klumpp, Doebler, & Ehring, 2017). Nevertheless, traumatic memories are usually not a focus of treatment when there is no PTSD.<sup>10</sup> Neglecting the processing of early memories of adverse experiences might be a major limitation in many current treatments.

#### 4. Mental representation

I have argued that mental representations are important in psychopathology, and that cognitive biases and emotion regulation problems can be better viewed as the consequence of dysfunctional mental representations, instead of causes of psychopathology. However, until now the construct of “mental representation” itself was not discussed. I will now discuss different aspects of the construct. As said, a mental representation is loosely defined as a model of external or internal stimuli (including complex stimulus constellations and sequences) formed by the organisms' mind. It is an abstract construct, not observable, but in some form postulated by most theories that are formulated to understand how the mind works. Mental representations include mental images, ideas, beliefs, schemas, memories, emotional meanings, etc. I prefer the use of the term mental representation in this essay as it has a more general meaning than ideas, schemas, beliefs etc.

A mental representation is a cognitive construct, as it refers to the organism's capacity to build a model of the world (and the self), preserve that in memory, make predictions on the basis of that model, and update the model on the basis of prediction errors. Nevertheless, mental representations are often rich in emotional meanings, and hence trigger action tendencies (e.g., approach or avoid). Mental representations do not imply consciousness, although mental representations are necessary for consciousness (Hubbard, 2007). That mental representations do not imply consciousness is important for the understanding and treatment of psychopathology. When we discuss mental representations in the context of psychopathology, we are not necessarily referring to representations people are aware of. Moreover, mental representations are not restricted to verbal beliefs about the world (or the self). Mental representations also cover emotional meanings of stimuli (e.g. telling the person that a spider is a threat, or that others cannot be trusted), imagery (there is a rich literature about imagery and mental representations) – including but not restricted to visualization, memories (whether implicit or explicit), fantasies (e.g. future projections), etc.

It is beyond the scope of this essay to discuss the rich but complex literature in psychology and philosophy on the exact nature of mental representation. In the context of the present essay, I use this term to refer to the approaches in the field of experimental psychopathology and clinical psychology that focus on mental models of the world and the self that are supposed to underlie psychopathology.

##### 4.1. Schemas, beliefs, and semantic and episodic memory

Beck introduced the schema construct in the field of psychopathology (Beck, 1967), defining it as “a structure for screening,

coding, and evaluating the stimuli that impinge on the organism.” (p. 283). However, it was Piaget (1923) who introduced it in psychology. While the schema construct has a more general meaning, a branch of the cognitive therapy movement started to focus on beliefs as the cognitive core underlying psychopathology. Beliefs are described as convictions that are represented in a verbal way. This branch of cognitive therapy narrowed the original idea that knowledge representations that can contain different modalities of representations (schemas) underlie psychopathology, to the idea that it are specific (propositional) beliefs that underlie mental health problems. The focus was laid on investigating (in research and in treatment) whether such beliefs were true or not. Extended cognitive therapy techniques based on logical and empirical testing were developed to help patients reconsider their beliefs. However, the discovery that treatment procedures that don't directly involve rationally assessing the truth of beliefs, but use irrational procedures such as imagery rescripting can lead to large changes in beliefs (Arntz, 2012; Arntz & Weertman, 1999; Holmes, Arntz, & Smucker, 2007) casts doubt on the idea that (non-true) propositional beliefs are central to psychopathology, or at least to all aspects of psychopathology.

At the other side of the spectrum are schema theories such as that of schema therapy (Young, Klosko, & Weishaar, 2003). Young defines schemas as made up of a specific pattern of memories, emotions, cognitions, and bodily sensations organized around a theme or pattern (Young et al., 2003, pp. 6–7), while later beliefs and neurobiological reactions were added (Louis, Wood, Lockwood, Ho, & Ferguson, 2018). Here the definition of a schema includes emotions, which in traditional CBT are seen as outputs of belief activation. Viewing the mental representations underlying psychopathology as incorporating sensory, emotional and cognitive elements, not necessarily all (immediately) open for consciousness allows for understanding how different procedures, using verbal (reasoning), sensory, emotional (experiential) channels, can change (aspects) of the complex mental representations underlying psychopathology.<sup>11</sup> This is especially important for understanding and treating forms of psychopathology where verbal propositions fall a short in capturing the problem, as for example with psychosomatic problems (see Henningsen et al., 2018, for an application of a mental representation model to psychosomatic disorders).

Whereas beliefs and schemas should be viewed as semantic memories, as they represent general rules, research into imagery rescripting demonstrated that addressing specific episodic (adverse) memories leads to strong reductions in dysfunctional beliefs (e.g., Cooper, Todd, & Turner, 2007; Lee & Kwon, 2013; Reimer & Moscovitch, 2015; Ritter & Stangier, 2016; Shibuya et al., 2018; Veale, Page, Woodward, & Salkovskis, 2015; Weertman & Arntz, 2007; Wild, Hackmann, & Clark, 2007, 2008). At first sight, this seems puzzling, as originally semantic and episodic memory were considered to be different systems with no (direct) mutual influence. However, this idea of separated memory systems appeared to be incorrect: the two kinds of memory influence each other (Greenberg & Verfaellie, 2010). This opens the possibility to change general views of the self and the world through addressing specific episodic memories that are associated with the formation of such generalized ideas. Moreover, addressing such emotionally “hot” memories might have a stronger and longer lasting effect than the use of verbal reasoning or single experiences of disconfirmation, which might not trigger the necessary accommodation, but might rather lead

<sup>11</sup> Note that Young's definition of a schema excludes behavior, which is seen as response to schema activation (Sempertégui et al., 2013). However, the behavioral channel can still be used for change as it can bring about cognitive and experiential change, and it can change rigid behavioral coping responses to schema activation (Young et al., 2003). Behavioral coping responses can also be conceptualized as mentally represented, but in Young's model they are not part of schemas. In Beckian cognitive models, they are represented as instrumental beliefs, fundamental assumptions about how to deal with challenges and temptations (Arntz, 2018).

<sup>10</sup> Exceptions in the field of CBT include Imagery Rescripting and EMDR when applied to disorders other than PTSD, and Schema Therapy.

to assimilation (i.e., where the information contradicting the representation is transformed or distorted so that it confirms the representation instead of leading to a change).

#### 4.2. Sensory, cognitive, and emotional change

If mental representations can be constituted of an amalgam of sensory, emotional and cognitive (meaning) elements, change can take place primarily at each of these elements and might (but perhaps not necessarily does) spread over the other elements. In therapeutic procedures developed for processing traumatic memories, we see this diversity of addressing specific elements. In EMDR for instance, the procedure to hold an image of the traumatic event in mind while at the same time following the finger movements of the therapist, leads primarily to a weakening of the sensory elements of the trauma memory representation, which might spread to the emotional and cognitive elements (e.g., because the trauma memory is sensorial less intense, the patient might become less frightened of it and might feel more control over it) (van den Hout, Bartelski, & Engelhard, 2013).<sup>12</sup> Nevertheless, procedures to explicitly deal with emotional and cognitive elements have been added to the EMDR protocols described above, probably because of clinical helpfulness or necessity. Another example of a procedure to directly change the sensory elements of trauma memories is the application of imagery rescripting procedures where the sensory elements are manipulated (e.g., the perpetrator is shrunk to a dwarf; the trauma scene is viewed as taking place on a television and another channel is switched on; cf. Holmes et al., 2007).<sup>13</sup>

An example of a procedure to directly change an emotional element of a trauma memory is the fear memory reconsolidation procedure discussed below, where the reconsolidation of an activated fear (in this case trauma) memory is blocked by the application of a beta-blocker (see Kindt & van Emmerik, 2016, for case examples). Here the primary change is in the emotional element of the representation. Cognitive therapy procedures for PTSD have been developed to directly address the cognitive elements (Resick, Monson, & Chard, 2016). An example of a treatment method that can change sensory, emotional and cognitive elements is imagery rescripting, although the direct manipulation of the sensory elements of the trauma memory is not so prominent in most applications, that focus more on the meaning aspects (Arntz, 2012).

#### 4.3. Dissociated yet related parts of mental representations

An important observation in the area of psychopathology is that aspects of mental representations can be influenced without (immediately) changing other aspects. Thus, there might be dissociations between aspects of the representations. Three examples of this with relevance for psychopathology are (i) the dissociation between the fear memory and other aspects of the memory of a threatening experience as result of a process of *erasing the fear memory*, (ii) the dissociation between knowing and feeling that often occurs with the application of cognitive therapy techniques, and (iii) the dissociation between reasoned insight and a felt subjective truth. These three examples are now discussed.

The finding that a memory can be brought into a temporary unstable state following its reactivation, during which it can be influenced before it is reconsolidated, has brought about a lot of interest among researchers. The potentials of this are enormous for the clinical field: changing important aspects of the memory itself is perhaps the most

<sup>12</sup> The “Tetris” treatment developed by Holmes uses a similar mechanism of taxing visual working memory to reduce the sensory vividness of the trauma memory (Holmes, James, Coode-Bate, & Deeprose, 2009).

<sup>13</sup> Note that increased controllability instead of the change in sensory elements might be essential in Imagery Rescripting (Kunze, Lancee, Morina, Kindt, & Arntz, 2019).

fundamental change that a treatment can bring about, and reduces, if not nullifies, the chance of relapse (return of the dominance of the original memory). Different types of (human) memory might be changed during reactivation by different procedures. It is yet far from clear whether and how this can be reliably done with different types of memory (i.e., procedural, declarative, physiological responding, etc., see Elsey, Van Ast, & Kindt, 2018, for a review). Nevertheless, the evidence for influencing one type of memory with a combined psychological and pharmacological procedure seems to be the most consistent, that is erasing a fear memory by combining reactivation with a prediction error and the application of propranolol (a beta-blocker) (Beckers & Kindt, 2017; Elsey et al., 2018). The idea is that the reactivation brings the fear memory in a temporarily unstable state, where it is open for change, with the application of propranolol blocking the reconsolidation of a part of the memory, so that the automatic fear response disappears. Interestingly, it seems that a prediction error is necessary to trigger this process: something unexpected happening during the reactivation seems necessary (Elsey et al., 2018). (This builds upon the general rule that learning only takes place when something unexpected takes place). Lab studies using classical conditioning paradigms found that it is the startle response that is influenced by this procedure, with (in the long term) no return of it to the conditioned stimulus when procedures are used that lead to its return when the classical procedure of extinction is used, such as reinstatement, renewal, and accelerated re-acquisition (Elsey et al., 2018). Interestingly, other indices such as skin conductance responses and US expectancies don't show this pattern (Elsey et al., 2018; Kindt, 2018). However, subjective distress experienced during the CS confrontation shows a similar pattern as the startle response (Soeter & Kindt, 2012). This indicates that a specific part of the fear memory is erased: the excessive negative valence of the US, as can be assessed with the startle response and subjective distress ratings. Calling this phenomenon “erasing fear memory” might therefore be confusing, as for instance the declarative memory of the US remains intact, thus the procedure affects a part of the automatic fear response. Also note that pilot work into clinical applications indicates that more complex emotions like shame and guilt are not affected by the procedure (Kindt, personal communication, 14 January 2019).<sup>14</sup> Thus, this research gives a clear example of how a specific procedure can influence a very specific part of the representation of a threatening stimulus – dissociated from the rest of the representation.

The second example is the finding in basic conditioning research that there is a dissociation between primary and higher order of learning. This is related to the clinical observation that some problems don't change despite successful application of treatment procedures. That is, after a first conditioned stimulus (CS1) becomes a predictor of an unconditioned stimulus (US) through classical conditioning, a second conditioned stimulus CS2 is associated with CS1 (in absence of the US), the CS2 is not associated with the US, although the sequence of conditioning started with the US. In other words, the presentation of the CS2 does not lead to an activation of the US-representation. Conversely, changes in the US representation (e.g. thru US inflation or deflation, habituation, etc.) don't affect the responding to the CS2 (but do change the responses to the CS1). Moreover, nonreinforcement of the CS1 does not lead to extinction of the responses to the CS2. It has therefore been proposed that the CS2 rather predicts the occurrence of a more general state of fear in case of aversive conditioning, or a more general state of hope (for reward) in case of appetitive conditioning (Gewirtz & Davis, 2000). With operant conditioning the situation is similar, in that behavioral responses to the second-order conditioned stimulus are resistant to change when the original US is changed or is no longer related to the behavior associated with first-order conditioned stimulus. For

<sup>14</sup> Simple positive emotional representations of stimuli might also be open for this procedure. This is of relevance for the treatment of addiction.



example, the escape (c.q. approach) response to the second-order conditioned stimulus is not changed, when the organism learns that the escape (c.q. approach) response to the first-order conditioned stimulus is no longer reinforced. Thus, higher order conditioned stimuli refer to representations of general states of fear or hope (craving) that might be dissociated from the original unconditioned stimulus. This phenomenon explains why emotional responses to second order conditioned stimuli not necessarily change, despite the person knowing that the first order conditioned stimulus does no longer predicts the US.

The third example of dissociation is the general finding that feeling and reasoning about specific mental representations can tell different things. In the application of more rational techniques from cognitive therapy this is well known as the “I know it but I don't feel it” counterargument of the patient. One of the most influential theories to account for this dissociation is the Interacting Cognitive Subsystems theory (ICS) (Teasdale, 1993; Teasdale & Barnard, 1993), describing two interacting but not automatically integrated systems. The implicational system integrates input from immediate perception of events, with embodied experience, including images, other sensory information and conceptual thought, encoded in latent implicational meaning, and operating at a felt-sense intuitive level. The verbally-based propositional knowledge system is thought to operate primarily at an intellectual level, whereby we may know something to be true factually, but this may not equate to feeling it to be true (summary from Simpson & Arntz, 2019). But there are more examples of theories stipulating a dissociation between representations of stimuli on a felt (sensory) level and on a reasoned (verbal) level (e.g., Brewin, Dalgleish, & Joseph, 1996; Ehlers & Clark, 2000; Roediger, 1990). The felt level is characterized by intuitive feelings, rich sensory representations (e.g., images and bodily feelings), and appears to have a strong automatic influence on attitudes, evaluations, and behaviors. Although the level that uses reasoned insight is able to overrule the felt level (e.g., one approaches a feared or disgusting stimulus for rational reasons), it is often difficult to use this level to directly change the representations at the felt level (Arntz, 2018). In sum, various theories describe subsystems of mental representations that show some dissociation between reasoned insight and felt subjective truth.

## 5. Clinical implications

I have argued that mental representations are important in understanding psychopathology and that psychological treatment should focus on changing the mental representations underlying the psychopathology to be optimally effective and lasting. What are the implications for clinical practice? Let us first discuss implications for three major schools of psychotherapy.

In classical behavior therapy, extinction (exposure), counterconditioning, and operant conditioning procedures are the central procedures. It is generally understood now that procedures such as exposure form a new memory trace that competes with the original one, and when its activation “wins” it inhibits the original memory trace. The context dependency of the new learning of extinction is well known, and explains how a change to a new context in which extinction did not take place can lead to a return of the original response (Bouton, 2002). The conservation of the original memory trace can also explain other examples of ‘relapse’, such as by a new exposure to the US.

Similarly, from a cognitive point of view it has been argued that change processes in treatment are based on influencing the competition between different memory representations, so that the more positive (functional) ones win the competition from the more negative (dysfunctional) ones (Brewin, 2006). Thus, a similar change process as in learning theory is hypothesized to underlie cognitive therapy, in that a newly learned memory trace competes with the original trace, whilst the original memory representation is not erased.

Although treatments that use change methods based on the behavioral and cognitive procedures mentioned above cannot immunize

against relapse, as the original representation is not erased (Bouton, 2002; Brewin, 2006), there are several ways to optimize them. Apart from actively promoting generalization, treatment can address the (affective) meaning of the US representation (US-revaluation, Davey, 1989; Arntz, 2012). A first approach is based on habituation. As experimental research has demonstrated that habituation to the US leads to reduction of CR and to reduced relapse (Bouton, 2002), it can be a good idea to integrate exposure to the US, if ethical and practical possible, in the treatment. As in many cases the US is painful because of its emotional meaning (and not because of its physical effects), one can use imagery-based techniques for this, e.g. imaginal exposure. Second, there are other ways than habituation to help the patient to reevaluate the US, for instance by imagery rescripting, role plays, emotional processing techniques as used in trauma treatment, and nonverbal techniques. Importantly, both approaches require that the treatment focuses on the representations of the US (or in general terms, the representation underlying the problem). It is exactly this aspect of treatment that is, in my view, often neglected, as the focus of treatment is often too much on short-term reduction of symptoms.

In cognitive therapy many techniques focus on automatic thoughts and correcting reasoning errors in them. Such an approach might but does not necessarily touch upon the underlying representation. Admittedly, cognitive techniques have been developed to address underlying (core) beliefs. Apart from that in many applications there is not an extended focus on these beliefs, there is another problem with these techniques. That is, they are usually restricted to verbal-rational reasoning, which might have limited effects in changing all aspects of the mental representation, as argued above. Thus, cognitive therapy might profit from a more extensive focus on underlying representations and from using other ways of change than verbal reasoning (Arntz, 2018).

Psychodynamic therapies have a long tradition in addressing the early memories related to current mental health problems. Although aiming to address underlying representations, the effectiveness and efficiency of the typical psychodynamic approaches might be limited because of the intellectual way the early memories are dealt with, the lack of focus of the associative procedures (which can lead to both relevant and irrelevant directions), the presumption that it is always a conflict that underlies the problems, and the lack of techniques that address areas that don't improve automatically by addressing the associated early memories, such as behavioral habits that became autonomous (see secondary conditioning above). Nevertheless, the assumption that early experiences underlie the present psychopathology is partially in line with the present argument.

After having addressed general implications for three major schools of psychotherapy, let us have a look at general implications that cut across different approaches.

(a) Without addressing the underlying mental representations, the treatment is incomplete. There is an increased chance of relapse, as the underlying representation can be easily activated again. Although the development of techniques to erase dysfunctional elements of the representation are in their infancy, we have methods to address mental representations instead of addressing the consequences of them, such as biased information processing, reasoning errors, and dysfunctional behavior. The prediction is that treatment effects will improve, especially the long-term effects, if treatment focuses on such representations. Often (but not necessarily always) mental representations underlying adult psychopathology have their roots in early learning during childhood. Processing childhood memories associated with current problems is expected to lead to more profound change, thus more resistance to relapse.<sup>15</sup>

<sup>15</sup> There are several methods developed now to emotionally and cognitively process memories from childhood. For instance, techniques that are used in the

- (b) Mental representations are cognitive constructs, but that does not imply they are based on logical reasoning. Mental representations encompass a wide range of elements, not only verbal elements. It is often difficult to use verbal reasoning to change the representations at the felt level (Arntz, 2018). Thus, procedures that address as many elements as possible will have better effects than procedures that address one element. Alternatively, one should combine techniques to cover the full range of the representation, or find ways to determine what are essential elements of the mental representation that should be changed and use the correct technique for that.
- (c) Addressing core representations is necessary to enhance a sustained effect, but sometimes it is not enough. Some responses and behaviors might have become autonomous (e.g., through higher order conditioning, habit formation, etc.) and might need additional attention. Treatment focusing on higher-order conditioned stimuli will probably not affect the representation of the unconditioned stimulus and the associated first order stimuli, and thus will lead to incomplete treatment and an unnecessary high risk of relapse.<sup>16</sup> Moreover, successful treatment of the core representations of first-order CSI and US, where the clinical problem originated from, will not necessarily lead to spontaneous recovery from dysfunctional responses to higher-order CSI. Thus, these often need separate attention e.g., in severe agoraphobia, successfully changing the meaning of panic attacks from potentially catastrophic to benign does not necessarily lead to reduction of agoraphobic avoidance, which needs to be addressed as such by exposure in vivo (van den Hout, Arntz, & Hoekstra, 1994). Lastly, in case the patient has problems in clarifying what the core of the problem is, and does not seem to get further than explaining that certain stimuli evoke vague feelings of fear or hope (craving) this might be a sign that the focus is upon higher order conditioned stimuli. In such cases more exploration needs to be done to unravel the core representation that lead to the development of the problems.
- (d) The challenge in clinical work is to find what the underlying mental representation is. It is beyond the scope of the present paper to focus on this extensively, but one of the aims of the present essay is to draw attention of researchers to further investigate issues related to mental representations in psychopathology, as increased knowledge will help clinicians. Nevertheless, I mention some aspects that in my view are important. First, we should be aware of the fact that any formulation is a working hypothesis, thus the formulation might change during treatment. Second, various procedures have been proposed to discover the underlying representation, including exploring when the problem started and what important events took place, and what the meaning of feared/hoped consequences is. Third, understanding why triggers and consequences were and/or are meaningful for the specific person calls for taking the person's life history. Fourth, implicit techniques such as the *affect bridge* in imagery work (imagining a recent emotional event, letting the image go but staying with the evoked emotion, and see whether an early memory pops up) are especially helpful when explicit procedures don't work. Fifth, it is unlikely that there are one-to-one relationships between symptoms (or disorders) and underlying representations, though often occurring

relations help the clinician to form hypotheses. Sixth, underlying representations might be related to issues from long ago (e.g., emotional abuse or neglect in childhood) or more recently acquired (e.g., parent died recently from a heart attack in case of panic disorder). Lastly, as argued above, some problems might have become dissociated from the mental representation. In the absence of clear indicators for these kind of problems, it is suggested to wait for later phases of treatment to see whether some problems need additional attention because they didn't change after addressing the (hypothesized) underlying mental representation.

## 6. Conclusions and future directions

Despite the fact that it was necessary in fundamental psychological research to use constructs of mental representations in theories that explain basic learning processes, deviations from this took place, even in cognitive approaches in experimental psychopathology. The last decades the idea that not mental representation, but other factors are central in psychopathology became popular, including cognitive biases and emotion regulation. In this invited essay I am not denying that phenomena such as cognitive biases might be important, but I argued that their causal status is overestimated and that for understanding psychopathology and for improving treatment more attention to mental representations is needed.

We are faced with stagnation in some areas of treatment, including that of depression. Effects of our current treatments are limited, and the high relapse percentages are alarming. The reason for this might be that current treatments don't focus enough on the level of mental representation underlying the disorder. For instance, in traditional CBT for depression, a lot of attention is paid at correcting reasoning errors made by the patient, whereas memories of (childhood) adversities are usually not addressed. Mental representations that were formed on the basis of such adversities thus continue to be a risk factor for relapse (Buckman et al., 2018). The data suggest that such problems with limited effects and relapse are less pronounced in trauma-focused treatments of PTSD and in treatments of personality disorders with a focus on underlying schemas and their development. Perhaps the treatment of depression and other conditions known for high relapse rates (e.g., eating disorders) can learn from PTSD treatment, and focus more on the emotional and cognitive processing of memories from (childhood) adversities that underlie the vulnerability for relapse. Clearly, the hypothesis that treatments for depression that focus on the underlying mental representations will show less relapse risk than traditional CBT needs empirical tests.

Mental representations that underlie clinical problems might be (partially) dissociated. Thus, addressing one part of a representation does not necessarily lead to a change in the other parts. And, not all elements of a mental representation necessarily change with one technique. Specific elements might need specific techniques. It is an important issue on the research agenda to disentangle what kind of techniques are useful for what aspects of mental representations. For instance, whereas the *fear-erasing* technique is effective for "wiping out" the automatic fear response, other procedures might be necessary to address complex emotions such as guilt and shame (Kindt & van Emmerik, 2016). Better understanding what techniques are most suitable to change what kind of element of mental representations will help to better personalize treatments, matched to the characteristics or specific problems of the individual patient. Moreover, better understanding the "architecture" of the mental representations that are important in psychopathology will be helpful for achieving this.

Relatedly, there is a need for further developing systematic methods to detect what the mental representation is that underlies the problems of the individual patient.

Another important issue for the research agenda is to further explore methods to interfere with memory reconsolidation in such a way that dysfunctional meanings are corrected in the memory itself –

(footnote continued)

treatment of childhood PTSD such as imaginal exposure, EMDR, Imagery rescripting, and letter writing. Moreover, experiential techniques such as drama rescripting and multiple chair techniques can be added to well-known cognitive techniques to address memories from childhood (Arntz, 2018).

<sup>16</sup> Interestingly, this also holds for treatment based on disrupting the reconsolidation of fear memories after reactivation (Beckers & Kindt, 2017). If higher order conditioned stimuli are reactivated and treated with such a procedure, the fear memory associated with the first order conditioned stimulus is not affected. In other words, the first order memory should be reactivated and treated (Dèbiec, Doyère, Nader, & LeDoux, 2006).

instead of building an alternative mental representation that has to compete with the original one. I tend to see this as the “holy grail” of our field, as such procedures would further our treatments enormously. So far, consistent evidence has only been found for combined psychological-pharmacological procedures that interfere with fear and appetitive memory reconsolidation in the amygdala (Elsej et al., 2018). Robust procedures able to address other aspects of memory are welcome.

In this essay I have formulated my view on the field. Some elements can be the basis of hypotheses that can be empirically tested. My propositions might turn out to be wrong. In other words, this essay is not a statement about how things are, but it is about my view on the direction I feel would be fruitful to take in our field.

### Conflicts of interest

The author wishes to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

### References

- Aktar, E., Bockstaele, B. V., Perez Edgar, K., Wiers, R. W., & Bögels, S. M. (2019). *Intergenerational transmission of attentional bias and anxiety*. *Developmental Science*, 12772.
- Arntz, A. (2012). Imagery rescripting as a therapeutic technique: Review of clinical trials, basic studies, and research agenda. *Journal of Experimental Psychopathology*, 3, 189–208.
- Arntz, A. (2018). Modifying core beliefs. In S. C. Hayes, & S. G. Hofmann (Eds.). *Process-based CBT: The science and core clinical competencies of cognitive behavioral therapy* (pp. 339–350). Oakland, CA: Context Press.
- Arntz, A., & Weertman, A. (1999). Treatment of childhood memories; theory and practice. *Behaviour Research and Therapy*, 37(8), 715–740.
- Bamelis, L. L., Evers, S. M., Spinhoven, P., & Arntz, A. (2014). Results of a multicenter randomized controlled trial of the clinical effectiveness of schema therapy for personality disorders. *American Journal of Psychiatry*, 171(3), 305–322.
- Bar-Haim, Y., Lamy, D., Pergamin, L., Bakermans-Kranenburg, M. J., & Van Ijzendoorn, M. H. (2007). Threat-related attentional bias in anxious and nonanxious individuals: A meta-analytic study. *Psychological Bulletin*, 133(1), 1–24.
- Beck, A. T. (1967). *Depression: Clinical, experimental, and theoretical aspects*. Philadelphia, PA: University of Pennsylvania Press.
- Beckers, T., & Kindt, M. (2017). Memory reconsolidation interference as an emerging treatment for emotional disorders: Strengths, limitations, challenges, and opportunities. *Annual Review of Clinical Psychology*, 13, 99–121.
- van den Berg, L. J., Tollenaar, M. S., Spinhoven, P., Penninx, B. W., & Elzinga, B. M. (2017). A new perspective on PTSD symptoms after traumatic vs stressful life events and the role of gender. *European Journal of Psychotraumatology*, 8(1), 1380470.
- Boffo, M., Zerhouni, O., Gronau, Q. F., van Beek, R. J., Nikolaou, K., Marsman, M., et al. (2019). Cognitive bias modification for behavior change in alcohol and smoking addiction: Bayesian meta-analysis of individual participant data. *Neuropsychology Review*, 1–27. <https://doi.org/10.1007/s11065-018-9386-4>.
- Boterhoven de Haan, K. L., Lee, C. W., Fassbinder, E., Voncken, M. J., Meewisse, M., van Es, S., et al. (2017). Imagery rescripting and eye movement desensitization and reprocessing for treatment of adults with childhood trauma-related post-traumatic stress disorder: IREM study design. *BMC Psychiatry*, 17, 165. <https://doi.org/10.1186/s12888-017-1330-2>.
- Bouton, M. E. (2002). Context, ambiguity, and unlearning: Sources of relapse after behavioral extinction. *Biological Psychiatry*, 52(10), 976–986.
- Brewin, C. R. (2006). Understanding cognitive behaviour therapy: A retrieval competition account. *Behaviour Research and Therapy*, 44(6), 765–784.
- Brewin, C., Dalgleish, T., & Joseph, S. (1996). A dual representation theory of posttraumatic stress disorder. *Clinical Psychology Review*, 10(3), 670–686.
- Brewin, C. R., Wheatley, J., Patel, T., Fearon, P., Hackmann, A., Wells, A., et al. (2009). Imagery rescripting as a brief stand-alone treatment for depressed patients with intrusive memories. *Behaviour Research and Therapy*, 47, 569–576.
- Buckman, J. E. J., Underwood, A., Clarke, K., Saunders, R., Hollon, S. D., Fearon, P., et al. (2018). Risk factors for relapse and recurrence of depression in adults and how they operate: A four-phase systematic review and meta-synthesis. *Clinical Psychology Review*, 64, 13–38.
- Chen, L. P., Murad, M. H., Paras, M. L., Colbenson, K. M., Sattler, A. L., Goranson, E. N., et al. (2010). Sexual abuse and lifetime diagnosis of psychiatric disorders: Systematic review and meta-analysis. *Mayo Clinic Proceedings*, 85, 618–629.
- Clarke, K., Mayo-Wilson, E., Kenny, J., & Pilling, S. (2015). Can non-pharmacological interventions prevent relapse in adults who have recovered from depression? A systematic review and meta-analysis of randomised controlled trials. *Clinical Psychology Review*, 39, 58–70.
- Cooper, M. J., Todd, G., & Turner, H. (2007). The effects of using imagery to modify core beliefs: An experimental pilot study. *Journal of Cognitive Psychotherapy*, 21, 117–122.
- Cristea, I. A., Kok, R. N., & Cuijpers, P. (2015). Efficacy of cognitive bias modification interventions in anxiety and depression: meta-analysis. *The British Journal of Psychiatry*, 206(1), 7–16.
- Davey, G. C. L. (1989). UCS revaluation and conditioning models of acquired fears. *Behaviour Research and Therapy*, 27(5), 521–528.
- Dębiec, J., Doyère, V., Nader, K., & LeDoux, J. E. (2006). Directly reactivated, but not indirectly reactivated, memories undergo reconsolidation in the amygdala. *Proceedings of the National Academy of Sciences*, 103(9), 3428–3433.
- DeRubeis, R. J., Siegle, G. J., & Hollon, S. D. (2008). Cognitive therapy versus medication for depression: treatment outcomes and neural mechanisms. *Nature Reviews Neuroscience*, 9(10), 788–796.
- Dobson, K. S., Hollon, S. D., Dimidjian, S., Schmaling, K. B., Kohlenberg, R. J., Gallop, R. J., et al. (2008). Randomized trial of behavioral activation, cognitive therapy, and antidepressant medication in the prevention of relapse and recurrence in major depression. *Journal of Consulting and Clinical Psychology*, 76(3), 468–477.
- Durham, R. C., Higgins, C., Chambers, J. A., Swan, J. S., & Dow, M. G. (2012). Long-term outcome of eight clinical trials of CBT for anxiety disorders: Symptom profile of sustained recovery and treatment-resistant groups. *Journal of Affective Disorders*, 136(3), 875–881.
- Ehlers, A., & Clark, D. (2000). A cognitive model of posttraumatic stress disorder. *Behaviour Research and Therapy*, 38, 319–345.
- Ehring, T., Welboren, R., Morina, N., Wicherts, J. M., Freitag, J., & Emmelkamp, P. M. (2014). Meta-analysis of psychological treatments for posttraumatic stress disorder in adult survivors of childhood abuse. *Clinical Psychology Review*, 34(8), 645–657.
- Elsej, J. W., Van Ast, V. A., & Kindt, M. (2018). Human memory reconsolidation: A guiding framework and critical review of the evidence. *Psychological Bulletin*, 144(8), 797–848.
- Felsenberg, J., Jacob, P. F., Walker, T., Barnstedt, O., Edmondson-Stait, A. J., Pleijzier, M. W., et al. (2018). Integration of parallel opposing memories underlies memory extinction. *Cell*, 175(3), 709–722.
- Field, M., & Cox, W. M. (2008). Attentional bias in addictive behaviors: A review of its development, causes, and consequences. *Drug and Alcohol Dependence*, 97(1–2), 1–20.
- Gewirtz, J. C., & Davis, M. (2000). Using Pavlovian higher-order conditioning paradigms to investigate the neural substrates of emotional learning and memory. *Learning & Memory*, 7, 257–266.
- Grafton, B., MacLeod, C., Rudaizky, D., Holmes, E. A., Salemink, E., Fox, E., & Notebaert, L. (2017). Confusing procedures with process when appraising the impact of cognitive bias modification on emotional vulnerability. *The British Journal of Psychiatry*, 211(5), 266–271.
- Gray, J. A. (1975). *Elements of a two-process theory of learning*. London: Academic Press.
- Greenberg, D. L., & Verfaellie, M. (2010). Interdependence of episodic and semantic memory: Evidence from neuropsychology. *Journal of the International Neuropsychological Society*, 16(5), 748–753.
- Hallion, L. S., & Ruscio, A. M. (2011). A meta-analysis of the effect of cognitive bias modification on anxiety and depression. *Psychological Bulletin*, 137(6), 940.
- Henningsen, P., Gündel, H., Kop, W. J., Löwe, B., Martin, A., Rief, W., et al. (2018). Persistent physical symptoms as perceptual dysregulation: A neuropsychobehavioral model and its clinical implications. *Psychosomatic Medicine*, 80(5), 422–431.
- Hollon, S. D., Cohen, Z. D., Singla, D. R., & Andrews, P. W. (2019). Recent developments in the treatment of depression. *Behavior Therapy*, 50(2), 257–269.
- Holmes, E. A., Arntz, A., & Smucker, M. R. (2007). Imagery rescripting in cognitive behaviour therapy: Images, treatment techniques and outcomes. *Journal of Behavior Therapy and Experimental Psychiatry*, 38, 297–305.
- Holmes, E. A., James, E. L., Coode-Bate, T., & Deerprouse, C. (2009). Can playing the computer game “tetris” reduce the build-up of flashbacks for trauma? A proposal from cognitive science. *PLoS One*, 4(1), e4153.
- van den Hout, M. A., Arntz, A., & Hoekstra, R. (1994). Exposure reduced agoraphobia but not panic, and cognitive therapy reduced panic but not agoraphobia. *Behaviour Research and Therapy*, 32, 447–451.
- van den Hout, M. A., Bartelski, N., & Engelhard, I. M. (2013). On EMDR: Eye movements during retrieval reduce subjective vividness and objective memory accessibility during future recall. *Cognition & Emotion*, 27(1), 177–183.
- Hubbard (2007). What is mental representation? And how does it relate to consciousness? *Journal of Consciousness Studies*, 14, 37–61.
- Kindt, M. (2018). The surprising subtleties of changing fear memory: A challenge for translational science. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 373, 20170033.
- Kindt, M., & van Emmerik, A. (2016). New avenues for treating emotional memory disorders: Towards a reconsolidation intervention for posttraumatic stress disorder. *Therapeutic Advances in Psychopharmacology*, 6(4), 283–295.
- Kline, A. C., Cooper, A. A., Rytwinski, N. K., & Feeny, N. C. (2018). Long-term efficacy of psychotherapy for posttraumatic stress disorder: A meta-analysis of randomized controlled trials. *Clinical Psychology Review*, 59, 30–40.
- Kunze, A., Lancee, J., Morina, N., Kindt, M., & Arntz, A. (2019). *Mediators of change in imagery rescripting and imaginal exposure for nightmares: Evidence from a randomized wait-list controlled trial*. *Behavior Therapy*. (in press).
- Larsen, S. E., & Paccella, M. L. (2016). Comparing the effect of DSM-congruent traumas vs. DSM-incongruent stressors on PTSD symptoms: A meta-analytic review. *Journal of Anxiety Disorders*, 38, 37–46.
- Lavy, E. H., & van den Hout, M. A. (1993a). Attentional bias for appetitive cues: Effects of fasting in normal subjects. *Behavioural and Cognitive Psychotherapy*, 21, 297–310.
- Lavy, E., & van den Hout, M. (1993b). Selective attention evidenced by pictorial and linguistic Stroop tasks. *Behavior Therapy*, 24(4), 645–657.
- Lee, S. W., & Kwon, J. H. (2013). The efficacy of imagery rescripting (IR) for social phobia: A randomized controlled trial. *Journal of Behavior Therapy and Experimental Psychiatry*, 44(4), 351–360.

- Lemmens, L. H. J. M., van Bronswijk, S. C., Peeters, F., Arntz, A., Hollon, S. D., & Huibers, M. J. H. (2018). Long-term outcomes of acute treatment with cognitive therapy v. interpersonal psychotherapy for adult depression: Follow-up of a randomized controlled trial. *Psychological Medicine*, 1–9.
- Linehan, M. M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. New York and London: The Guilford Press.
- Lobbetael, J., Arntz, A., & Bernstein, D. P. (2010). Disentangling the relationship between different types of childhood maltreatment and personality disorders. *Journal of Personality Disorders*, 24(3), 285–295.
- Louis, J. P., Wood, A. M., Lockwood, G., Ho, M. H. R., & Ferguson, E. (2018). Positive clinical psychology and schema therapy (ST): The development of the Young positive schema questionnaire (YPSQ) to complement the Young schema questionnaire 3 short form (YSQ-S3). *Psychological Assessment*, 30(9), 1199–1213.
- Lundh, L. G., & Öst, L. G. (2001). Attentional bias, self-consciousness and perfectionism in social phobia before and after cognitive-behaviour therapy. *Scandinavian Journal of Behaviour Therapy*, 30(1), 4–16.
- Mackintosh, N. J. (1987). Neurobiology, psychology and habituation. *Behaviour Research and Therapy*, 25, 81–97.
- Main, M., Kaplan, N., & Cassidy, J. (1985). *Security in infancy, childhood, and adulthood: A move to the level of representation*. Monographs of the society for research in child development.
- Malogiannis, I. A., Arntz, A., Spyropoulou, A., Tsartsara, E., Aggel, A., Karveli, S., et al. (2014). Schema therapy for patients with chronic depression: A single case series study. *Journal of Behavior Therapy and Experimental Psychiatry*, 45, 319–329.
- Matheson, S. L., Shepherd, A. M., Pinchbeck, R. M., Laurens, K. R., & Carr, V. J. (2013). Childhood adversity in schizotypy: A systematic meta-analysis. *Psychological Medicine*, 43(2), 225–238.
- Mathews, A., & MacLeod, C. (2002). Induced processing biases have causal effects on anxiety. *Cognition & Emotion*, 16, 331–354.
- Mathews, A., Mogg, K., Kentish, J., & Eysenck, M. (1995). Effects of psychological treatment on cognitive bias in generalized anxiety disorder. *Behaviour Research and Therapy*, 33(3), 293–303.
- Mattia, J. I., Heimberg, R. G., & Hope, D. A. (1993). The revised Stroop color-naming task in social phobics. *Behaviour Research and Therapy*, 31, 305–314.
- McMain, S. F., Guimond, T., Streiner, D. L., Cardish, R. J., & Links, P. S. (2012). Dialectical behavior therapy compared with general psychiatric management for borderline personality disorder: Clinical outcomes and functioning over a 2-year follow-up. *American Journal of Psychiatry*, 169(6), 650–661.
- McNally, R. J. (2019). Attentional bias for threat: Crisis or opportunity? *Clinical Psychology Review*, 69, 4–13.
- Mogg, K., Bradley, B. P., Hyare, H., & Lee, S. (1998). Selective attention to food-related stimuli in hunger: Are attentional biases specific to emotional and psychopathological states, or are they also found in normal drive states? *Behaviour Research and Therapy*, 36(2), 227–237.
- Mol, S. S., Arntz, A., Metsemakers, J. F., Dinant, G. J., Vilters-van Montfort, P. A., & Knottnerus, J. A. (2005). Symptoms of post-traumatic stress disorder after non-traumatic events: Evidence from an open population study. *British Journal of Psychiatry*, 186(6), 494–499.
- Nanni, V., Uher, R., & Danese, A. (2012). Childhood maltreatment predicts unfavorable course of illness and treatment outcome in depression: A meta-analysis. *American Journal of Psychiatry*, 169(2), 141–151.
- Nelson, J., Klumpp, A., Doebler, P., & Ehring, T. (2017). Childhood maltreatment and characteristics of adult depression: meta-analysis. *British Journal of Psychiatry*, 201, 96–104.
- Piaget (1923). *Les fonctions du langage de deux enfants de six ans. Chapitre extrait de Langage et pensée chez l'enfant, paru chez Delachaux et Niestlé avec une préface d'E. Claparède: 1ère éd. 1923. Version électronique réalisée par les soins de la Fondation Jean Piaget pour recherches psychologiques et épistémologiques [3e éd. 1948. Neuchâtel: Delachaux et Niestlé, p. 43f.]*
- Pool, E., Brosch, T., Delplanque, S., & Sander, D. (2016). Attentional bias for positive emotional stimuli: a meta-analytic investigation. *Psychological Bulletin*, 142(1), 79.
- Raabe, S., Ehring, T., Arntz, A., Marquenie, L., & Kindt, M. (2018). Imagery rescripting versus STAIR/imagery rescripting for PTSD related to childhood abuse: A randomized controlled trial. *Paper presented at the 48<sup>th</sup> EACBT conference in Sofia, Bulgaria* September 5 – 8, 2018.
- Rachman, S. (1991). Neo-conditioning and the classical theory of fear acquisition. *Clinical Psychology Review*, 11(2), 155–173.
- Reimer, S. G., & Moscovitch, D. A. (2015). The impact of imagery rescripting on memory appraisals and core beliefs in social anxiety disorder. *Behaviour Research and Therapy*, 75, 48–59.
- Renner, F., Arntz, A., Peeters, F. P., Lobbetael, J., & Huibers, M. J. (2016). Schema therapy for chronic depression: Results of a multiple single case series. *Journal of Behavior Therapy and Experimental Psychiatry*, 51, 66–73.
- Rescorla, R. A. (1988). Pavlovian conditioning: It's not what you think it is. *American Psychologist*, 43(3), 151.
- Resick, P. A., Monson, C. M., & Chard, K. M. (2016). *Cognitive processing therapy for PTSD: A comprehensive manual*. Guilford Publications.
- Ritter, V., & Stangier, U. (2016). Seeing in the Mind's eye: Imagery rescripting for patients with body dysmorphic disorder. A single case series. *Journal of Behavior Therapy and Experimental Psychiatry*, 50, 187–195.
- Roediger, H. L. (1990). Implicit memory: Retention without remembering. *American Psychologist*, 45, 1043–1056.
- Roepke, A. M. (2015). Psychosocial interventions and posttraumatic growth: A meta-analysis. *Journal of Consulting and Clinical Psychology*, 83(1), 129.
- Rosen, G. M., & Lilienfeld, S. O. (2008). Posttraumatic stress disorder: An empirical evaluation of core assumptions. *Clinical Psychology Review*, 28(5), 837–868.
- Shafran, R., Lee, M., Cooper, Z., Palmer, R. L., & Fairburn, C. G. (2008). Effect of psychological treatment on attentional bias in eating disorders. *International Journal of Eating Disorders*, 41(4), 348–354.
- Shibuya, T., Seki, Y., Nagata, S., Murata, T., Hiramatsu, Y., Yamada, F., et al. (2018). Imagery rescripting of traumatic memories for panic disorder: An exploratory study. *The Cognitive Behaviour Therapist*, 11(e4), 1–21.
- Sieswerda, S., Arntz, A., & Kindt, M. (2007). Successful psychotherapy reduces hypervigilance in borderline personality disorder. *Behavioural and Cognitive Psychotherapy*, 35(4), 387–402.
- Simpson, S., & Arntz, A. (2019). Core principles of imagery. In H. Startup, & G. Heath (Eds.). *Creative methods in schema therapy: Advances and innovation in clinical practice* (in prep).
- Soeter, D., & Kindt, M. (2012). Erasing fear for an imagined threat event. *Psychoneuroendocrinology*, 37, 1769–1779.
- Teasdale, J. D. (1993). Emotion and two kinds of meaning: Cognitive therapy and applied cognitive science. *Behaviour Research and Therapy*, 31(4), 339–354.
- Teasdale, J., & Barnard, P. (1993). *Affect, cognition and change: Re-modelling depressive thought*. Hove: Lawrence Erlbaum Associates.
- Van Bockstaele, B., Verschuere, B., Tibboel, H., De Houwer, J., Crombez, G., & Koster, E. H. (2014). A review of current evidence for the causal impact of attentional bias on fear and anxiety. *Psychological Bulletin*, 140(3), 682.
- Veale, D., Page, N., Woodward, E., & Salkovskis, P. (2015). Imagery rescripting for obsessive compulsive disorder: A single case experimental design in 12 cases. *Journal of Behavior Therapy and Experimental Psychiatry*, 49, 230–236.
- Vittengl, J. R., Clark, L. A., Dunn, T. W., & Jarrett, R. B. (2007). Reducing relapse and recurrence in unipolar depression: A comparative meta-analysis of cognitive-behavioral therapy's effects. *Journal of Consulting and Clinical Psychology*, 75(3), 475.
- Wagner, A. R. (1979). Habituation and memory. In A. Dickinson, & R. A. Boakes (Eds.). *Mechanisms of learning and motivation*. Hillsdale, N.J.: Lawrence Erlbaum.
- Waters, A. M., Wharton, T. A., Zimmer-Gembeck, M. J., & Craske, M. G. (2008). Threat-based cognitive biases in anxious children: Comparison with non-anxious children before and after cognitive behavioural treatment. *Behaviour Research and Therapy*, 46(3), 358–374.
- Webb, T. L., Miles, E., & Sheeran, P. (2012). Dealing with feeling: A meta-analysis of the effectiveness of strategies derived from the process model of emotion regulation. *Psychological Bulletin*, 138(4), 775–808.
- Weertman, A., & Arntz, A. (2007). Effectiveness of treatment of childhood memories in cognitive therapy for personality disorders: A controlled study contrasting methods focusing on the present and methods focusing on childhood memories. *Behaviour Research and Therapy*, 45(9), 2133–2143.
- Wetzelaer, P., Farrell, J., Evers, S. M., Jacob, G. A., Lee, C. W., Brand, O., et al. (2014). Design of an international multicentre RCT on group schema therapy for borderline personality disorder. *BMC Psychiatry*, 14(1), 319.
- Wild, J., Hackmann, A., & Clark, D. M. (2007). When the present visits the past: Updating traumatic memories in social phobia. *Journal of Behavior Therapy and Experimental Psychiatry*, 38(4), 386–401.
- Wild, J., Hackmann, A., & Clark, D. M. (2008). Rescripting early memories linked to negative images in social phobia: A pilot study. *Behavior Therapy*, 39(1), 47–56.
- Williams, J. M. G., Watts, F. N., MacLeod, C., & Mathews, A. (1988). *Cognitive psychology and emotional disorders*. Oxford, England: John Wiley & Sons.
- Young, J. E., Klosko, J. S., & Weishaar, M. E. (2003). *Schema therapy: A practitioners guide*. New York: Guilford Press.
- Yueng-Tin, O. (2019). *Comparing cognitive restructuring and imagery rescripting in the treatment of depression*. Ms. submitted for publication.