Optimizing Exposure

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Table of Contents

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General Introduction: Exposure Therapy

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1. Historical Development

Exposure therapy initially emerged as a procedure called systematic desensitization, that was elaborated by Wolpe (1968) mainly on the basis of his empirical research on learning and unlearning of fears in cats. Anxiety responses were induced in cats according to a pavlovian conditioning procedure. Cats repeatedly received electrical shocks (unconditioned stimulus: US) from the floor of their cage. As a consequence, they developed a persistent fear (conditioned response: CR) of the cage, considered as a conditioned stimulus (CS). Wolpe (1968) observed that this fear reaction could be weakened or removed by getting the cat to eat repeatedly in the presence of the cage. Most importantly, he observed that in order to get the cat to eat, it had to be fed initially in low anxiety provoking situations (in a similar but different room that the room used for conditioning). If the anxiety was too strong, eating was inhibited. Then, the animal was fed in successively stronger anxiety provoking situations. Wolpe (1968) hypothesized that a process called reciprocal inhibition was responsible for the reduction of fear responses in cats (Abramowitz, Deacon, & Whiteside, 2011) : eating in the presence of the CS inhibited anxiety. On this basis, he developed a therapeutic procedure called systematic desensitization with deep muscle relaxation. Patients were initially trained to relaxation using the technique of Jacobson (1938). Then, when relaxed, they were confronted in imagination and very gradually with the feared stimuli. A fear hierarchy starting with the least disturbing scenes was used. The presentation of the same scene was repeated until no distress was longer present. Then, the patient was confronted with the next steps of the hierarchy. Variants of systematic desensitization included the induction of pleasant emotions or the use of mild electric current stimulation in order to arouse a dominant motor response. In those procedures, the concurrent induction of a stimulus thought to inhibit anxiety and progressivity in the confrontation were postulated as critical ingredients. It is worth acknowledging at this point that the procedure elaboration was not driven by theoretical elements but rather by empirical observations.

In parallel, flooding (Foa, Blau, Prout, & Latimer, 1977) and implosive therapy (Stampfl & Levis, 1967) were developed. Both forms of therapy used a nongraduated procedure in which the patient was confronted from the start to a maximal level of anxiety and asked to stay in the situation until anxiety declined. The main difference between flooding and implosive therapy relies on the fact that while flooding simply consists in confronting to intense stimuli (e.g., rats in the case of rat phobia) for an extended period of time with prevention of avoidance behaviours, implosive procedures expose participants in imagination to unrealistic scenes containing horror (e.g., being eaten by a rat) (Morganstern, 1973) and cues of hypothesized psychodynamic sources of anxiety such as hostility towards parental figures, rejection and sex (Abramowitz et al., 2011). Both flooding and implosive therapy rely on the learning principles: the activation of anxiety without the use of avoidance leads to a decrease of anxiety. It should be noted that systematic desensitization highlighted the

importance of moving gradually from one step to another while flooding and implosive therapy suggest starting with the highest feared cues. Moreover, systematic desensitization recommended to inhibit anxiety during exposure by supplementing relaxation, positive emotion induction or motor responses, while the principle of implosion and flooding is to maximize anxiety during exposure.

Back to the seventies, the debate whether desensitization or flooding should be preferred emerged. In his reviews in which the term “exposure” emerged (Tryon, 2005), Marks (1975, 1978) brought to light that despite obvious procedural differences, desensitization, flooding and implosive therapy share a same common principle : the exposure to the evoking stimuli. This acknowledgement was influential among clinicians (McNally, 2007) and led in the seventies and eighties to the development of a gradual exposure procedure in which the relaxation component of desensitization and the psychodynamic elements of implosion were removed (Abramowitz et al., 2011). Moreover, as a consequence of the dissemination of cognitive therapy (Beck, 1976), exposure was also later on combined with cognitive restructuring (i.e. an intervention aimed at modifying distorted cognitions) and integrated in what is called today cognitive behavioural therapy (Abramowitz et al., 2011). The emotional processing theory (Foa & Kozak, 1986; Lang, 1977) extensively contributed to this reconciliation between the cognitive and the behavioural aspects by providing a conception in which the informational value of the stimulus changes during exposure. In terms of procedure, the patient was asked to identify and modify distorted thoughts about a feared stimulus. Then, he was presented with the rationale of habituation (Lader & Mathews, 1968) and confronted repeatedly and gradually to each steps of a hierarchy. The prevention of avoidance was considered as crucial. When a given step no longer elicited anxiety, the patient was asked to move to the next step.

More recently, a new class of treatments commonly called the third wave of cognitive and behaviour therapies emerged and redefined the core target of exposure as the emotions experienced by an individual. The toleration of an aversive state is considered in those therapies as a critical component (Barlow, Allen, & Choate, 2004; Greenberg, 2002; Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Segal, Williams, & Teasdale, 2002). This approach recommends paying more attention to the attitude in which exposure therapy is realized. The patient is taught to develop acceptance of emotions and a non-judgmental observation of emotions and physical sensations during exposure.

2. Efficacy

Choy, Fyer, and Lipsitz (2007) realized a review of 30 treatment studies in specific phobia. The authors concluded that the most robust treatment for specific phobias appears to be in vivo exposure therapy. Most studies demonstrated that in vivo exposure is more effective than a placebo or a wait-list control. The follow-up studies demonstrated that the effects are generally maintained from six months to one year, with improvements if self-exposure is continued.

Wolitzky-Taylor, Horowitz, Powers, and Telch (2008) performed a meta-analysis that sampled 33 randomized control trials investigating psychological treatments for specific phobias. The study demonstrated that exposure treatments (including in vivo and imaginal exposure, systematic desensitization, flooding as well as other treatments that include an exposure component like eye movement desensitization and reprocessing) produced a medium effect size at post-treatment and a large effect size at follow-up relative to placebo. Exposure treatment also yielded significantly better results than alternative psychotherapeutic approaches (cognitive therapy, relaxation and tension techniques alone) both at post-treatment and at follow-up.

Those evidences combined with the global consensus among experts in regard to the efficacy of exposure therapy should not yet disguise some concerns in regards the use of exposure therapy. Some authors have indeed highlighted the acceptability problem of exposure. Some patients refuse to engage in exposure (Abramowitz et al., 2011; Choy et al., 2007). Moreover, high dropout rates have been reported in some studies (Choy et al., 2007). Furthermore, according to Craske, Treanor, Conway, Zbozinek, and Vervliet (2014), a meaningful portion of patients do not achieve clinically significant symptom relief from exposure therapy (Arch & Craske, 2009) or experience a return of fear following exposure (Craske & Mystkowski, 2006). Finally, Brown and Barlow (1995) reported that some patients do not maintain their observed improvements.

3. Postulated Underlying Mechanisms

Although the procedures of exposure are generally simple, the question of the mechanisms underlying its effectiveness turned out to be much more complex than initially expected (Mineka & Thomas, 1999). As noted by Barlow (1988), while some authors have used exposure as an explanation of its effectiveness, exposure is just the observation a common procedure among therapeutic approaches but it does not elucidate the underlying mechanisms of its efficacy[1]. Various models of exposure have been proposed and each considers different ingredients to be critical and responsible for change.

3.1 Habituation

Habituation has been initially considered as a change process implied in exposure. It refers to a decrement of fear response (generally unconditioned) due to repeated exposure to fear-eliciting stimuli. This notion was initially developed independently from the literature on exposure. Based on psychophysiological studies on cats, Groves and Thompson (1970) postulated that this mechanism was responsible for learning and more complex forms of behavioural plasticity. According to their dual-process-theory of response plasticity, the processes of habituation and sensitization rely on separate neuronal mechanisms and

[1] Several historical explanations of the efficacy of exposure like reciprocal inhibition have been presented extensively elsewhere (for a comprehensive review, see Barlow, 1988; Tryon, 2005) and are therefore not presented in the following section. Those processes are rather descriptive and provides no real theoretical explanation of the effect of exposure.

pathways and interact in order to produce the behavioural outcome. Habituation (i.e. decrease of response) supposedly relies on the most direct route through the central nervous system from stimulus to response, while sensitization (i.e. increase of response) supposedly relies on a collection of pathways, systems, and regions that determine the general level of responsiveness of the organism. Habituation would not be likely to occur when the baseline arousal is too high. In this case, desensitization would occur. The principle of habituation has later on been used in order to account for the effects of systematic desensitization and ultimately of exposure (Barlow, 1988). However, it seems that habituation is a phenomenon but not an explanation. Moreover, it does not explain properly some phenomena observed in exposure (Mineka & Thomas, 1999). At first, the theory cannot account why prolonged exposure with maximal levels of arousal (e.g. flooding) do not yield an increase in arousal (i.e. sensitization). Moreover, Craske and Rachman (1987) demonstrated that a return of subjective fear occurred for a significant portion of the beneficent of exposure even though the participants had experienced habituation. Finally, habituation is thought to occur only in response to unconditioned stimuli and therefore does not explain the effects achieved by exposure in regard to conditioned fears. At the empirical level, it seems that fear habituation does not predict long term outcomes (Baker et al., 2010; Kircanski, Mortazavi, et al., 2012; Plendl & Wotjak, 2010; Prenoveau, Craske, Liao, & Ornitz, 2013; Rescorla, 2006). A sustained arousal may actually better predict long-term results (Culver, Stoyanova, & Craske, 2012).

3.2 Extinction

Another potential explanation is extinction. Extinction can be defined both in the context of pavlovian and operant conditioning (Bouton, 2016). In terms of classical conditioning, it refers to a decrement in the conditioned response due to CS-only presentations (after an acquisition phase in which the CS and US were paired). In regard to anxiety, it would mean that being confronted with a feared situation (CS) without experiencing the fearful consequences (US) would lead to a decrease of the anxiety responses (CR). In the context of operant conditioning, it refers to the gradual decrease (or reduction in the probability) of an operant behaviour when the reinforcer no longer follows the behaviour (after an R-O relation: a behaviour is emitted because it is reinforced). Extinction focuses on the decrease of learned (conditioned or operant) responses (de Houwer, 2018). Similarly as for habituation and despite its use in the literature as an explanation, extinction cannot be considered as a process but only as a phenomenon.

The two factor theory (Mowrer, 1951) has been traditionally used in order to explain the aetiology of anxious disorders. It postulates that an operant conditioning occurs in addition to an initial classical conditioning. The first phase of avoidance acquisition would rely on pavlovian conditioning: the simultaneous presentation of an antecedent stimulus with an aversive stimulus evokes fear. Then, in a second phase that relies on instrumental learning, avoidance responses that are produced in the presence of the antecedent stimulus are negatively reinforced by fear reduction. Avoidance would then prevent extinction to occur. This theory has been widely used as a rational in exposure protocols. Despite its influence,

this theory has largely been criticized and disconfirmed by later data. The strongest criticism against this theory is that fear may not be systematically involved in the maintenance of avoidance. Solomon, Kamin, and Wynne (1953) have indeed shown with dogs that avoidance may persist even though fear is not present anymore. Similarly, Kamin, Brimer, and Black (1963) demonstrated that it is possible, after an avoidance training, to trigger avoidance responses in rats even though there was almost no fear of the CS. At a more clinical level, it has been demonstrated that the improvement following exposure therapy is not dependent upon the fear level at the end of exposure (De Silva & Rachman, 1984), which suggests that terminating exposure prematurely does not serve as negative reinforcement for escape (Krypotos, Effting, Kindt, & Beckers, 2015). Moreover, the theory fails to explain how avoidance can be acquired in the absence of an explicit antecedent stimulus. Finally, the tendency to avoid may be acquired via purely classical conditioning without operant learning (Krypotos et al., 2015).

3.3 Fear Structure Modification

Emotional Processing Theory (EPT) is the first explanatory model of exposure that give a prominent place to the concept of emotion. This theory was initiated by Rachman (1980) and later elaborated by Foa and Kozak (1986). Inspired by the bioinformational conceptualization of fear (Lang, 1977), this theory is based on the notion of fear structure. A fear structure is a memory network that includes three kind of information: (a) information about the feared stimulus (i.e. information relevant to the recognition of the stimulus, including the relevant context of appearance), (b) information about the responses (i.e. physiological, emotional and behavioural responses) and (c) information about the meaning of the stimuli and the responses (i.e. interpretation of the significance of input and output events, probabilities of stimulus occurrence and consequences of action).

The fear structure is regarded as a program that triggers escape and avoidance behaviours. As such, it contains information about the dangerousness of the stimuli and/or responses as well as information about the preparatory physiological reactivity needed to escape. The fear structure is triggered by elements that are correspondent with the fear structure and then activates the other elements of the fear structure.

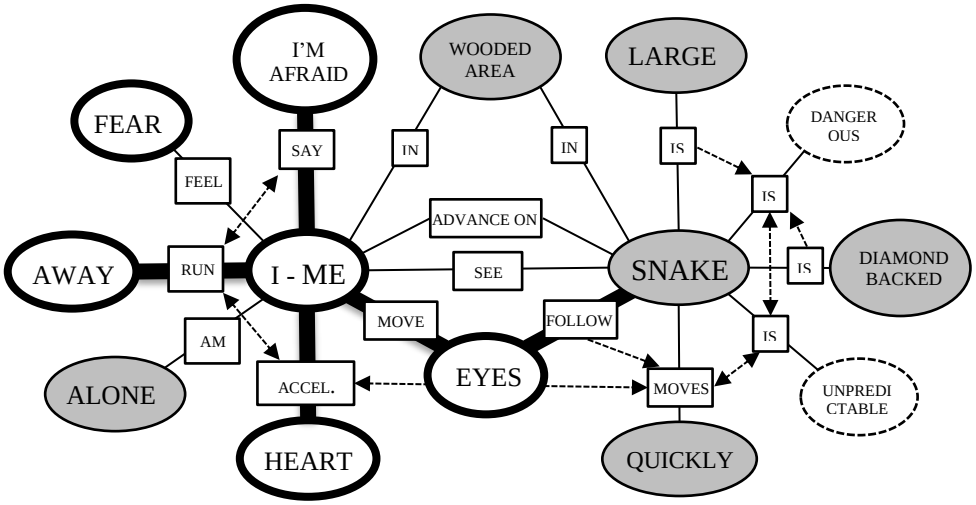

Figure 1. Prototype of an emotion network (fear structure) in snake phobia adapted from Lang (1984, p.197). Information about the feared stimulus is represented in grey circles. Information about the responses is represented in the white circles with thick lines. Information about the meaning of the stimuli and the responses are represented in white circles with dotted lines.

The authors of EPT propose that pathological anxiety emerges when the link between stimuli and responses is strong and rigid. Some information of the fear structure is in the scope of consciousness but a person could also be unaware of some of the information of the fear structure. The modification of a fear structure is achieved through what is called emotional processing when two conditions are met. First, the fear structure must be activated. In other words, fear relevant information must be activated in memory. Moreover, the activated information must also include elements that are incompatible with the fear structure. Then, a new memory is supposedly created and integrated into the fear memory. According to Foa and Kozak (1986), the activation of fear followed by within- (short-term) and between-sessions habituation (longer-term) are indicators of emotional processing. The aim of exposure therapy is to encourage experiences in which information is incompatible with the fear structure in order to reduce fear. In regards to the actual status of the theory, the premises of EPT are not supported by research (Craske et al., 2008). The evidence for the role of between and within-session habituation as being indicative of long-term improvement is limited (see previous section on habituation). The model has also been criticized for being descriptive and providing no real explanation (McNally, 2007).

3.4 Cognitive and Social Cognitive Models

The cognitive model considers that clinical improvements result from a change in the cognitions determining the aversive response. Those changes could be either achieved by cognitive techniques such as cognitive restructuring (i.e. an intervention aimed at modifying distorted cognitions) or indirectly by exposure techniques (Beck, 1976; Clark, 1986). This

model has led to an important emphasis on the role of belief disconfirmation consequences in exposure therapy (Salkovskis, Hackmann, Wells, Gelder, & Clark, 2007).

The notion of self-efficacy has been developed in the social cognitive theory. This theory was elaborated by Bandura (1977) in a context in which the field of behavioural change was split in two tendencies. On the one hand, there was a strong recognition of the power and effectiveness of behavioural procedures in order to achieve change. On the other hand, there were increasing formulations of cognitive mechanisms to account for human behaviour. This author attempted to develop a unifying theory in order to account for the behaviour changes induced by diverse treatment approaches. Bandura observed that behaviour change can result both in response to behavioural and cognitive media. Based on this acknowledgement, he postulated that behaviour changes achieved with various means are mediated by a common cognitive process, i.e. a change in self-efficacy. This notion is defined as the belief in the ability to achieve a given behavioural outcome. In regards to exposure, Bandura (1977) postulated that the effects of exposure are mainly achieved by the development of self-efficacy following the accomplishment of mastery experiences over the feared situation. In the same line, the notion of perceived control over threat has been postulated as critical in exposure. Mineka and Thomas (1999) proposed that a crucial information represented in cognitive-affective fear structure is the belief regarding the ability to regulate potentially threatening or affective situations. According to these authors, the efficacy of exposure relies on the establishment of a sense of control over potentially aversive situations. Similarly, according to Barlow (1988), the reason why exposure therapy is only partially effective is that it may fail to provide a sense of control over environmental or somatic events. A successful exposure could occur when the patient learns that the events are not out of control.

3.5 Inhibitory Learning

The inhibitory learning model considers that the process responsible for the effects of exposure is not the removal of a dysfunctional association but rather the creation of a new association that inhibits this conditioned association. Research indicates that the original association between a CS-US is not erased but left undamaged as a new secondary inhibitory learning occurs, namely that the CS does not predict the US anymore (Bouton, 1993). This theory is substantiated by research conducted on neural circuitry involved in anxiety. It seems that the amygdala is inhibited by the medial prefrontal cortex following an extinction learning (Milad et al., 2009; Milad et al., 2007; Shin & Liberzon, 2010). The CS would possess two meanings after exposure: the original excitatory meaning (CS-US) in addition to an inhibitory meaning (CS-no US) (Craske et al., 2014). The inhibitory learning model would account for several observed phenomena that show that the newly created inhibitory learning is more fragile than the original association. At first, a return of fear, that is commensurate with the time delay since the last exposure, is commonly observed. Second, a change of context may lead to a renewal of fear, showing that this inhibitory learning is context dependent. Third, the unpaired presentation of the US may lead to a reinstatement of fear. Craske et al. (2014) proposed to enhance inhibitory learning during exposure with several strategies: (a) expectancy violation, i.e. designing exposures that maximally violate expectancies related to

the frequency or intensity of aversive outcomes, (b) deepened extinction, i.e. the separate extinction of multiple CSs prior to combined extinction (c) occasional reinforced extinction, i.e. occasional CS-US parings during extinction, (d) the removal of safety signals (e.g., presence of another person, cell phone, medication….), (e) variability of stimuli and intensity of exposure, (f) retrieval cues, i.e. enhancing the retrieval of extinction learning with cues, (g) use of multiple contexts of exposure, (h) and reconsolidation of the inhibitory memory by the brief introduction of the stimulus prior to exposure.

3.6 Toleration and acceptance

Together with the concept of emotion regulation and with the development of the third wave of cognitive behaviour therapy, the concept of acceptance, defined as the toleration of an aversive state, emerged in the field of exposure. In terms of emotion regulation, a rigid downregulation of emotions is considered as detrimental (Gross, 2002). Moreover, persistent attempts to downregulate aversive states is thought to be critical in the onset of anxiety disorders (Forsyth, Eifert, & Barrios, 2006). At the opposite, the toleration of an aversive state, is considered as providing an opportunity to recover from painful emotional states in several models of psychotherapy (Barlow et al., 2004; Greenberg, 2002; Hayes et al., 2006; Segal et al., 2002). The main contribution of acceptance models has been to stress the importance of attitude in which exposure should preferably be realized.

3.7 Overlap and distinctions between models

In the following section, we will outline the overlap and distinctions between those various models. A schematic representation of those overlap and distinctions is provided in Figure 2.

The acceptance models rely on the attitude to develop when facing distress, while EPT, the inhibitory learning model, and the social cognitive model all rely on information processing. Information processing is the postulate that the experience of exposure leads to the integration of incompatible information. The nature of this incompatible information though differs between the models. In EPT, the incompatible information relies on the fact that emotion decreases (i.e. habituation). In the inhibitory learning model, the incompatible information relies on the fact that the catastrophic expectancies do not occur (i.e. mismatch with expectancies). Finally, in the social cognitive model, the incompatible information relies on the development of the sense of being able to cope with the situation (i.e. self-efficacy).

EPT and the inhibitory learning model differ on the postulated impact of information processing. EPT postulates that it produces a change in the fear structure. The inhibitory learning model postulates that it is result of the inhibition of an old association (CS-US association) by a new corrective association (i.e. the CS no longer predicts the US). At the neural level, this competition of association would be translated as the inhibition of the amygdala activation by medial prefrontal cortex influences.

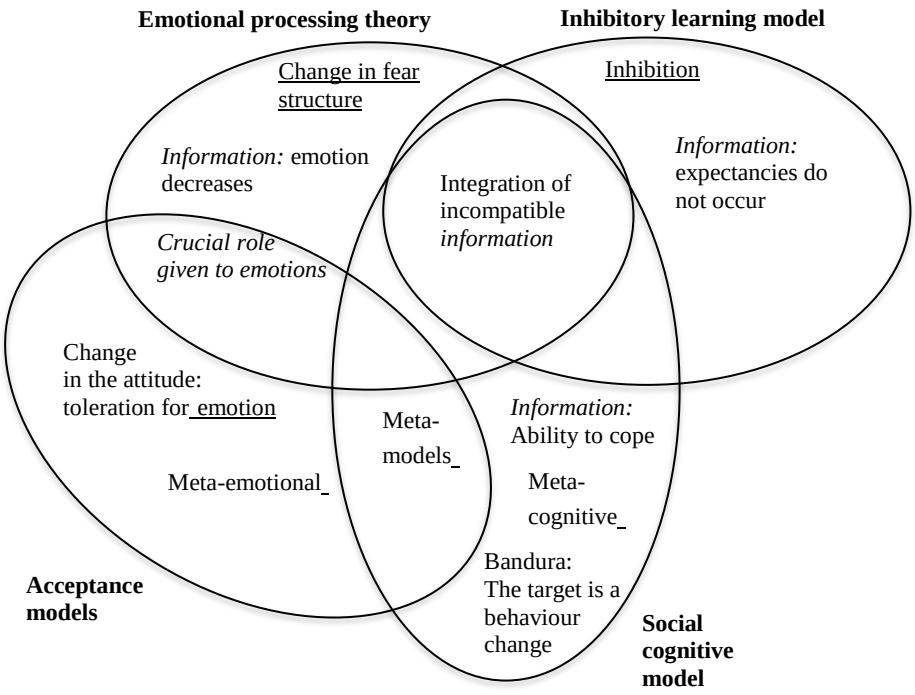

Figure 2. Overlap and distinctions between models

EPT and the acceptance models both give a crucial role to emotion. The target of exposure though differs between the models. While EPT targets the decrease of emotion, the acceptance model targets the toleration of emotions. The acceptance models and the social cognitive model are meta-models. The acceptance models are meta-emotional models in the sense that they encourage to develop a different relationship with emotions. The social cognitive model is a metacognitive model in the sense that it targets a change in the perception of the self.

EPT and the social cognitive model of Bandura differ on the outcome variable of exposure. While EPT aims at decreasing subjective fear and the subsequent avoidance behaviour, the social cognitive model as postulated by Bandura (1988) focuses on behaviour as an outcome variable, without targeting a reduction of fear, although this focus on behaviour has been abandoned by later authors (Mineka & Thomas, 1999).

3.8 Critical review and empirical status of the models regarding the core distinctive mechanisms

EPT postulated a change in the fear structure. This postulate is inconsistent with the research on extinction that shows that the original learning is not erased but put in competition with new learnings (Bouton, 1993). It therefore seems that there is no change in

the fear structure, i.e. no replacement of the original association (Weisman & Rodebaugh, 2018). Besides, to our knowledge, no empirical study has tested that the introduction of a new piece of information consisting in the fact that fear decreases is responsible for the observed effects of exposure. Moreover, there has been no empirical test of the fact that exposure produces a change in the representation of fear. Furthermore, the importance given to learning that fear decreases during exposure is strongly questioned by the evidence showing that fear habituation does not predict long term outcomes (Baker et al., 2010; Kircanski, Mortazavi, et al., 2012; Plendl & Wotjak, 2010; Prenoveau et al., 2013; Rescorla, 2006). Finally, to our knowledge, no empirical investigation has shown that one element of the fear structure automatically activates the other elements of the fear structure, as suggested by the theory.

The inhibitory learning model postulates a crucial role for the inhibition of an original excitatory association by a new association. This theory is strongly supported by animal research on extinction, in particular by research on the renewal effect that demonstrated that fear conditioning is not erased (Bouton, 1993, 2000) as well as by the neuroimaging research with humans that evidenced that the amygdala, considered as being central in conditioning, is inhibited by cortical influences of the medial prefrontal cortex as the result of extinction (Milad et al., 2009; Milad et al., 2007). It should be noted though that while the empirical evidence strongly supports this theory, the empirical evidence regarding the enhancement strategies that derive from the model have been quite inconsistent and that even among studies supporting those techniques, most of the effects are modest (see Weisman & Rodebaugh, 2018 for a comprehensive review). Those modest effects could be explained by the difficulty of translating basic research into clinical practice or by the fact that the previous research, while isolating the strategies, have failed to test the combined effect of those strategies (Weisman & Rodebaugh, 2018).

The social cognitive model postulates that self-efficacy is a mediator of the efficacy of guided mastery and that guided mastery is more efficient than mere exposure. On one hand, the evidence in favour of the model suffers from methodological issues. One study that is often cited in order to account for the empirical status of self-efficacy is the study of Williams, Dooseman, and Kleifield (1984). Those authors compared mere exposure with guided mastery in the treatment of 32 severe high and driving phobics. Exposure consisted in a gradual confrontation to height or driving. The exposure was performed alone (with no therapist accompanying the participant). Guided mastery also consisted in a gradual confrontation to height or driving, but in addition, behavioural guidance was offered. The participant was accompanied by the therapist and was guided whenever difficulties were met. For instance, subtasks were practiced separately before performing the whole task. Or the participant was encouraged to eliminate defensive manoeuvres. The results demonstrated that guided mastery was significantly more effective that exposure alone in restoring behavioural functioning, improving self-efficacy and diminishing the anticipated anxiety and performance anxiety. Self-efficacy predicted therapeutic behaviour change significantly better than anxiety, exposure duration, or performance level achieved during treatment. It should be note though that what is called “guided mastery” in this experiment is an aggregate

of very distinct factors, including the fact of being accompanied with a therapist that makes sure that exposure is performed in the best way. The evidenced difference between conditions is therefore hardly attributable to developing mastery experiences alone. Other evidences in favour of the social cognitive model are correlational evidences. Lee (1984) reported that self-efficacy expectations were better predictors of performance than outcome expectations in a study in which 33 male non-phobics undergraduates were asked to handle snakes. Other studies have found a modest correlational evidence between self-efficacy and the outcome of treatment (e.g., Biran & Wilson, 1981). As such, those correlational evidence are not sufficient to establish a causal relation (Mineka & Thomas, 1999). On the other hand, the theory has been discarded because of the lack of predictive power of self-efficacy regarding the physiological responses of US veterans of World War II (Rachman, 1978). As noted by Barlow (1988), those data do not especially conflict with the claims of Bandura, as he mainly postulated that self-efficacy is predictive of behaviour and not especially of subjective fear or of the physiological component of fear.

The acceptance models postulate that the toleration of an aversive state is responsible for the efficacy of exposure. Only a few studies have evaluated the role of acceptance during exposure. Eifert and Heffner (2003) compared the effect of acceptance vs. control on the avoidance of aversive interoceptive stimulation. Sixty highly anxiety sensitive participants were exposed to two 10-min inhalation of 10 % carbon dioxide, a situation that generally induces distress. Before inhalation, the participants were trained either at mindfully exploring their experience (acceptance context) or at controlling symptoms with diaphragmatic breathing (control context). A third group was not given any instruction. The results demonstrated that acceptance context participants were less avoidant behaviourally and reported less intense fear and cognitive symptoms as well as fewer catastrophic thoughts, as compared to control context or no-instruction participants. It is also consistent with the few studies that manipulated experiential avoidance vs. acceptance during exposure with clinical populations. Levitt, Brown, Orsillo, and Barlow (2004) compared the effects of acceptance vs. suppression of emotion during exposure. Sixty patients with panic disorder were exposed to inhalation of 5.5% carbon dioxide for 15 minutes. Prior to exposure, participants received instructions about emotion regulation strategies (acceptance or suppression) or heard a neutral narrative (control group). Acceptance instructions mainly consisted in emphasizing that attempts to control emotions and thoughts may be futile, while focusing on behaviour change in valued directions is more functional. Suppression instructions consisted in encouraging participants to gain control over their thoughts and feelings by pushing negative thoughts and emotions away. The results demonstrated that the acceptance group was significantly less anxious and less avoidant than were the suppression or control groups in terms of subjective anxiety and willingness to participate to a second exposure, but not in terms of self-reported panic symptoms and physiological measures. England et al. (2012) compared the effectiveness of acceptance-based treatment for public-speaking anxiety with the standard habituation-based exposure in a clinical population (45 adults). In the Exposure with Acceptance rationale group, the treatment focused on accepting and defusing from one's own distressing thoughts, feelings and sensations while engaging in valued public speaking activities (exposure). Techniques designed to promote acceptance and defusion, and

meditation techniques were presented and practiced before and during exposure exercises. In the Exposure with Habituation rationale, public speaking anxiety was presented as a learned behaviour that could be reduced through habituation. Participants were asked to remain in the feared situation until their anxiety decreased. The results demonstrated that participants who received acceptance-based exposure were significantly more likely than those receiving habituation-based exposure to achieve diagnostic remission by 6-weeks follow-up. There was no difference between groups in terms of public-speaking-related cognitions, confidence and social skills. Unfortunately, those results cannot be attributed solely to acceptance whereas the groups differ on other variables: importance given to the engagement in values, thoughts defusion, graduality of exposure, etc… As a conclusion, the results of the few studies that evaluated the effect of acceptance support the notion that acceptance plays a positive role in exposure. What is covered by the term "avoidance" though seem to differ slightly across studies. Most importantly, the model of acceptance does not say much regarding the mechanisms that underlie the efficacy of acceptance during exposure. Studies exploring the processes are needed in order to fully support those models.

4. Conclusion

The exposure procedure evolved drastically across time. Although exposure has shown its efficacy across studies, we have pointed to several issues with the use of exposure: dropouts, acceptability, return of fear... Various theoretical models that strived to explain the mechanisms underlying its efficacy were formulated. Our analysis of the overlap and distinctions between models has shown that the models can be differentiated regarding the core processes that are postulated. Finally, the empirical status of those models varies strongly. EPT has poor empirical support and is strongly challenged by the research on the exposure, while the evidence supports the mechanisms postulated by the inhibitory learning model. The popularity of EPT among clinicians does not seem to be related to the robustness of empirical evidence. The evidence towards the socio-cognitive model is limited. In regards to the acceptance model, it seems that there is promising evidence but a need for more research specifying the mechanisms.

PART I

ATTENTIONAL FOCUS DURING EXPOSURE

Chapter 1

The Issue of Distraction

The role of attentional focus and distraction has been a persistent debate in the literature. In regard to Emotional Processing Theory and inhibitory learning, distraction may impede the efficacy of exposure. At the opposite, from a socio-cognitive perspective, distraction may be beneficial to exposure. Number of studies have evaluated the effect of focused vs. distracted exposure and have yielded very contradictory results. These inconsistent results may stem from the variability in the operationalization of distraction. We postulated that most manipulations of distraction involve at least three different factors: schematicity, valence, and interactivity. In the present work, studies have been conducted in order to disentangle those factors and in order to test their respective impact on exposure efficacy. Those studies will allow us to trial the various models against one another.

The Issue of Distraction

1. Theoretical Debate

There has been a persistent debate in the literature about the factors that may help to improve exposure therapy (Craske et al., 2008; McNally, 2007). One such factor is the role of attentional focus or distraction during exposure. Theoretical models hold opposite predictions in regard to its effect on exposure. The question of whether distraction improves or impede the efficacy exposure has therefore been considered as having the potential of challenging the theoretical models. There is no universal definition of distraction, but it generally refers in the literature to directing the attention away from the feared stimulus.

In regards to EPT (Foa & Kozak, 1986), the efficacy of exposure relies on emotional processing. This processing consists in the activation of the fear structure and the inclusion in the memory of new incompatible elements in the fear structure. The authors of the model considered distraction as a form of cognitive avoidance. Distraction would include strategies such as pretending to be somewhere else, distorting a fearful image, or concentrating on non-feared elements of a situation. Based on their integration of habituation in their model, the authors of EPT postulated that distraction may impede the emotional processing and the efficacy of exposure, considering distraction may diminish the encoding of fear-relevant information and therefore decrease the activation of the fear structure. In the same line, the inhibitory learning theory (Craske et al., 2014) considers distraction to be detrimental for exposure. The model considers expectancy violation as an important ingredient for successful exposure. In order to take place, expectancy violation requires the facilitation of attention on both the CS and the non-occurrence of the US. The acceptance model does not provide strong predictions in regard to the role of distraction. However, whereas distraction is generally considered as an avoidance strategy, it is generally considered as being opposed to acceptance and therefore as detrimental.

From the socio-cognitive model perspective, partial distraction may be beneficial to exposure. According to the proponents of this model, distress during exposure should be maintained at a sustainable level. Distraction during exposure would diminish distress, allowing participants to bear the phobogenic situation and therefore to restore their sense of self-efficacy. On the basis of this model as well as on the claims of Mineka and Thomas (1999) and Barlow (1988) in regards to the role of perceived control, some researchers argued that distraction may allow to stay in the feared situation and may provide a coping technique that enhances self-efficacy, thereby reducing anxiety (Johnstone & Page, 2004; Oliver & Page, 2003, 2008; Penfold & Page, 1999). From the best of our knowledge, the extinction model does not make any clear and specific prediction in regard to the role of distraction.

2. Empirical Review

Our review of the empirical studies was conducted on Scopus with the keywords "Attentional focus", "Distraction", and "Exposure therapy". The relevant studies were identified and the articles citing those studies and cited in the references of those articles were searched in order to identify potential missing references. We identified 19 studies that evaluated the effect of focused exposure versus distracted exposure. Those studies are reviewed extensively in Table A1 (in Annex 1). They have yielded contradictory results: Some favour partial distraction (Johnstone & Page, 2004; Oliver & Page, 2003, 2008; Penfold & Page, 1999), some are against distraction (Grayson, Foa, & Steketee, 1982; Haw & Dickerson, 1998; Kamphuis & Telch, 2000; Mohlman & Zinbarg, 2000; Raes, De Raedt, Verschuere, & De Houwer, 2009) and others evidenced no significant difference between distracted vs. focused exposure (Antony, McCabe, Leeuw, Sano, & Swinson, 2001; Rose & McGlynn, 1997; Schmid-Leuz, Elsesser, Lohrmann, Jöhren, & Sartory, 2007; Telch et al., 2004). We believe that these inconsistent results might be related to the variability in operationalization of distraction. For example, the distraction task consisted in Schmid-Leuz et al. (2007) in playing puzzle games with the therapist during exposure, while in Kamphuis and Telch (2000), it consisted in pressing a button each time an odd or an even number occur and in adding the sum of the last two number before a click (strings of number presented through a headphone).

When looking at it more closely, it seems that in most of those studies, the manipulation of distraction involves at least three different factors: schematicity, valence, and interactivity. Schematicity refers to the extent to which a stimulus is associated to the fear structure, in regard to the EPT. For example, for a spider phobic, a cobweb is strongly associated to the fear schema, whereas an object like a lamp is relatively unrelated to the fear schema. Most of the studies manipulated schematicity in the sense that they manipulated the degree to which the elements that were attended to were related to the fear schema. For instance, in the study of Craske, Bunt, Rapee, and Barlow (1991), snake and spider phobics were exposed in vivo for 24 minutes to a tarantula spider or corn snake. In the attentionally focused group, the participants were instructed by an audiotape to think at the same time about the features of the snake or spider and to their own subjective and physical reactions. In the distraction group, the participants were instructed to listen to audiotaped passages of intrinsic interest value about the effects of exercise on sex and longevity and to place check marks on a sheet of paper whenever they heard specific target words. In this study, the attention of the participants belonging to the attentionally focused group was focused on more schematic elements (i.e. features of the snake or spider) than those who were in the distraction group who focused on rather non-schematic elements (i.e. effects of exercise on sex and longevity).

However, like in most other studies, the manipulation of this study also involves differences between groups in terms of valence. Valence refers to the evaluation of whether a stimulus is likely to result in pleasure or pain (Scherer, 2001). Most studies, while comparing distracted vs. focused exposure also manipulated the valence of the stimuli that were attended to in addition to their schematicity. In our previous example (Craske, Street, Jayaraman, & Barlow, 1991), the attention of the participants belonging to the attentionally

focused group was focused on more negative elements (i.e. features of the snake) than those who were in the distraction group who focused on rather positive elements (i.e. effects of exercise on sex and longevity).

Moreover, the studies vary in the level of interactivity. Interactivity refers to the extent to which the participant is in interaction with the experimenter during exposure. Some studies used an interactive design while some other studies used a non-interactive design. In our previous example (Craske, Street, et al., 1991), the design was rather non-interactive because it did not require interactions with the experimenter during exposure. However, in other designs, like the study of Johnstone and Page (2004), the manipulation is much more interactive. In this study, spider phobics were exposed in vivo to spiders for 30 minutes and instructed to maintain a visual contact. During exposure, the participants engaged in conversations with the experimenter. Those conversations were either stimulus-relevant (focusing group: phobic stimulus, spider in general and the experience of anxiety) or personally relevant (distraction group: vacation, studies, plans for the future).

Table 1 presents for each of the studies the way in which these three factors were involved in the manipulation. The table also includes several important design features: single vs. multiple sessions, the delay between sessions, the dependant variables as well as the conclusion in terms of superiority. This categorization between studies allows to point out several general trends: First of all, it seems that the studies that concluded on the superiority of distracted exposure all used an interactive design, while the studies that concluded on the superiority of focused exposure mainly used non-interactive designs. Of note, the interactive studies that concluded on the superiority of exposure included other elements than interactivity per se: valence of the task, a greater manifested interest of the experimenter towards self-relevant aspects of the life of the individual, and an increased sensation of having been taken care of. Moreover, the studies that concluded on the superiority of distracted exposure compared a focusing group whose focus object was negative to a distracted group whose focus object was neutral and positive. The observed results may therefore stem from interactivity itself or from the valence. However, given that those factors are confounded across studies, we cannot conclude on the specific role of each factor. Another observation is that no study has directly manipulated schematicity while manipulating valence independently at the same time.

More generally, it should be noted that there is a lot of heterogeneity between the various measures of anxiety, i.e. subjective distress, physiological variables and approach behaviour. In other words, the conclusions drawn from the different dependant variables are generally not unanimous. Those discrepancies between the various dependant variables makes it even harder to conclude on this topic. Finally, the studies vary in terms of the number of sessions that were included. Some of them include only one session of exposure. This limitation is of importance considering the fact that the habituation observed in one session is not predictive of longer-term clinical outcomes (Craske et al., 2008)

Table 1. Summary of studies that evaluated the efficacy of distracted vs. focused exposure as a function of schematicity, valence and interactivity, as well as disorder, dependant variables and concluding superiority

Study	Disorder	Schematicity	Valence	Interactivity	Times	Delay	SUD	HR	BAT	SC	Superiority
Grayson et al. (1982)	OCD	Schematic vs. Non-schematic	Negative vs. Positive	Interactive	Repeated	2 days	x	x			AF
Grayson, Foa, and Steketee (1986)	OCD	Schematic vs. Non-schematic	Negative vs. Positive	Interactive	Repeated	2 days	x	x			AF
Haw and Dickerson (1998)	Spider phobia	Schematic vs. Non-schematic	Negative vs. neutral	Non-interactive	Single		x	x			AF
Kamphuis and Telch (2000)	Claustrophobia	Schematic vs. Non-schematic	Negative vs. neutral	Non-Interactive	Repeated	2 weeks	x	x	x		AF
Mohlman and Zinbarg (2000)	Spider phobia	Schematic vs. Non-schematic	Negative vs. neutral	Non-interactive	Repeated	3-4 weeks	x	x	x		AF
Rodriguez and Craske (1995)	Animal phobia	Schematic vs. Non-schematic	Negative and positive vs. neutral	Non-interactive	Single		x	x	x		AF
Raes et al. (2009)	Healthy participants	Not relevant	Not relevant	Non-Interactive	Single		x			x	AF
Johnstone and Page (2004)	Spider phobia	Schematic vs. Non-schematic	Negative vs. neutral and positive	Interactive	Repeated	4 weeks	x	x	x	x	D
Oliver and Page (2008)	Blood injection phobia	Schematic vs. Non-schematic	Negative vs. neutral and positive	Interactive	Repeated	1 month	x		x		D
Oliver and Page (2003)	Blood injection phobia	Schematic vs. Non-schematic	Negative vs. neutral and positive	Interactive	Repeated	1 month	x				D
Penfold and Page (1999)	Blood injection phobia	Schematic vs. Non-schematic	Negative vs. neutral and positive	Interactive	Single		x		x		D
Antony et al. (2001)	Spider phobia	Schematic vs. Non-schematic	Negative vs. neutral or positive	Non-interactive	Single		x	x	x		No diff
Arntz and Lavy (1993)	Spider phobia	Not relevant	Not relevant	Interactive	Single				x		No diff
Craske, Street, et al. (1991)	Snake and spider phobia	Schematic vs. Non-schematic	Negative vs. Positive	Non-Interactive	Single		x	x			No diff
Craske, Street, and Barlow (1989)	Panic disorder	Schematic vs. Non-schematic	Negative vs. Neutral	Interactive	Repeated	11 sessions weekly	x		x		No diff
Rose and McGlynn (1997)	Snake and spider phobia	Schematic vs. Non-schematic	Negative vs. neutral	Non-interactive	Repeated	1 and 4 weeks	x	x	x		No diff
Schmid-Leuz et al. (2007)	Dental phobia	Schematic vs. Non-schematic	Negative vs. positive	Interactive	Repeated	1 week	x	x			No diff
Telch et al. (2004)	Claustrophobia	Schematic vs. Non-schematic	Negative vs. neutral	Non-Interactive	Single		x	x	x		No diff
Wood and McGlynn (2000)	Claustrophobia	Schematic vs. Non-schematic	Negative vs. neutral and positive	Non-Interactive	Repeated	1 week	x	x	x		No diff

Note. AF = Attentionally focused exposure; BAT = Behavioural avoidance test; D = Distracted exposure; HR: Heart rate; No diff = No difference between conditions; OCD = Obsessive-Compulsive Disorder; SC = Skin conductance; SUD = Subjective Units of Distress

It should also be noted that the manipulation used in a few studies cannot be categorized into the three described factors. For instance, in the study of Raes et al. (2009), 41 participants were confronted with an acquisition phase, in which an angry face (CS+) was paired with a white noise (US). Later, in the extinction phase, the US was no longer presented following the CS+. During this phase, some participants were required to perform a low load distracting task (i.e. repeat one digit), while others were required to perform a high load distracting task (i.e. repeat six different digits). The results demonstrated that participants with low anxiety exhibit a full extinction in the low load distracting task; while those in the high distracting task exhibited significantly higher skin conductance responses in response to the CS+(SCRs). However, no difference was exhibited in the high anxiety group. The authors concluded that extinction is not automatic but requires cognitive resources in order to occur.

3. Meta-analysis

Podină, Koster, Philippot, Dethier, and David (2013) conducted a meta-analysis that evaluated the efficacy of attentionally focused exposure against distracted exposure. The meta-analysis is presented in Annex 2[2]. The study included 15 randomized studies and therefore comprises 444 participants with specific phobia. The following studies were excluded: with crossover designs, with a manipulation of attention after or before exposure, with outcome measure assessment only during exposure, with combined interventions and with attention allocation measured as a trait. Potential moderators were included in the analysis: (a) the clinical status of the sample (Clinical samples vs. Clinically-analogue samples), (b) the interactivity with the experimenter (Interactive vs. Non-interactive), (c) the number of exposure sessions (Single vs. Multiple sessions), (d) and the follow-up length (less than one month or one month). The outcome measures comprised distress measures (situational and general distress estimates, self-reports of anxiety and questionnaires), behavioural measures (i.e. feared stimulus approach) and physiological measures (heart rate, skin conductance…). Post-exposure and follow-up effect sizes were computed on the following pairs: uninstructed-distraction, uninstructed-focus, and distraction-focus. There were no statistical differences between conditions for distress and physiology both at post-exposure and follow-up, for none of the pairs. In regard to behaviour, the results indicated that participants in the distraction group displayed marginally better behavioural outcomes than participants of the focused group at post-exposure. This difference reached significance at follow-up. Moreover, participants in the uninstructed group displayed significantly better behavioural outcomes than participants of the distracted group at post-exposure. Moderation analysis revealed that distracted exposure yielded better results in terms of distress and behaviour when the distracter was interactive and when multiple sessions of exposure were performed. The moderation analyses did not reach significance in regard to physiological responses. As a conclusion, this meta-analysis indicates that distraction during exposure

[2] The meta-analysis has been included in the Appendices and is summarized in this thesis because even though we contributed to this study, we are not the first author of the meta-analysis.

might not be as detrimental as expected and might even be beneficial. These results are explained in terms of increased perceived control in the uninstructed and distracted groups.

4. Hypothesis and overview of the empirical section

The question of distraction remains an open debate. The importance of three factors implied in distraction has been evidenced in our theoretical (schematicity) and empirical reviews (valence and schematicity). We believe that the difficulty of the literature in providing clear conclusions from previous studies partly derives from the fact that these components have not been manipulated separately.

The studies included in this project have been designed in order to disentangle these various components of distraction and to test their respective impact on exposure efficacy. In those studies, spider phobics will perform a dual task. They will be exposed to spider stimuli while focusing at the same time on stimuli that differ in terms of each of the components of distraction. The separate manipulations of each of the components of distraction will allow us to trial the various models against one another.

In regard to schematicity, proving that focusing on schematic elements during exposure is more efficient than focusing on non-schematic elements, would give more credit to the EPT that postulates that focusing on schematic elements would lead to a greater activation of the fear structure and would therefore yield the best results. It would also support the inhibitory learning model that states that expectancy violation requires the highest salience of the elements that announce the fear outcome. At the opposite, if being exposed while focusing at the same time on non-schematic elements shows its superiority, the socio-cognitive model should be preferred. Indeed, focusing on non-threatening elements during exposure would diminish distress, allowing participants to bear the phobogenic situation and to restore their sense of self-efficacy. Schematicity is experimentally manipulated in Study 1.

In regard to valence, if being exposed while focusing at the same time on positive elements is more efficient than being exposed while focusing on negative elements, this would give more credit to the socio-cognitive model that states that maintaining distress at a sustainable level would produce the best results. The opposite pattern would favour acceptance/toleration model. Staying in touch with the emotional distress would be considered as crucial ingredient. Valence (and schematicity) are experimentally manipulated in Study 2.

In regards to interactivity, the meta-analysis of Podină et al. (2013) suggested that interactivity may be part of the observed beneficial effect of distraction. However, the previous manipulations of distraction also included other factors than interactivity per se: valence of the task, a manifested interest of the experimenter towards self-relevant aspects of the life of the individual, and an increased sensation of having been taken care of (e.g., Penfold & Page, 1999). Our aim in the present work is therefore to manipulate interactivity in a way that it does not include other confounding elements. If an effect of interactivity is evidenced, it could then be attributed to interactivity per se. At the opposite, the results would

suggest that the effect is attributable to these confounding factors that were present in previous studies. Interactivity (and attentional focus) are experimentally manipulated in Study 3.

Chapter 2

The Effect of Schematicity of a partial distractor during Exposure in Spider Phobia (Study 1)

Research has provided controversial results regarding the role of distraction (vs. attentional focus) during exposure therapy. In the present study, we manipulated the nature of the concepts activated during exposure. Sixty-six spider phobics were exposed to pictures of spiders and asked, or not, to form mental images of concepts that were either related or unrelated to spiders. At pre-exposure, mid-exposure, post-exposure, and follow-up, subjective distress, heart rate variability, and skin conductance responses were measured, and the Fear of Spiders Questionnaire and a Behavioural Avoidance Test were performed. Results showed that the activation of concepts unrelated to spiders led to return of distress at follow-up. Moreover, the activation of concepts related to spiders decreased emotional and avoidance responses between sessions. This pattern of results suggests that the nature of the activated concepts does not influence subjective distress during exposure, but plays an important role in the maintenance of distress reduction between sessions.

Reference[3]

Dethier, V., Bruneau, N., & Philippot, P. (2015). Attentional focus during exposure in spider phobia: The role of schematic versus non-schematic imagery. Behaviour Research and Therapy, 65, 86-92. doi:10.1016/j.brat.2014.12.016

[3] Some changes have been added in this chapter after publication. The newly added text is presented in italics (pages 41, 45, 47).

The Effect of Schematicity of a partial distractor during Exposure in Spider Phobia (Study 1)

1. Introduction

The efficacy of exposure in the treatment of specific phobias is widely recognized among experts (Barlow, 2002). A recent meta-analysis has demonstrated that exposure-based treatments yield large effect sizes (Wolitzky-Taylor et al., 2008). The mechanisms underlying exposure therapy, however, still raise much debate (Craske et al., 2008; McNally, 2007), particularly concerning the role of attentional focus. A crucial question is whether partial distraction is beneficial or detrimental for therapeutic effectiveness: Not only is the answer important for the fundamental understanding of the processes involved, but it also implies opposite recommendations for clinical interventions.

Emotional processing theory (EPT; Foa & Kozak, 1986), based on the bioinformational model (Lang, 1977), poses that focusing attention on threat is necessary for therapeutic success, and it highlights emotional processing as a central mechanism. This theory is underpinned by the notion of fear structure, conceptualized as a memory network that includes information about (a) stimuli defining a feared situation, (b) responses in that situation, and (c) the meaning of these stimuli. According to EPT, emotional processing requires the activation of the fear structure. Distraction, i.e. paying attention to something not belonging to the fear structure, impedes emotional processing and therefore the reduction of anxiety. This view is compatible with other approaches such as the inhibitory learning theory (Bouton, 1993; Craske et al., 2014), which requires awareness of the conditional stimulus, as well as awareness of the non-occurrence of the unconditional stimulus, and hence the focus of attention on these elements and the avoidance of distraction by other elements.

Other researchers have suggested that distraction may enhance the effects of exposure (Johnstone & Page, 2004; Oliver & Page, 2003, 2008). On the basis of the self-efficacy model of Bandura (1988) and the model of Barlow (1988), these researchers argued that distraction allows individuals to stay in the feared situation and provides a coping technique that enhances self-efficacy and increases perceived emotional control, thereby reducing anxiety (Oliver & Page, 2003).

Studies investigating attentional focus in exposure therapy have mainly compared conditions in which attention was either focused on threat or partially distracted from it. However, the operationalization of distraction strongly varied across studies: Some manipulated the conversation with the therapist during exposure (neutral topics vs. threat stimuli responses) (Johnstone & Page, 2004; Oliver & Page, 2003, 2008; Penfold & Page, 1999), others manipulated the cognitive load (Kamphuis & Telch, 2000; Raes et al., 2009), or the activated concepts during exposure (Telch et al., 2004), and still others proposed a

non-related task during exposure (e.g. play a puzzle; Schmid-Leuz et al., 2007).The results of these studies are inconsistent, some favouring partial distraction (Johnstone & Page, 2004; Oliver & Page, 2003, 2008; Penfold & Page, 1999) and others suggesting the opposite (Grayson et al., 1982; Haw & Dickerson, 1998; Kamphuis & Telch, 2000; Mohlman & Zinbarg, 2000; Raes et al., 2009) or not showing significant differences between conditions (Antony et al., 2001; Rose & McGlynn, 1997; Telch et al., 2004).

A recent meta-analysis systematically addressed the role of attention allocation in exposure therapy effectiveness (Podină et al., 2013). Although no differences were demonstrated between distracted and focused exposure for distress and physiological measures, higher effectiveness regarding distress and behavioural avoidance was found at follow-up for distraction when it consisted of an interaction with the experimenter. Inconsistencies in earlier studies might partly result from the various ways that distraction has been operationalized. A central issue for understanding potential effects of distraction is thus to target the main distinctive feature of EPT, i.e. whether the client focuses on matters that are associated with the fear structure (schematic concepts, “focused exposure”) or not (non-schematic concepts, “distraction”).

To date, only one study has directly manipulated the nature of the activated concepts during exposure (Telch et al., 2004): Claustrophobic patients were presented with words via a headphone and had to repeat the word aloud and to form a mental image. Some patients were presented with claustrophobia-relevant words (e.g., suffocate), while others were presented with neutral words (e.g., banana). No significant differences were found between these conditions. Unfortunately, whereas a return of distress is a crucial aspect in anxiety treatment (Craske & Rachman, 1987), no follow-up measure was proposed, greatly limiting the implications of this study.

The main aim of the present study was thus to determine whether the nature of the activated concepts (schematic vs. non-schematic) impacts exposure effectiveness. A session of exposure and a follow-up assessment was proposed to spider phobics. Exposure was manipulated in three between-subjects conditions: exposure alone, exposure plus schematic imagery, and exposure plus non-schematic imagery. Multimodal measures of anxiety were performed before and after exposure, as well as at a 16-day follow-up session. As there is little evidence that within-session habituation is a good outcome indicator of global improvement (Craske et al., 2008), our exploration mainly focused on between-session habituation, and two hypotheses were tested. The hypothesis of maximal emotional processing (EPT) predicts that the activation of non-schematic words should lead to more return of distress at follow-up. Conversely, the hypothesis of distraction as a coping mechanism predicts that the activation of non-schematic words should not lead to return of distress. This study also aimed to investigate the processes of change at play in exposure therapy concerning emotional processing. EPT predicts that the activation of non-schematic words should impede habituation during the first session, whereas the activation of schematic words should lead to a stronger habituation. Moreover, EPT predicts that within habituation is an index of successful learning that is related to between-session habituation.

2. Method

2.1 Participants

Participants were recruited through announcements on posters, in electronic mail, and on social networks. The volunteers scoring over 4 (of 7) on the Fear of Spiders Questionnaire (FSQ; Szymanski & O'Donohue, 1995) were invited to participate in the study. All participants (n = 66) completed the A, B, C, D, F, and G criteria of the Diagnostic and Statistical Manual of Mental Disorders (4th ed., text rev.; American Psychiatric Association, 2000), as ascertained by the Structured Clinical Interview for DSM-IV-TR Axis I Disorders (First, Spitzer, Gibbon, & Williams, 2002). *The E criterion (i.e. significant interference with daily functioning, social activities or relationships or marked distress caused by the phobia) was not retained as an inclusion criterion for this study because it is highly dependent on the living context of the individual. Considering this criterion may lead to exclude participants presenting all the relevant psychological mechanisms, hence unduly limiting sample size.* The sample consisted of 64 women and 4 men. All of the participants were Caucasian. Their age ranged between 18 and 54 years (M = 26.97, SD = 7.99). Five participants were medicated with antidepressants, but none of the participants were medicated with benzodiazepines or neuroleptics. All participants gave their informed written consent before starting the survey. The study protocol was approved by the ethical committee of the *Psychological Science Research Institute* of the Université catholique de Louvain.

2.2 Measures

2.2.1 Self-reported Measures

The FSQ (French validation: Delroisse & Philippot, 2007) comprises 18 items (7-point Likert-type scale) and measures two factors: emotional and avoidance responses, and anxious anticipation of spiders.

A Self-Efficacy Scale (SES) was created following the recommendations of Bandura (2006). It consists of 17 items, each depicting a step of the Behavioural Avoidance Test (BAT), for which participants report their confidence in their capacity to perform it, on a scale from 0 (cannot do at all) to 100 (highly certain can do).

The Subjective Units of Distress (SUDs) Scale (Wolpe, 1958) measured the peak level of distress when viewing spider pictures from the assessment set (see Materials section) on a scale from 0 (no distress) to 100 (extreme distress).

2.2.2 Behavioural Measure

The BAT measured the number of steps that participants could achieve when confronted with a live spider. It consisted of a 17-step hierarchic exposure described by Merluzzi, Taylor, Boltwood, and Gotestam (1991), starting with standing at 3 m from a spider enclosed in a container to letting the spider walk on one’s forearm. The participants were asked to perform each of the steps. They could stop as soon as they wanted to.

2.2.3 Physiological Measures

Skin conductance (SC) and heart rate variability (HRV) were measured via the Active Two System (Biosemi, Amsterdam, Netherlands) in response to the assessment set of spider pictures (see Materials section). For SC, electrodes were placed on the forefinger and middle finger. HRV was measured by a digital photoplethysmograph. In order to reduce noise, participants were explicitly asked not to move during measurement.

2.3 Materials

Pictures of spiders inducing high arousal were selected from the Geneva Affective Picture Database (Dan-Glauser & Scherer, 2011). Fifty pictures were used for exposure (exposure set). Seven novel sets of six spider pictures with similar mean arousal scores, $F(6, 35) = .001$, *ns*, but with pictures that differed from the exposure pictures (assessment sets), were used to assess the SUDs and the physiological variables, as suggested by Craske et al. (2008). This also allowed testing the generalizability of the results. A live spider was used for the BAT. This spider was 5-cm long (Agelenidae).

The word stimuli were selected in a pretest. Participants with arachnophobia and psychotherapists who had treated arachnophobia were asked to produce a large number of words associated with fear of spiders. These words were then matched to control words with a similar frequency, based on the lexical database of New, Pallier, Brysbaert, and Ferrand (2004). Finally, the two sets of 50 words each were evaluated on their degree of imageability (as measured by Desrochers & Thompson, 2009) and inclusion in the fear schema (the degree to which the word evokes the spider or the fear associated with it on a 7-point scale) by 30 participants with arachnophobia who scored 4.5 or higher on the FSQ. The 24 words displaying the highest degree of inclusion in the fear schema were included in the schematic set, and the 24 words displaying the lowest level of inclusion were included in the non-schematic set. They differed significantly in terms of degree of inclusion in the fear schema, $t(23) = 27.841$, $p < .001$, but showed no significant differences for imageability, $t(42) = .118$, ns, and frequency, $t(46) = .178$, ns.

2.4 General Procedure

The study comprised two sessions. In the first session, participants performed measures before exposure, at mid-exposure, and after four trials of prolonged exposure with spider pictures from the exposure set. The second session tested the maintenance of Session 1 distress reduction. Another trial of exposure was provided and the measures were performed again. An overview of the procedure is provided in Figure 3.

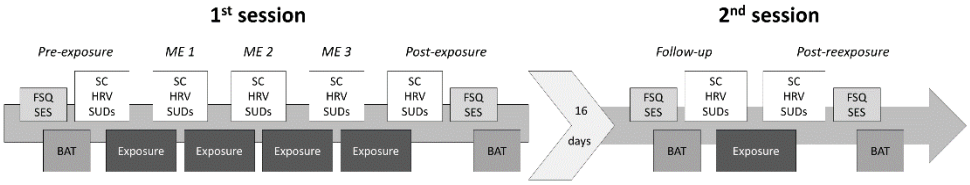

Figure 3. Procedure and measurements. FSQ = Fear of Spiders Questionnaire; SUDs = Subjective Units of Distress; HRV = heart rate variability; SC = skin conductance; SES = Self-efficacy Scale; BAT = Behavioural Avoidance Test; ME = mid-exposure time.

At the first session, participants successively completed the FSQ, SES, the first BAT, and four 5-min exposure trials with spider pictures. Each exposure trial consisted of an exposure to pictures of spiders from the exposure set. Participants were randomly allocated to one of the three conditions: exposure plus schematic imagery (SI), exposure plus non-schematic imagery (NSI), or exposure alone (EA). Participants in SI and NSI performed a dual task during the exposure. The first task consisted of focusing on spider pictures displayed on the screen at positions varying randomly every 1 to 5 s and pressing the space bar at every change in the spider picture or position. The concurrent task was to form a mental image of a word presented every 12.5 s via headphones and to verbally report the intensity of imagery on a scale from 0 to 10. Before starting, a short training consisting of the same dual task but with geometrical figures and neutral words was performed. Although the dual task was similar across conditions, the nature of the words to imagine varied: schematic (spider, net, etc.) in the SI condition and non-schematic (steel, pen, etc.) in the NSI condition. In the EA condition, participants performed only the first task and did not imagine words.

Before exposure, at mid-exposure, and after each exposure trial, SC, HRV, and SUDs were measured in response to a novel "assessment" set of six spider pictures, each presented for 7 s and separated by a 4-s blank screen. After the four exposure trials, participants again completed the FSQ, SES, and BAT. Note that the BAT and the exposure trials were conducted in a different context. The BAT was performed with a live spider, whereas the exposure trials were conducted with pictures of spiders in a different room.

At the second session, participants completed all the measures before and after a single exposure trial. The mean number of days between the sessions was 16.17 (*SD* = 4.45). At the end of the experiment, participants were fully debriefed about the objective of the study and referred to a therapist if they were willing to engage in therapy.

3. Results

3.1 Data Preparation

3.1.1 Skin Conductance (SC)

SC was analysed with Ledalab (Benedek & Kaernbach, 2010). Continuous decomposition analysis was performed to distinguish phasic and tonic activity. A response window of 1 to 4 s after stimulus onset and a minimum amplitude criterion of .01 µS were used (Boucsein et al., 2012). Skin conductance responses (SCRs) were square root transformed and averaged.

3.1.2 Heart Rate Variability (HRV)

Pulse peaks were detected by using a peak detection algorithm from Friesen et al. (1990) and applied in MATLAB 8.0 (Mathworks, Natik, MA, USA). HRV spectral indexes calculated with this algorithm on a photoplethysmograph signal at rest have been shown to correlate strongly with indexes derived from an electrocardiogram (Giardino, Lehrer, & Edelberg, 2002). Signals that were not suitable for peak detection were excluded (4.91% of data). Each signal was visually inspected for false detection. Interbeat intervals were analysed with ArtiiFact (Kaufmann, Sütterlin, Schulz, & Vögele, 2011) at a frequency of 128 Hz. Artefacts were corrected with a linear convolution. Fast Fourier transform was applied. For each participant, a low frequency/high frequency (LF/HF) ratio was calculated and log transformed to correct for skewness of the distribution. As LF reflects sympathetic activity and HF reflects parasympathetic activity, this ratio is an index of the sympathovagal balance (Bernston et al., 1997).

3.2 Statistics

Statistical analyses were performed with SPSS 21 (IBM, Armonk, NY, USA). Within- and between-sessions effects were tested separately. Greenhouse-Geisser correction was applied when sphericity was not met. The mean and standard deviation of each dependent measure are presented in the Annex 3.

3.2.1 Preliminary Analyses

Dropouts

Seven participants did not complete the second session (three in the SI group, two in the NSI group, and two in the EA group, with no difference among conditions, $\chi^2 = .320$, *ns*). Dropouts were compared with finishers on outcome and on demographic variables. There were no differences, except that dropouts reported significantly less self-efficacy, $t(64) = 2.206$, $p < .05$, and less achievement at the BAT, $t(64) = 2.796$, $p < .01$.

Group Equivalence

Preliminary analysis indicated no pre-treatment differences among the groups on each of the outcome variables, i.e. on emotional and avoidance responses, $F(2, 63) = .857$, *ns*;

anxious anticipation of spiders, $F(2, 63) = .959$, *ns*; SUDs, $F(2, 63) = 1.519$, *ns*; SCRs, $F(2, 63) = 1.663$, *ns*; LF/HF ratio, $F(2, 63) = .426$, *ns*; and BAT $F(2, 63) = .332$, *ns*. All groups were similar in terms of age, $F(2, 63) = .936$, *ns*; gender ($\chi^2 = 3.726$, *ns*); antidepressant medication ($\chi^2 = 1.731$, *ns*); and number of days between the sessions, $F(2, 56) = 1.152$, *ns*.

3.2.2 Return of Distress across Conditions

Repeated measure analyses of covariance with Time as within-subject factor (Post-exposure, Follow-up) and Condition as between-subjects factor were computed for each outcome variable to evaluate the return of distress across conditions. Pre-exposure measure was introduced as a covariate for each analysis. The results are presented in Table 2.

Table 2. Between-sessions effects: Repeated measure ANOVAs.

Variable	Time effect					Time × condition effect					Condition effect				
	df_n	df_d	*F*	*p*	η^2	df_n	df_d	*F*	*p*	η^2	df_n	df_d	*F*	*p*	η^2
FSQ															
Emotional and avoidance responses	1	55	2.435	ns		2	55	3.276	.045	.106	2	55	.908	ns	
Anxious anticipation of spiders	1	55	.684	ns		2	55	.420	ns		2	55	.421	ns	
SUDs	1	55	.020	ns		2	55	2.873	.065	.095	2	55	.828	ns	
SCRs	1	55	.236	ns		2	55	3.288	.045	.107	2	55	1.315	ns	
HRV: LF/HF ratio	1	52	.847	ns		2	52	1.685	ns		2	52	1.446	ns	
BAT	1	55	4.604	.036	.077	2	55	.202	ns		2	55	.731	ns	
Self-efficacy	*1*	*55*	*6.915*	*.011*	*.112*	*2*	*55*	*1.796*	*ns*		*2*	*55*	*.270*	*ns*	

Note. ANOVAs = analyses of variance; FSQ = Fear of Spiders Questionnaire; SUDs = Subjective Units of Distress; SCRs = skin conductance responses (square root transformed); HRV = heart rate variability; LF/HF ratio = low frequency/high frequency ratio (logarithmic transformation); BAT = Behavioural Avoidance Test; ns = >.10.

For the emotional and avoidance scale of the FSQ, a significant Time × Condition interaction was found. Post hoc pairwise comparisons are presented in Figure 4. These analyses indicated that in the SI group, participants showed a significant decrease between post-exposure and follow-up (Cohen's $d = .47$), whereas no significant change was observed in the NSI group or in the EA group. Moreover, the participants in the SI group reported a marginally significant lower score at follow-up than did the participants in the NSI group (Cohen's $d = .29$), whereas other differences between conditions, both at post-exposure and at follow-up, were not significant. For the other dimension of the FSQ (anxious anticipation), no significant main effect of Time or Time × Condition interaction was observed.

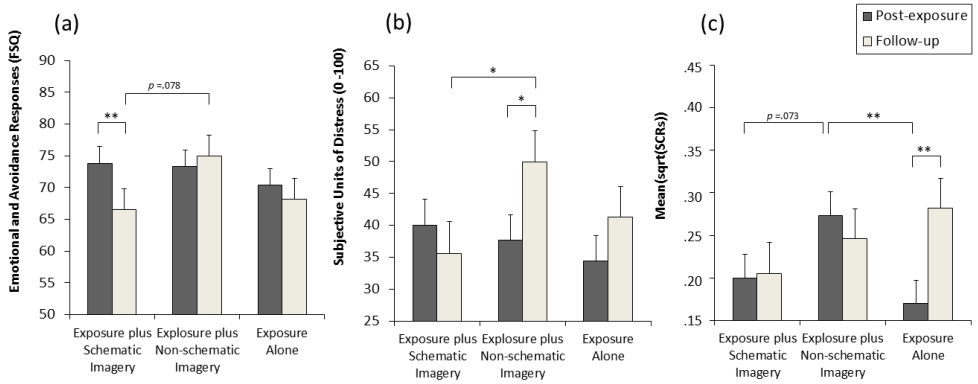

Figure. 4. Post hoc comparisons (estimated marginal means). (a) Emotional and avoidance responses (Fear of Spiders Questionnaire; FSQ) as a function of time and treatment condition. (b) Subjective Units of Distress as a function of time and treatment condition. (c) Averaged and square root transformed skin conductance responses (SCRs) as a function of time and treatment condition. * p < .05; ** p <.01. All other relations are non-significant (>.10).

For the SUDs, a significant main effect of Time and a marginally significant Time × Condition interaction effect were shown. Post hoc pairwise comparisons showed that participants in the NSI group displayed a significant return of distress (Cohen's d = .39), whereas no change was observed in the SI group or in the EA group. Moreover, at follow-up, the participants in the NSI group displayed a significantly higher score than did the participants in the SI group (Cohen's d = .32). The other differences between conditions, both at post-exposure and at follow-up, were not significant. No main effect of Time was observed, but a significant Time × Condition interaction effect was shown for SCRs. Post hoc pairwise comparisons indicated that participants in the EA group displayed a significant return of distress between post-exposure and follow-up (p < .01, Cohen's d = .45). Moreover, at post-exposure, the participants in the NSI group had significantly higher scores than did participants in the EA group (p < .01, Cohen's d = .42), and marginally significantly higher scores than did participants in the SI group (p = .073, Cohen's d = .29). For the LF/HF ratio, no significant main effect of Time or Time × Condition interaction effect were shown. For BAT *and self-efficacy*, no Time × Condition interaction effect was demonstrated, but a main effect of Time was observed. Participants improved their scores between post-exposure and follow-up in all conditions.

3.2.3 Process Analyses

To investigate the processes of change, we addressed additional questions.

Did the manipulation induce different response patterns on the outcome variables during the first session?

Repeated measure analyses of variance4 with Time (Pre-exposure, Mid-exposures, Post-exposure) as within-subject factor and Condition as between-subjects factor were computed for each outcome variable (see Table 3).

Table 3. Within-session effects: Repeated measure ANOVAs.

Variable	Time effect					Time × condition effect					Condition effect				
	df_n	df_d	*F*	*p*	η^2	df_n	df_d	*F*	*p*	η^2	df_n	df_d	*F*	*p*	η^2
FSQ															
Emotional and avoidance responses	1	63	61.616	<.001	.494	2	63	1.201	ns		2	63	.265	ns	
Anxious anticipation of spiders	1	63	.147	ns		2	63	.824	ns		2	63	1.144	ns	
SUDs	3	174	12.421	<.001	.165	6	174	.834	ns		2	63	.917	ns	
SCRs	4	252	15.854	<.001	.474	8	252	1.906	.059	.057	2	63	.366	ns	
HRV: LF/HF ratio	4	236	.322	ns		8	236	.621	ns		2	59	2.995	.058	.092
BAT	1	63	83.875	<.001	.571	2	63	.045	ns		2	63	.306	ns	
Self-efficacy	*1*	*63*	*122.968*	*<.001*	*.661*	*2*	*63*	*.669*	*ns*		*2*	*63*	*.530*	*ns*	

Note. ANOVAs = analyses of variance; FSQ = Fear of Spiders Questionnaire; SUDs = Subjective Units of Distress; SCRs = skin conductance responses (square root transformed); HRV = heart rate variability; LF/HF ratio = low frequency/high frequency ratio (logarithmic transformation); BAT = Behavioural Avoidance Test; ns = <.10.

No significant effects of Condition or Time × Condition effects were shown for FSQ facets, SUDs, BAT *or self-efficacy*. For SCRs, a significant main effect of Time was modulated by a Time × Condition marginal interaction. Post hoc pairwise comparisons indicated that in the SI and EA groups, participants displayed a significant decrease from pre-exposure to post-exposure ($p < .001$ and, $p < .05$, respectively). In contrast, participants in the NSI group displayed no significant decrease, ns.

In regard to the LF/HF ratio, analyses revealed a marginal effect of Condition, $F(2, 59) = 2.995$, $p = .058$, $\eta^2 = .092$. Post hoc comparisons indicated that participants in the SI group displayed a higher LF/HF ratio than did participants in the NSI group ($p = .054$, Cohen's $d = .38$). To better understand this effect and because there was no significant difference among conditions at pre-exposure regarding the LF/HF ratio, we reran the analyses without pre-exposure time. These new analyses revealed a significant effect of Condition, $F(2, 59) = 3.923$, $p < .05$, $\eta^2 = .117$. Post hoc tests indicated that participants in the SI group displayed a higher LF/HF ratio than did participants in the NSI group ($p = .021$, Cohen's $d = .43$).

Are between-session effects related to within-session effects?

Correlations between the within- and between-session changes were computed for each variable. In the NSI group, the more emotional and avoidance responses decreased during the first session, the more they increased between sessions ($r = .515$, $p < .05$). This correlation

[4] The same results were obtained with multilevel analyses.

was not significant in the SI group (r = -.061, ns) or in the EA group (r = -.100, ns). Regarding the SUDs, the more they decreased during the first session, the more important was the return of distress between the sessions in the NSI group (r = .663, p < .01) and in the EA group (r = .513, p < .01), but not in the SI group (r = .147, ns).

Correlational analyses showed no significant link between the between-sessions effects and the physiological or self-efficacy changes in the first session (r < .201, ns).

4. Discussion

This study aimed to trial two opposing views regarding the role of attentional focus during exposure therapy. A computerized dual task with spider phobics was used to manipulate the nature of the concepts activated during visual exposure. Results show that the nature of these concepts does not modulate subjective distress reduction within the first session, during which all groups displayed similar decreases, but that it plays an important role in the later maintenance of distress reduction. In contrast to the activation of schematic concepts, the activation of non-schematic concepts in imagery during exposure was associated with a return of subjective distress at follow-up. This return of distress was positively related to the reduction of distress during the first session, which suggests that distraction may be effective in reducing anxiety at that moment only. Moreover, the activation of schematic concepts induced a significant decrease of emotional and avoidance responses between sessions that was not related to the importance of decrease during the first session. These effects were especially marked in terms of trajectories within each group, though the differences among groups at follow-up, while corresponding to the expected pattern, were not as significant. The differential between-sessions effects are linked with differentiated physiological activation patterns within the first session. Indeed, in contrast with the activation of non-schematic concepts, the activation of schematic concepts during exposure led to a significant reduction of SCRs during the first session. Furthermore, it tended to induce a higher sympathovagal balance.

These results extend to follow-up, the fear-reduction previously shown favouring attentional focusing (Grayson et al., 1982; Haw & Dickerson, 1998; Kamphuis & Telch, 2000; Mohlman & Zinbarg, 2000; Raes et al., 2009). They are consistent with the predictions of the bioinformational model of Lang (1977) and the EPT (Foa & Kozak, 1986): The activation of concepts that do not belong to the fear structure induced decreased physiological reactivity, as reflected in sympathovagal balance and a return of subjective distress at follow-up. The absence of correlation between the changes in self-efficacy, on the one hand, and the between-session effects on either distress or avoidance responses, on the other hand, goes against the notion that the effect is accounted for by an expectation or a placebo effect. Had that been the case, all of these self-reported measures would have covaried. Rather, it suggests involvement of automatic and implicit changes of the emotional representation. Overall, these results suggest that the nature of the activated concepts during exposure induces distinct mechanisms: an effective coping in reducing distress in the short term at a

definite time for non-schematic concept activation, and longer term learning (e.g., emotional processing, inhibitory learning) for schematic concept activation.

Conversely, our results conflict with those from studies that demonstrated a superiority of distracted exposure (Johnstone & Page, 2004; Oliver & Page, 2003, 2008; Penfold & Page, 1999), which might be partly explained by the fact that those studies induced distraction through interactivity with the therapist. This variable has been identified in the meta-analysis of Podină et al. (2013) as a moderator of the effect of distraction on behaviour and distress. In fact, no studies showed a consistent positive effect of distraction without interactivity, suggesting that interactivity with the therapist is the active factor, rather than distraction per se. Indeed, positive interactions with the therapist might induce changes in the subjective evaluation of distress and in achievement because of efforts of the client to meet the expectancies of the therapist.

Although self-efficacy changes were not related to the observed effect, self-efficacy seems to play a role in adherence to treatment. Indeed, participants with low self-efficacy were at higher risk of dropping out. These results suggest that therapists should be particularly careful in identifying participants with low self-efficacy in order to prevent dropout. An approach based on guided mastery (Bandura, 1977), which mainly consists of providing the individual with environmental conditions that ensure successful experiences, may be particularly indicated for these participants.

No differences among conditions in regard to the BAT were observed. This result reflects the often-observed discordance among the response systems (behavioural, subjective, and physiological responses) of emotions (Barlow, 1988).

Although differences in visual processing might be involved in the group differences observed (e.g. more specific processing of the visual features in the schematic condition), the central strength of this study is the direct manipulation of the nature of the concepts activated during exposure therapy and the measure of extensive indicators at several times. This procedure allowed strong experimental control over the many variables that could influence the course of anxiety and a comprehensive measurement of the discordant facets of emotions over time. Nonetheless, this study has several limitations. As some effects are marginal, it could be argued that the number of participants was too small. Moreover, we measured the SUDs in response to the assessment sets of spider pictures but not during exposure trials where concepts were activated. This allowed quantifying the generalization of distress decrease, but not the changes in distress induced by the differential activation of concepts per se. Finally, as it could be considered an exposure itself, the many repetitions of the BAT may hamper its stability across time and dilute the effect of the experimental manipulation.

Chapter 3

The Effect of Valence and Schematicity of a Partial Distractor during Exposure in Spider phobia (Study 2)

This study examines the impact of partial distractor valence and schematicity (i.e. their relation to fear representation) on exposure efficacy. One hundred forty-one spider phobics were exposed to spider pictures and asked, in a between-subjects experimental design, to form mental images of words that were fear related (to spiders) and negative (schematic negative), fear unrelated and negative (non-schematic negative) or fear unrelated and positive (non-schematic positive). Multilevel measures of anxiety were performed at pre-exposure, post-exposure and 6 days' follow-up. Results show that both of the negative condition groups displayed similar results on all outcome variables and systematically differed from the positive condition group. While the latter group displayed a stronger decline in distress during exposure itself, the other groups showed greater exposure benefits: a stronger decline in emotional and avoidance responses and skin conductance responses from pre- to post-exposure and more approach behaviours when confronted with a real spider. The critical feature of distraction thus seems not to be the fact of being distracted from the phobic stimulus, but rather the fact of performing emotional avoidance by distracting oneself from negative affect. The results highlight that the acceptance of aversive emotional states is a critical active process in successful exposure.

Reference[5]

Dethier, V., & Philippot, P. (2017). Attentional focus during exposure in spider phobia: The effect of valence and schematicity of a partial distractor. *Behaviour Research and Therapy, 93,* 104-115. doi:10.1016/j.brat.2017.03.013

[5] Some changes have been added in this chapter after publication. The newly added text is presented in italics (pages 56, 70).

The Effect of Valence and Schematicity of a Partial Distractor during Exposure in Spider phobia (Study 2)

1. Introduction

Exposure therapy consists of repeated confrontation with a feared stimulus. Despite the well-recognized and demonstrated efficacy of this therapy in the treatment of anxiety disorders (Barlow, 2002; Wolitzky-Taylor et al., 2008), uncertainty still abounds regarding the optimization of its clinical implementation. More particularly, the role of attentional focus during exposure remains unsettled, the beneficial effect of partial distraction being under debate (Podină et al., 2013). Indeed, previous studies investigating this question have yielded contradictory results: Some favour partial distraction (Johnstone & Page, 2004; Oliver & Page, 2003, 2008; Penfold & Page, 1999), some are against distraction (Grayson et al., 1982; Haw & Dickerson, 1998; Kamphuis & Telch, 2000; Mohlman & Zinbarg, 2000; Raes et al., 2009) and others show no evidence of any significant impact of distraction (Antony et al., 2001; Rose & McGlynn, 1997; Telch et al., 2004). These inconsistent results might be related to the current lack of precise conceptualization of distraction during exposure and of its underlying processes. It is thus crucial to examine which dimensions of distraction are posed as determinant by theoretical models and what their predictions are regarding exposure efficacy.

According to the emotional processing theory (Foa & Kozak, 1986), emotional processing, considered as a central mechanism for exposure efficacy, requires attention to be focused on threat elements during exposure. More particularly, it requires the activation of the fear schema, i.e. a memory network that includes information about (a) stimuli defining a feared situation, (b) responses in that situation and (c) the meaning of these stimuli. The fear schema is aroused by the activation of some of its elements, this activation then spreading towards other elements of the schema. In regard to distraction, emotional processing theory states that paying attention to elements that are not part of the fear schema regardless of their valence impedes emotional processing and, consequently, reduces exposure efficacy. Attention should be focused only on information related to the fear schema. The emotional processing theory is thus clearly against distraction during exposure. In the same vein, the inhibitory learning approach (Craske et al., 2008; Craske et al., 2014) considers distraction to be detrimental to exposure. This approach states that successful exposure is not the result of the removal of the original association between the conditioned stimulus (CS) and the unconditioned stimulus (US). Rather, it is best explained by inhibitory learning (Bouton, 1993), that is, the creation of a secondary association that competes with the original association (the CS no longer predicts the US). By reducing the awareness of the relationship between the CS and the absence of US, distraction may hinder expectancy violation and therefore inhibitory learning.

An alternative account of exposure is based on the concept of self-efficacy (Bandura, 1988) or perceived control (Mineka & Thomas, 1999). The aim of exposure is to enhance the belief of phobics in their ability to overcome aversive situations. Learning an effective coping response would thus enhance exposure efficacy. From this perspective, distress during exposure should be maintained at a sustainable level—an aim that partial distraction helps to reach. Distraction during exposure, with neutral or positive material, would reduce distress, allowing participants to sustain the phobogenic situation and consequently to restore their sense of self-efficacy (Johnstone & Page, 2004; Oliver & Page, 2003, 2008; Penfold & Page, 1999). McNally (2007) suggested that the effect of distraction may vary as a function of the current level of fear. Distraction would be more beneficial if fear is above an optimal level, that is, by reducing fear to an intensity that the individual can tolerate and/or regulate. Those views are congruent with another claim that presenting the feared object simultaneously with positive stimuli may yield an affective valence change for the feared object (De Jong, Vorage, & Van Den Hout, 2000).

At least two important dimensions of potential distractors emerge from these models: schematicity and valence. Schematicity refers to the extent to which a stimulus is related to the fear schema. For example, for a spider phobic, the word “bite” is strongly related to the fear schema (“schematic element”), whereas the word “bill” is relatively unrelated to the fear schema (“non-schematic element”). Regarding valence, in the emotion appraisal theory (Scherer, 2001), valence appraisal refers to the evaluation of whether a stimulus is likely to result in pleasure or pain. This evaluation leads to distinct emotions and action tendencies: approach when the stimuli is judged as positive and avoidance when the stimulus is judged as repulsive.

The importance of schematicity is supported by preliminary evidence. Dethier, Bruneau, and Philippot (2015; Study 1 of this thesis) directly manipulated the schematicity of the concepts activated during exposure. Spider phobics were exposed to pictures of spiders and concurrently asked to form mental images of concepts associated or not with the fear schema (schematic and non-schematic elements, respectively). The results demonstrated that the activation of non-schematic concepts during exposure leads to a return of distress at follow-up, whereas the activation of schematic concepts during exposure leads to a decrease of emotional and avoidance responses at follow-up.

One limit of this study and of the other studies on distraction, however, is that valence was not controlled for. In Dethier et al.’s (2015) study, the words used in both sets (schematic vs. non-schematic) might have differed in terms of pleasantness. Schematic words such as “bite”, “fear” or “spider” lead to a more negative judgment than do non-schematic words such as “candle”, “pen” or “interest” and therefore induce different emotions and subsequent action tendencies (approach vs. avoidance) during exposure. In previous studies, distraction has been operationalized with considerable variations in regard to valence. In some studies, distraction was positive, e.g.., playing games with the therapist (Grayson et al., 1982; Schmid-Leuz et al., 2007) or listening to audio excerpts chosen for their intrinsic interest value (Craske, Street, et al., 1991). In a study by Rodriguez and Craske (1995), distraction involved both positive and negative slides projected on the wall in the high distraction

condition and neutral slides in the low distraction condition. Telch et al. (2004) used neutral words and images. In other studies, the valence was not determined: the presentation of a printed word next to the picture (Haw & Dickerson, 1998) and listening to an audiotape about leadership and goal setting (Rose & McGlynn, 1997). Finally, in some studies, distraction was considered neutral but could potentially be positive: conversations about future plans, studies and leisure activities (Johnstone & Page, 2004; Oliver & Page, 2003, 2008; Penfold & Page, 1999). Therefore, we cannot exclude the possibility that mood induction was part of the effects attributed to distraction. To our knowledge, no study has directly manipulated the valence of the distractor by comparing negative and positive distraction during exposure.

Beyond the schematicity and valence of the distractors, an important caveat is the control of participants' attentional focus during exposure. Indeed, most studies used partial distraction (i.e. divided attention between the phobic object and the distractor), but none controlled attention allocation towards the phobic object, assuming that it would automatically capture attention. This consideration is particularly important because the affective priming effect depends upon the explicit evaluation required by a task (Spruyt, De Houwer, & Hermans, 2009). In conclusion, studies investigating partial distraction during exposure should check whether explicitly identifying the phobic stimulus matters or not.

In view of these unexplored issues, in the present study, we examined the respective impact of partial distractor valence and schematicity on exposure efficacy while controlling for explicit processing of the phobic stimuli. Two sessions of exposure were given to spider phobics 6 days apart. During exposure, the nature of the partial distractor was manipulated in terms of schematicity and valence. There were three conditions: schematic negative (Sch−), non-schematic negative (nSch−) and non-schematic positive (nSch+). In order to check whether it matters that phobic stimuli are processed explicitly, we also manipulated the explicit versus implicit nature of the processing: Some participants performed the task while explicitly identifying the phobic stimuli (i.e. pressing a key only when a spider picture is presented) and others without explicitly identifying the phobic stimuli (i.e. pressing a key at each stimulus presentation). No differences between these types of processing in their effect on exposure were expected if phobic stimuli are automatically processed. Multimodal measures of exposure were recorded at pre- and post-exposure. We hypothesized that, if schematicity is the determining factor, the Sch− group would differ from both the nSch− and the nSch+ group in terms of efficacy. Conversely, if valence is the most relevant factor, both the Sch− and the nSch− group would differ from the nSch+ group in terms of efficacy.

2. Method

2.1 Participants

Participants were recruited through announcements on posters, in electronic mail, in a popular magazine and on social networks. The volunteers who scored over 4 (out of 7) on the Fear of Spiders Questionnaire (FSQ; Szymanski & O'Donohue, 1995) were invited to participate in the study. Three participants who expressed subjective distress (see the Measures section) lower than 20 (out of 100) when looking at pictures of spiders were

excluded from the study. All participants (n = 141) complied with the A, B, C, D, F and G specific phobia criteria of the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; DSM-IV-TR; American Psychiatric Association, 2000), as ascertained by the Structured Clinical Interview for DSM-IV-TR Axis I Disorders (First et al., 2002). *The E criterion (i.e. significant interference with daily functioning, social activities or relationships or marked distress caused by the phobia) was not retained as an inclusion criterion for this study because it is highly dependent on the living context of the individual. Considering this criterion may lead to exclude participants presenting all the relevant psychological mechanisms, hence unduly limiting sample size.* The diagnosis was performed by trained master students in clinical psychology who were supervised by a licensed psychotherapist. The sample consisted of 129 women and 12 men, their age ranging between 18 and 62 years (M = 25.28, SD = 9.34). None of the participants were medicated with psychotropic drugs. All participants gave their informed written consent before starting the survey. A transportation cost compensation of 20 euros was offered to participants who had to travel to the laboratory. The study protocol was approved by the ethical committee of the Psychology Department of the Université catholique de Louvain.

2.2 Measures

2.2.1 Control Measures

The trait version of the State-Trait Anxiety Inventory (STAI-T; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983; French adaptation: Bruchon-Schweitzer & Paulhan, 1993) is a 20-item self-reported measure of anxiety proneness. Cronbach's alpha (α) in the current sample was .90.

The Vividness of Visual Imagery Questionnaire (VVIQ; Marks, 1973; French validation: D'Argembeau & Van der Linden, 2006) is a 16-item scale that comprises situations (e.g., a relative's face, a common place) that the participant is asked to visualize and to rate for vividness (α = .82).

2.2.2 Outcome Measures

Subjective Units of Distress (SUD)

The Subjective Units of Distress Scale (Wolpe, 1968) measures the peak level of distress. This measure was taken both during exposure and when participants viewed spider pictures from the assessment set and neutral pictures (see the Materials section) on a scale from 0 (no distress) to 100 (extreme distress).

Physiological Measures

Physiological measures were recorded in response to the assessment set of spider pictures and neutral pictures (see Materials section). Skin conductance (SC) and heart rate (HR) were measured via the Active Two System (Biosemi, Amsterdam, Netherlands) and digitized by the software ActiView at a rate of 1024 Hz. For SC, two passive 8-mm Ag/AgCl electrodes

were attached to the forefinger and middle finger of the non-dominant hand with double-sided adhesive disks (13 × 5mm) and an electrolyte paste specifically formulated with 0.5% saline in a neutral base (TD-246, MedCat supplies, Netherlands). HR was measured by a digital photoplethysmograph sensor (MLT1020, ADI Instruments) placed on the thumb of the non-dominant hand. In order to reduce noise, we explicitly asked participants not to move during measurement.

Self-reported Measures

The FSQ (French validation: Delroisse & Philippot, 2007) comprises 18 items (7-point Likert-type scale) and measures the severity of spider phobia symptoms on two factors: emotional and avoidance responses (α = .86, e.g., "If I saw a spider right now, I would feel very panicky"), and anxious anticipation of spiders (α = .72, e.g., "Currently, I am sometimes on the lookout for spiders). The "emotional and avoidance responses" factor has been shown to be sensitive to change within a single exposure session, in contrast with the "anxious anticipation of spiders" factor (Dethier et al., 2015).

A Self-Efficacy Scale (SES) was created following the recommendations of Bandura (2006). It consists of items depicting steps of the Behavioural Avoidance Task (BAT), for which participants report their confidence in their capacity to perform it on a scale from 0 (cannot do at all) to 100 (highly certain can do) (α = .95).

Behavioural Measure

The BAT measured the number of steps that participants could achieve when confronted with a live spider. It consisted of a 22-step hierarchic exposure adapted from Merluzzi et al. (1991), from looking and touching a picture of a spider to standing 3 m from a spider enclosed in a container to letting the spider walk on one's forearm. The participants were asked to perform each of the steps and could stop whenever they decided. No verbal encouragement was given during the BAT in order to avoid any interaction effect with the experimenter.

2.3 Materials

Pictures were selected from the Geneva Affective Picture Database (Dan-Glauser & Scherer, 2011). Sixty pictures inducing high arousal were used for exposure (exposure set). Twelve neutral pictures of common objects (e.g., bike, computer, chair, lamp, pen) were also included in the exposure set. Six neutral pictures were used to assess the SUD and physiological variables in a resting state. Four sets of six spider pictures with similar mean arousal scores, $F(3,20) = .034$, $p = .991$, were used to assess the SUD and the physiological variables (assessment sets). A live spider was used for the BAT. This spider was 4 cm long (Agelenidae).

Three sets of 24 words were used during exposure: schematic negative words (e.g., spider, cobweb, fear), non-schematic negative words (e.g., error, bill, pollution) and non-schematic positive words (e.g., interest, sympathetic, cute). Schematic words were taken from words associated with fear of spiders generated by psychotherapists experienced in arachnophobia

(Dethier et al., 2015). The three sets of words were evaluated in pre-tests, with spider phobic participants scoring higher than 4 on the FSQ. Schematicity was operationalized as the degree to which a word evokes thoughts or images about spiders or the fear of spiders and was evaluated on a 7-point scale by a sample of 23 spider phobic participants not included in the main sample. Schematic negative words were significantly more schematic than both non-schematic negative words, $t(46) = 27.191$, $p < .001$, and non-schematic positive words, $t(46) = 25.857$, $p < .001$. No difference was shown between non-schematic negative and non-schematic positive words, $t(46) = .943$, $p = .351$. Imageability was measured with the same procedure as used by Desrochers and Thompson (2009) in the same sample. The three sets of words were similar in terms of imageability, $F(2,69) = .131$, $p = .878$. Valence was evaluated on a scale from -4 to +4 by another sample of 35 spider phobic participants who scored higher than 4 on the FSQ. Non-schematic positive words were significantly more positive than both schematic negative words, $t(46) = 9.934$, $p < .001$, and non-schematic negative words, $t(46) = 10.031$, $p < .001$. No difference in terms of valence was shown between schematic negative words and non-schematic negative words, $t(46) = 1.367$, $p = .178$. The three sets of words were similar in frequency on the basis of the lexical database of New et al. (2004), $F(2,69) = 1.271$, $p = .320$.

2.4 General Procedure

The study included two sessions. In the first session, participants performed measures during, before and after five trials of exposure with spider pictures from the exposure set. The second session tested a potential distress return as well as the efficacy of the treatment at post-reexposure. Two new trials of exposure were provided and measures were performed again. An overview of the procedure is provided in Figure 5. This study has a 2 (stimuli identification (between subjects)) × 3 (word set (between subjects)) × 4 (assessment time (within subjects)) design.

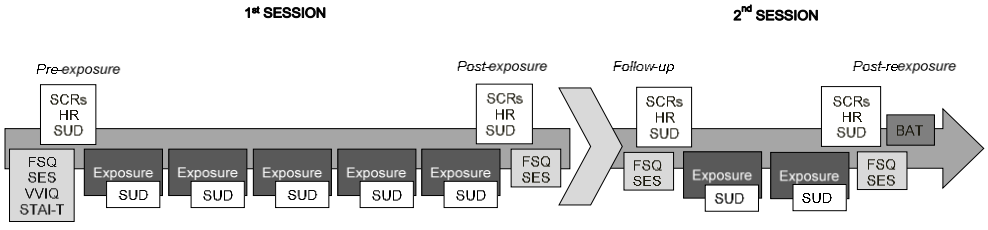

Figure 5. Procedure and measurements. BAT = Behavioural Avoidance Task; FSQ = Fear of Spiders Questionnaire; HR = heart rate; SCRs = skin conductance response; SES = Self-Efficacy Scale; STAI-T = State Trait Anxiety Inventory (trait version); SUD = subjective units of distress; VVIQ = Visual Vividness Imagery Questionnaire.

At the first session, participants completed the FSQ, the SES, the VVIQ and the STAI-T. SC, HR, and SUD were measured first in response to a set of six neutral pictures and then in response to a set of six spider pictures, each presented for 7 s and separated by a 4-s blank screen (after a resting period of 20 s). These measures were aimed at providing an assessment

of subjective and physiological reactivity both at rest and when confronted with spider pictures. Participants then performed five 5-min exposure trials consisting of an exposure to pictures of spiders from the exposure set. The participants performed a dual task during exposure. One task consisted of focusing on pictures that were displayed on the screen at positions varying randomly every 1 to 5 s. The concurrent task was to form a mental image of a word presented every 12.5 s via headphones and to verbally report the intensity of imagery on a scale from 0 (no clear image) to 10 (very clear image). Each spider and neutral picture of the measurement set and each of the 24 words (described in the Materials section) was presented once during each exposure trial. The duration of each picture presentation was pseudo-random, with the constraint that the exposure trial had to last 5 min overall and that three pictures had to be presented for the presentation of one word. No time was left between trials, except the time necessary for the participant to report the SUDs. After that, the next trial was run as soon as the participant was ready.

Participants were randomly allocated to one of the conditions that differed in terms of word valence and schematicity: Sch– (e.g., spider, cobweb, fear), nSch– (e.g., error, bill, pollution) and nSch+ (e.g., interest, sympathetic, cute). Moreover, we manipulated whether participants explicitly processed spider stimuli. Participants were therefore allocated to one of the resulting six groups: (1) schematic negative with explicit stimuli identification (n = 23), (2) schematic negative without explicit stimuli identification (n = 25), (3) non-schematic negative with explicit stimuli identification (n = 25), (4) non-schematic negative without explicit stimuli identification (n = 21), (5) non-schematic negative with explicit stimuli identification (n = 25), (6) non-schematic negative without explicit stimuli identification (n = 22).

A sixth of the pictures of the exposure set were neutral. Participants in the condition in which explicit identification of spider stimuli was required were asked to respond specifically (by pressing the space bar) at the presentation of a new spider picture, while participants in the condition in which no explicit identification of spider stimuli was required were instructed to press the space bar in response to any new spider or neutral picture. After each exposure trial, the participants were asked to report the peak level of distress (SUD) during exposure.

After the five exposure trials, subjective and physiological reactivity were measured in response to a novel set of six spider pictures. The use of different sets allowed us to test the generalizability of potential distress reduction in response to novel spider stimuli, as well as in the context in which the systematic use of the concurrent task was interrupted. Participants again completed the FSQ and the SES.

At the second session, participants completed all the measures before and after two exposure trials. Exposure trials were included at the second session in order to evaluate the differential effects of the conditions (trained during the first session) on the mediating processes during re-exposure. They also performed the BAT in the same room. The mean number of days between sessions was 6.35 (SD = .98). At the end of the experiment, the participants were fully debriefed about the objective of the study and oriented to a therapist

for those who were willing to engage in therapy. Five experimenters conducted this study as a function of their availability, with 23 to 41 participants per experimenter.

3. Results

3.1 Data Preparation

3.1.1 Skin conductance

SC raw data was analysed with Ledalab (Benedek & Kaernbach, 2010) on MATLAB 8.0 (Mathworks, Natick, MA, USA). No filter or smoothing was applied. A continuous decomposition analysis was performed to distinguish phasic and tonic activity. A response window of 1 to 4 s after stimulus onset and a minimum amplitude criterion of .01 µS were used (Boucsein et al., 2012). Skin conductance responses (SCRs) in response to each of the presented pictures were range-corrected by dividing each response of an individual by his or her maximal response (Lykken & Venables, 1971). Range-corrected SCRs were then square root transformed for reducing skewness. Finally, the range-corrected square root transformed SCRs of each measurement set were averaged in order to provide an index of the electrodermal activity for each of the repeated confrontations with spider pictures (pre-exposure, post-exposure, follow-up and post-reexposure).

3.1.2 *Heart rate*

Pulse peaks were detected by using a peak detection algorithm (based on first derivative; FD1) from Friesen et al. (1990, p. 92) and applied in MATLAB. Signals that were not suitable for peak detection were excluded (3.94% of the data). Signals were visually inspected for false detection and the number of beats per minute was calculated for each measurement set.

3.2 Statistics

Statistical analyses were performed with SPSS 21 (IBM, Armonk, NY, USA). Preliminary analyses tested the equivalence between dropouts and finishers, a potential stimuli identification effect, group equivalence and a potential effect of the words used on imagery intensity. The equivalence between dropouts and finishers was tested with chi-squared tests and t-tests on independent samples. The stimuli identification effect was tested with two-way repeated measures analyses of variance (ANOVAs). The differential effect of condition on imagery intensity was tested separately in each of the sessions with two-way repeated measures ANOVAs.

The main results will be presented along the following structure: (1) Within-session effects (changes that occurred during exposure), (2) Between-sessions effects (changes that occurred from post-exposure to follow-up) and (3) Efficacy at the end of treatment (at post-reexposure). In regard to the literature, the amplitude of within-session effects does not seem to predict overall improvement. Moreover, based on the notion that there is a discordance between fear expressions versus learning, it has been recommended to assess the outcome of

exposure independently of the indices of emotional processing in order to avoid tautology (Craske et al., 2008). Within-session effects are therefore not considered in this study as critical indices of outcome but as relevant in order to disentangle the mechanisms implied in successful exposure, namely emotional processing and self-efficacy. The distress intensity changes in response to the regular stimuli used during exposure, to novel sets of pictures (generalizability) and in response to spiders more generally (self-reported questionnaire) are considered as various indices of the activation of the fear structure (cf emotional processing theory). Moreover, potential changes in self-efficacy offer the possibility to test an alternative explanation of the success of exposure therapy. Between session effects aim at testing a potential return of fear after a follow-up period. Efficacy is tested at the end of treatment because we consider this measurement time to be the most relevant index of a successful therapy more especially in terms of behavioural achievement. Within and between sessions effects were tested thanks to two-way repeated measures ANOVAs. In regard to the efficacy at the end of treatment, one-way ANOVAs were performed. The aim for including a nSch– group in the experimental was to test the influence of valence and schematicity. The extent to which the result pattern of this group is closer to one of the other groups should be indicative of the most determining factor. We hypothesized that, if schematicity is the determining factor, the Sch– group would differ from both the nSch– and the nSch+ group in terms of efficacy. Conversely, if valence is the most relevant factor, both the Sch– and the nSch– group would differ from the nSch+ group in terms of efficacy. Therefore, when the analyses revealed an effect of the experimental conditions, and in order to disentangle the respective influence of valence and schematicity of the partial distractor used during exposure, specific contrasts were tested with the LMATRIX and MMATRIX subcommands in SPSS, as described in Howell and Lacroix (2012). The contrasts tested two models in which the predominance of schematicity and valence varied. The schematicity contrasts tested, on the one hand, whether the non-schematic conditions (positive and negative) displayed similar results and whether the results observed in the non-schematic conditions differed from those of the schematic condition (negative) (Sch– ≠ (nSch– = nSch+)). The valence contrasts tested, on the other hand, whether the negative conditions (schematic and non-schematic) displayed similar results and whether the results observed in the negative conditions differed from those of the positive condition (non-schematic) ((Sch– = nSch–) ≠ nSch+). In the following sections, the terms schematicity contrasts and valence contrasts are used to refer to these statistical tests. No adjustment was applied to the results of these contrasts. The means and standard deviations of each outcome variable are presented in Appendix 4.A (see Annex 4).

3.2.1 Preliminary Analyses

Dropouts

Ten participants (7.09%) did not complete the second session. There was no significant difference in dropout frequency between conditions, $\chi^2(2) = .218$, $p = .897$ (three in Sch–, three in nSch–, and four in nSch+). Dropouts were compared to finishers on demographic and outcome variables. Dropouts reported more emotional and avoidance responses (FSQ)

at post-exposure, $t(13) = 2.682$, $p = .019$, as well as lower SUD at pre-exposure, $t(139) = 2.257$, $p = .026$, and lower trait anxiety (STAI-T), $t(16) = 4.086$, $p < .001$. They also reported more self-efficacy at pre-exposure, $t(139) = 2.189$, $p = .030$, but not at post-exposure, $t(139) = -.191$, $p = .849$. A repeated measure ANOVA showed a significant Time × Finisher status interaction in regard to self-efficacy between pre- and post-exposure, $F(1,139) = 5.560$, $p = .02$. Finishers showed a significant increase in self-efficacy ($p < .001$), which was not found among dropouts. Dropouts seemed to have overestimated their capacity to confront spiders before exposure. They adjusted their evaluations after exposure. There were no significant differences for other variables.

Stimuli Identification

We checked for the impact of adding explicit visual stimuli identification. No differences between these types of processing in their effect on exposure were expected. Similar analyses to those presented in the following section (efficacy analyses) have been performed. A two-way repeated measures ANOVA with Time (pre-exposure and post-exposure) as a within-subject factor and Stimuli identification and Condition as between-subjects factors was conducted. Another two-way repeated measures ANOVA with Time (post-exposure and follow-up) as a within-subject factor and Stimuli identification and Condition as between-subjects factors was also conducted. The results are presented in Appendix 4B (see Annex 4). This manipulation did not lead to any significant effect[6]. For clarity, we therefore present the results without this factor. The results imply that the main factor, i.e. the type of words used in imagery, were similar to (sometimes even more significant than) those presented in the next section.

Imagery Intensity

Whereas forming mental images that are not related to the task at hand (non-schematic) may be more difficult than forming mental images related to the task (schematic), we expected the non-schematic words to yield less intense images than the schematic words, at least for the first trials. In order to check this hypothesis, a two-way repeated measure ANOVA with Time (Trial 1, Trial 2, Trial 3, Trial 4, Trial 5) as a within-subject factor and Condition as a between-subjects factor was computed on the mean intensity of imagery reported during each of the exposure trials of the first session. The results revealed a significant main effect of Time, $F(4,552) = 35.687$, $p < .001$, $\eta^2 = .205$, modulated by a significant Time × Condition interaction, $F(8,552) = 11.309$, $p < .001$, $\eta^2 = .141$. Paired comparisons demonstrated that at Trial 1, participants in the schematic negative condition reported higher imagery intensity scores ($M = 7.256$, $SD = .247$) than did participants in the non-schematic negative condition ($M = 5.758$, $SD = .252$, $p < .001$) and in the non-schematic positive condition ($M = 5.822$, $SD = .250$, $p < .001$), with no significant difference between the latter conditions ($p = .728$). From the first to the fifth trial, the imagery intensity scores

[6] For three of the outcome variables (of 13), the triple Time × Stimuli identification × Condition (type of words used in imagery) interaction was at the edge of significance. Considering the fact that borderline effects imply second-order effects and because of their lack of stability across measures, these results should not be interpreted.

linearly increased in both the non-schematic negative condition ($p < .001$) and the non-schematic positive condition ($p < .001$), in contrast with the schematic negative condition in which the scores remained stable ($p = .929$). At the fifth trial, no significant difference was observed between conditions. The schematic negative condition scores ($M = 7.240$, $SD = .275$) did not differ significantly from both the non-schematic negative condition ($M = 7.006$, $SD = .281$, $p = .553$) and the non-schematic positive condition scores ($M = 7.100$, $SD = .258$, $p = .929$), with no significant difference between the latter conditions ($p = .812$). A similar two-way repeated measure ANOVA with Time (Trial 1, Trial 2) as a within-subject factor and Condition as a between-subjects factor was computed on the mean intensity of imagery reported during the exposure trials of the second session. The results showed a significant main effect of Time, $F(1,128) = 8.942$, $p < .003$, $\eta^2 = .065$, with an increase from the first ($M = 7.036$, $SD = 1.769$) to the second trial ($M = 7.206$, $SD = 1.791$), but no significant Time × Condition interaction, $F(2,128) = 1.961$, $p = .145$, $\eta^2 = .030$ These analyses revealed that there was more difficulty in forming mental images of words that were not related to the task. This increased difficulty seemed to be compensated for across trials by a learning effect.

Group Equivalence

The number of participants per condition ranged from 46 to 48. Preliminary analyses indicated no differences across conditions on the outcome variable measured at pre-exposure, i.e. on emotional and avoidance responses, $F(2,138) = .218$, $p = .804$; anxious anticipation of spiders, $F(2,138) = .1.382$, $p = .255$; self-efficacy, $F(2,138) = .772$, $p = .464$; and reactivity to spider pictures, i.e. SUD, $F(2,138) = .040$, $p = .961$, SCRs, $F(2,137) = .680$, $p = .508$, and HR, $F(2,132) = .093$, $p = .911$; as well as on reactivity to neutral images, i.e. SUD, $F(2,138) = .493$, $p = .612$, SCRs, $F(2,136) = .512$, $p = .600$, and HR, $F(2,131) = .143$, $p = .867$. All groups were similar in terms of age, $F(2,138) = 1.152$, $p = .289$; gender ratio, $\chi^2(2) = .509$, $p = .775$; number of days between sessions, $F(2,128) = 1.217$, $p = .299$; and trait-anxiety, $F(2,138) = .185$, $p = .831$. A significant difference between groups emerged on the VVIQ, $F(2,135) = 3.111$, $p = .048$, but no post hoc differences were shown after Bonferroni correction[7].

3.2.2 Main Analyses

Within-session Effects[8]

Subjective distress habituation during exposure. We hypothesized that forming mental images of negative schematic words may induce a weaker short-term decline in anxiety than would forming mental images of positive non-schematic words. This hypothesis is based on the emotional processing theory that states that the activation of distress during exposure is

[7] However, in order to exclude any potential role of this variable on the observed effects of the treatment, we computed Pearson's correlations between the VVIQ and the scores of differences between pre-exposure and post-exposure. None of the correlations were significant.

[8] Those analyses tested the changes observed during the first session of exposure. Similar analyses realized for the second session are reported in Appendix 4C (see Annex 4). Overall, the effect tested in the first session in regard to subjective distress during exposure tended to maintain in the second session. However, the observed effect for SCRs and emotional and avoidance responses did not maintain.

dependent upon the degree to which the content of the evocative information is related to the fear structure (Foa & Kozak, 1986). A two-way repeated measure ANOVA with Time (first and last trial of exposure) as a within-subject factor and Condition as a between-subjects factor was computed on the SUD reported after each trial of exposure in order to evaluate a potential differential within-session habituation effect between conditions. The results are presented in Table 4.

Table 4. Two-way repeated measures analyses of variance with Time as a within-subject factor and Condition as a between-subjects factor

Variable	Time effect					Time × Condition effect				
	df_n	df_d	F	p	η^2	df_n	df_d	F	p	η^2
Habituation during exposure trials (SUD; first and last trial)	1	138	166.593	<.001	.447	2	138	3.086	.049	.043
Generalizability (pre-exposure and post-exposure)										
SUD	1	138	100.314	<.001	.421	2	138	.446	.641	.006
SCRs	1	136	153.908	<.001	.531	2	136	2.301	.104	.033
HR	1	131	265.463	<.001	.670	2	131	.234	.792	.004
Reported symptoms (pre-exposure and post-exposure)										
Emotional and avoidance responses	1	138	71.259	<.001	.341	2	138	3.225	.043	.045
Anxious anticipation of spiders	1	138	1.829	.179		2	138	1.141	.322	.016
Self-efficacy (pre-exposure and post-exposure)	1	138	36.788	<.001	.210	2	138	1.840	.163	.026

Note. SUD = subjective units of distress; SCRs = skin conductance responses (square root transformed); HR = heart rate.

A significant main effect of Time was modulated by a significant Time × Condition interaction. Schematicity and valence contrasts were performed on the SUD changes observed from the first to the last trial. The results (presented in Figure 6) supported the valence model but not the schematicity model. Participants in the negative conditions (schematic and non-schematic) did not differ in the habituation of subjective distress from the first to the last trial, $F(1,92) = .002$, $p = .965$, $\eta^2 < .001$. In contrast, participants in the positive condition (non-schematic) showed a significantly greater habituation than in the negative conditions, $F(1,138) = 6.172$, $p = .014$, $\eta^2 = .043$. Conversely, participants in the non-schematic conditions (positive and negative) displayed dissimilar decreases of subjective distress from the first to the last trial, $F(1,91) = 6.184$, $p = .015$, $\eta^2 = .064$, which questions the schematicity model.

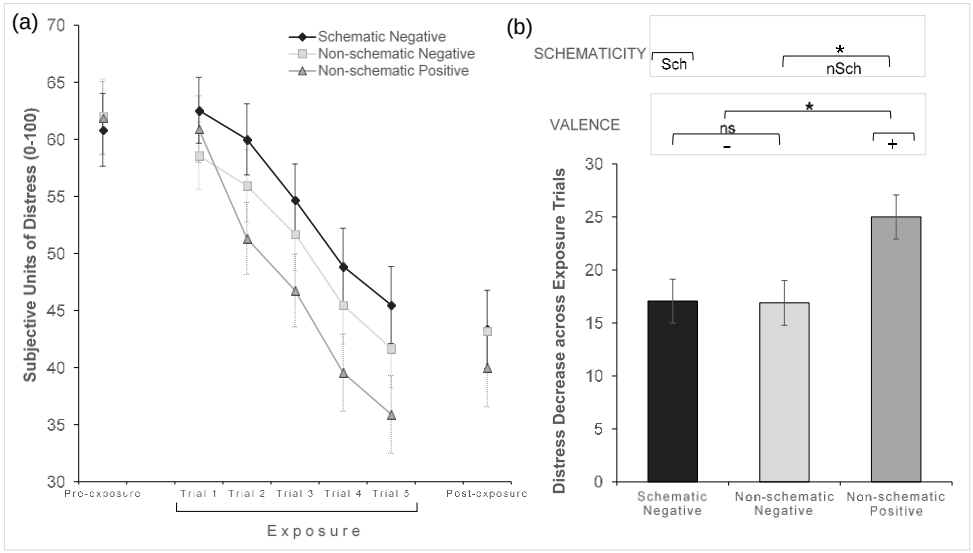

Figure 6. (a) Subjective units of distress (SUD) as a function of time and treatment condition. The figure represents both the habituation of SUD during the exposure trials and the generalizability in response to novel sets of pictures at pre- and post-exposure. (b) SUD decrease across exposure trials (from trial 1 to trial 5) as a function of treatment condition. Asterisks represent the significance of the tests of contrast. Error bars represent standard errors. nSch = non-schematic condition; Sch = schematic condition; + = positive condition; – = negative condition; ns = >.10; * $p < .05$.

Generalizability. In contrast to expectations for habituation, no potential benefit of non-schematic positive imagery over schematic negative imagery was expected for the generalizability of potential differential distress habituation to novel phobic stimuli in a context in which there was no concurrent task (both for the SUD and physiological measures). This hypothesis is based on the fact that the habituation to specific stimuli during a session of exposure does not necessarily generalize to other set of stimuli (Craske et al., 2008). By extension, we hypothesize that a potential benefit of a distraction (vs. focusing) during exposure will not likely be generalized and helpful in response to other stimuli. Two-way repeated measure ANOVAs with Time (pre-exposure and post-exposure) as a within-subject factor and Condition as a between-subjects factor were computed on SUD, SCRs and HR measured in response to novel sets of pictures. The results are presented in Table 4.

In regard to the SUD, we found a significant main effect of Time with a decrease from pre- to post-exposure in all conditions, but no Time × Condition interaction effect. The observed increased habituation in the positive condition (non-schematic) when compared to the negative conditions (non-schematic and schematic) did not generalize. In regard to SCRs, a significant main effect of Time was modulated by a weak tendency for a Time × Condition interaction ($p = .104$) between pre- and post-exposure. Schematicity and valence contrasts performed on the change in SCRs observed from pre-exposure to post-exposure indicated that valence was the most relevant model. The results are presented in Figure 7. Participants in the negative conditions (schematic and non-schematic) did not differ in their decrease in SCRs, $F(1,90) = .179$, $p = .673$, $\eta^2 = .002$. In contrast, participants in the positive condition

(non-schematic) displayed a significantly weaker decrease in SCRs than did those in the negative conditions (schematic and non-schematic), $F(1,136) = 4.424$, $p = .037$, $\eta^2 = .032$. The schematicity model was not valid because participants in the non-schematic conditions (positive and negative) displayed dissimilar decreases in SCRs from pre-exposure to post-exposure, $F(1,91) = 4.055$, $p = .047$, $\eta^2 = .043$. For HR, a significant effect of Time but no Time × Condition interaction was shown. HR decreased in all conditions.

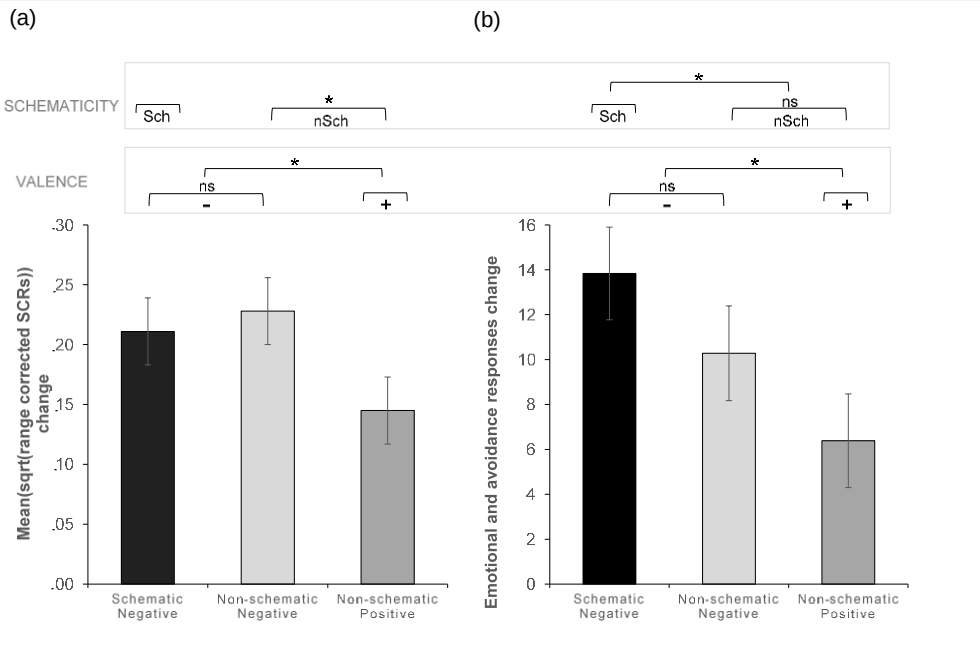

Figure 7. (a) Skin conductance responses (SCRs) decrease from pre- to post-exposure as a function of treatment condition. (b) Emotional and avoidance responses (Fear of Spiders Questionnaire) decrease from pre- to post-exposure as a function of treatment condition. Error bars represent standard errors. Asterisks represent the significance of the tests of contrast. nSch = non-schematic condition; Sch = schematic condition; sqrt = squared root transformation; + = positive condition; – = negative condition; ns = >.10; * $p < .05$.

Reported Severity of Symptoms. We hypothesized no impact of the manipulation on the observed change in the self-reported severity of symptoms from pre-exposure to post-exposure. Similarly as to the previous hypothesis, we did not expect distraction to be helpful in regard to the reported severity of symptoms expressed in response to spiders more generally. Two-way repeated measure ANOVAs with Time (pre-exposure and post-exposure) as a within-subject factor and Condition as a between-subjects factor were computed on the dimensions of the FSQ questionnaire. The results are presented in Table 4.

In regard to emotional and avoidance responses, a significant main effect of Time was modulated by a significant Time × Condition interaction effect between pre- and post-exposure. Schematicity and valence contrasts performed on the change in emotional and avoidance responses observed from pre-exposure to post-exposure indicated that both models were valid. The results are presented in Figure 7. Participants in the negative conditions

(schematic and non-schematic) did not differ in their decrease of emotional and avoidance responses, $F(1,92) = 1.192$, $p = .278$, $\eta^2 = .013$. In contrast, participants in the positive condition (non-schematic) displayed a significantly weaker decrease in emotional and avoidance responses than did those in the negative conditions (schematic and non-schematic), $F(1,138) = 4.935$, $p = .028$, $\eta^2 = .035$. Reciprocally, participants in the non-schematic conditions (positive and negative) did not differ in their decrease in emotional and avoidance responses, $F(1,91) = 2.393$, $p = .125$, $\eta^2 = .026$. Participants in the schematic condition (negative) displayed a significantly larger decrease in emotional and avoidance responses than did those in the non-schematic conditions (positive and negative), $F(1,138) = 4.685$, $p = .032$, $\eta^2 = .033$. For anxious anticipation of spiders, no significant effect of Time or Time × Condition interaction was observed.

Self-efficacy. Those analyses allowed to test an alternative hypothesis stated by the proponents of distraction who argued that the use of distraction is beneficial for increasing individuals' confidence in their ability to confront a spider. If this hypothesis is true, then we should observe a larger increase in self-efficacy in the non-schematic conditions as compared with the schematic condition. In order to test this hypothesis, we conducted a two-way repeated measure ANOVA with Time (pre-exposure and post-exposure) as a within-subject factor and Condition as a between-subjects factor on self-efficacy. The results are presented in Table 4. A significant effect of Time but no Time × Condition interaction was shown. Self-efficacy increased regardless of conditions during the first session.

Between-sessions Effects

We hypothesized that participants who formed mental images of non-schematic positive words would show a stronger return of distress between sessions than would participants who formed mental images of schematic negative words. This hypothesis is based on the results observed in Dethier et al. (2015). Such a stronger rebound effect was also expected on the self-reported severity of symptoms. We also wondered whether physiological data would be consistent with such effects: The participants who formed mental images of non-schematic positive words would show a stronger return of fear responses between sessions than would participants who formed mental images of schematic negative words. No specific hypothesis was formulated in regard to self-efficacy. Two-way repeated measure ANOVAs with Time (post-exposure and follow-up) as a within-subject factor and Condition as a between-subjects factor were computed on the outcome variables. These analyses allowed us to test a potential return of distress at follow-up. The results are presented in Table 5.

Table 5. Two-way repeated measures analyses of variance with Time (post-exposure and follow-up) as a within-subject factor and Condition as a between-subjects factor

Variable	Time effect					Time × Condition effect					Condition effect				
	df_n	df_d	F	p	η^2	df_n	df_d	F	p	η^2	df_n	df_d	F	p	η^2
Reactivity measures															
SUD	1	128	22.711	<.001	.151	2	128	.476	.622	.007	2	128	.384	.682	.006
SCRs	1	125	18.658	<.001	.130	2	125	1.051	.353	.017	2	125	.376	.688	.006
HR	1	120	31.109	<.001	.206	2	120	.218	.805	.004	2	120	.191	.827	.003
Reported symptoms															
Emotional and avoidance responses	1	128	.173	.679	.001	2	128	1.123	.328	.017	2	128	2.921	.057	.044
Anxious anticipation of spiders	1	128	9.753	.002	.071	2	128	.139	.871	.002	2	128	.727	.485	.011
Self-efficacy	1	128	.792	.375	.006	2	128	.419	659	.006	2	128	.451	.638	.007

Note. SUD = subjective units of distress; SCRs = skin conductance responses (square root transformed); HR = heart rate.

The analyses of the variables measured in response to novel sets of pictures, namely SUD, SCRs and HR, showed significant Time effects but no significant Time × Condition interactions or Condition effects. Each of these variables increased from post-exposure to follow-up regardless of conditions, indicating some return of distress.

In regard to emotional and avoidance responses, no significant effect of Time or Time × Condition interaction was shown, but there was a marginal effect of Condition. Schematicity and valence contrasts performed on emotional and avoidance responses measured both at post-exposure and follow-up indicated that both schematicity and valence models were valid. Participants in the negative conditions (schematic and non-schematic) did not differ in emotional and avoidance responses, $F(1,86) = 1.326$, $p = .253$, $\eta^2 = .015$. In contrast, participants in the positive condition (non-schematic) displayed significantly higher emotional and avoidance responses than did those in the negative conditions (schematic and non-schematic), $F(1,128) = 4.171$, $p = .043$, $\eta^2 = .032$. Reciprocally, participants in the non-schematic conditions (positive and negative) did not differ in emotional and avoidance responses, $F(1,84) = 1.594$, $p = .210$, $\eta^2 = .019$. Participants in the schematic condition (negative) displayed significantly weaker emotional and avoidance responses than did those in the non-schematic conditions (positive and negative), $F(1,128) = 4.551$, $p = .035$, $\eta^2 = .034$. A significant effect of Time on anxious anticipation was observed, with a decrease from post-exposure to follow-up. No Time × Condition interaction or Condition effect was shown. No significant effect was observed for self-efficacy.

Efficacy at the End of Treatment

We hypothesized that participants who formed mental images of positive non-schematic words would show more avoidance when confronted with a real spider when compared with participants who formed mental images of schematic words. Moreover, we hypothesized that

participants who formed mental images of positive non-schematic words would experience more subjective distress when confronted to a novel set of pictures of spiders and more emotional and avoidance responses. This hypothesis is based on emotional processing theory that states that the use of distraction will likely result in less emotional processing and therefore lesser resulting outcomes. We had no specific hypothesis in regard to physiological variables and self-efficacy.

In order to test these hypothesis, one-way ANOVAs were computed on the outcome variables measured at post-reexposure. In regard to the BAT, a significant effect of Condition was observed, $F(2,128) = 6.209$, $p = .003$, $\eta^2 = .088$. Schematicity and valence contrasts performed on the BAT indicated that valence was the most relevant model. The results are presented in Figure 8. Participants in the negative conditions (schematic and non-schematic) did not differ in terms of avoidance behaviour, $F(1,86) = .348$, $p = .557$, $\eta^2 = .004$. Moreover, participants in the positive condition displayed more avoidance than did those in the negative conditions (schematic and non-schematic), $F(1,128) = 12.003$, $p = .001$, $\eta^2 = .086$. The schematicity model was not supported, as participants in the non-schematic conditions (positive and negative) displayed dissimilar avoidance behaviours, $F(1,84) = 7.725$, $p = .007$, $\eta^2 = .084$.

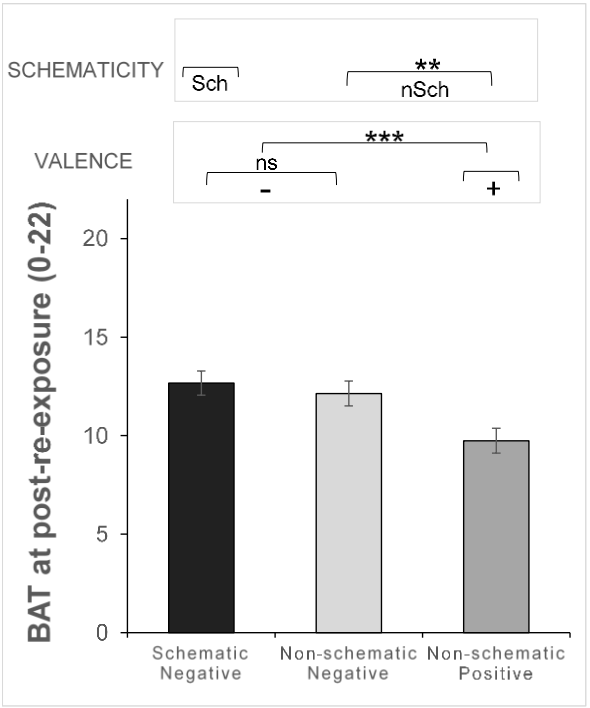

Figure 8. Behavioural Avoidance Task as a function of treatment condition. A lower score expresses more avoidance. Error bars represent standard errors. Asterisks represent the significance of the tests of contrast. nSch = non-schematic condition; Sch = schematic condition; + = positive condition; – = negative condition; ns = >.10; ** $p < .01$; *** $p < .001$.

No effect of Condition was evidenced for the SUD in response to a novel set of spider pictures, $F(2,128) = 1.563$, $p = .214$, $\eta^2 = .024$, emotional and avoidance responses, $F(2,128) = 1.031$, $p = .360$, $\eta^2 = .016$, anxious anticipation of spiders, $F(2,128) = .394$ $p = .675$, $\eta^2 = .006$, SCRs, $F(2,127) = .520$, $p = .596$, $\eta^2 = .008$, HR, $F(2,124) = .116$, $p = .891$, $\eta^2 = .002$, and self-efficacy, $F(2,128) = .644$, $p = .527$, $\eta^2 = .010$.

4. Discussion

This study aimed to examine the respective impact of valence and schematicity of a partial distractor during exposure. Results demonstrate that the participants who were required to form mental images of schematic negative words during exposure displayed results that were similar to those of participants who were required to form images of non-schematic negative words on all variables (i.e. habituation of SUD during exposure, decrease in SCRs, decrease in self-reported emotional and avoidance responses between pre- and post-exposure, avoidance behaviours when confronted with a real spider). In contrast, when compared to participants in the former conditions, participants who were required to form non-schematic positive mental images showed a stronger habituation of subjective distress during exposure and this effect tended to maintain in the second session. However, this immediate distress relief did not index a therapeutic improvement in the longer run. Indeed, when confronted with novel sets of pictures but without forming mental images of non-schematic positive concepts, these participants showed the same decline in distress as those in the other two conditions, suggesting that the apparent benefit experienced during exposure with positive distractors did not generalize. Moreover, these participants showed poorer declines on other variables than did those in the other two conditions: a weaker decline in emotional and avoidance responses from pre- to post-exposure (this difference persisting marginally at follow-up but not at post-reexposure) together with a weak tendency (p=.104) for weaker decline in SCRs from pre-exposure to follow-up. Finally, they manifested more avoidance when confronted with a real spider at post-reexposure.

A potential interpretation of these converging indices of therapeutic efficacy is that participants in the non-schematic positive condition engaged in more avoidance from emotional aversive states than did those in the other groups. Although the findings for self-reported emotional and avoidance responses did not allow us to differentiate the valence against schematicity models, the contrasts performed on subjective distress during exposure, on behavioural avoidance and, to a lesser extent, on SCRs did favour the valence model. Moreover, no differences between the two negative conditions were observed. These elements suggest that successful emotional processing during exposure does not rely much on schematicity, but rather on the focus on negative affect and the capacity to tolerate it. Additionally, adding explicit visual stimuli identification did not lead to any significant and stable effect, suggesting that spiders automatically captured attention of phobic participants[9].

These data have clear implications in regard to the postulated mechanisms implied in exposure therapy. In contrast with the principles of emotional processing theory, maximal

[9] This interpretation needs to be furthered by experimental studies in which automaticity is manipulated.

matching of the elements that are in the scope of attention with fear structure elements does not seem to be a key factor for successful exposure. Rather, the results are congruent with the notion that emotional aversive state toleration is a crucial factor in exposure efficacy. The maximal efficacy of exposure may rely on two conditions: activation of the fear of spiders and maintenance of the confrontation with an aversive emotional state. These conditions suggest that the critical matter for successful exposure rests more in the process that is being engaged, namely emotional acceptance or tolerance of aversive affect, rather than the specific content of the emotional information being attended to.

This latter conclusion calls for reconsideration of distraction during exposure. The critical feature of distraction is not the fact of being distracted from the phobic stimulus, but rather the fact of performing emotional avoidance. In other words, partial distraction does not seem to be harmful, as long as it will not entail avoidance of the negative affect induced by exposure to the phobic stimulus. This interpretation is consistent with the claim that emotional avoidance is deleterious and results in the maintenance of the avoided emotion (Barlow & Allen, 2007). More particularly, it is also congruent with studies showing the deleterious effect of avoidance and the contrasted effects of acceptance of an aversive state versus its suppression (for a comprehensive review, see Salters-Pedneault, Tull, & Roemer, 2004, and Helbig-Lang & Petermann, 2010). For example, Levitt et al. (2004) exposed patients with panic disorder to inhalation of 5.5% carbon dioxide. Prior to exposure, participants received instructions about emotion regulation strategies (acceptance or suppression) or heard a neutral narrative (control group). The acceptance group was significantly less anxious and less avoidant than were the suppression or control groups.

The present results also bring to light the importance of distinguishing the observations made during exposure and the resulting therapeutic efficacy. Indeed, the stronger habituation of distress in the non-schematic positive condition could have been interpreted as indexing therapeutic efficacy. However, re-confrontation with novel sets of pictures demonstrated that the benefit of distraction did not generalize and even that non-schematic positive participants displayed poorer efficacy on several other outcome variables.

These results are consistent with those of Dethier et al. (2015), who reported greater benefits of schematic imagery (negative) over non-schematic imagery (neutral and positive). However, because valence was not controlled for, the effect of schematicity has been overrated. The results of the present study lead us to reconsider the interpretation of the former observations. Rather than the intensity of the association with the fear structure, the fact of being confronted or not with a sustained emotional aversive state seems to be the mechanism that best accounts for the observed effects. This interpretation is also consistent with the observations of Tabibnia, Lieberman, and Craske (2008), who confronted spider phobics with images of spiders on a screen, followed by the presentation of a cross (exposure only group), or negative words unrelated to spiders (negative label group), or of neutral or slightly positive words (neutral label group). They reported a benefit during exposure to the subsequent presentation of an unrelated negative word, with greater attenuation of SCRs. Similar results were shown with healthy controls presented with threatening pictures.

Maintaining the confrontation with the emotional aversive state rather than escaping it therefore seems to be an important active ingredient of exposure.

A similar manipulation was performed in a clinical context (Kircanski, Lieberman, & Craske, 2012). Eighty-eight spider-fearful individuals were repeatedly exposed to a live spider while uttering a sentence that included either negative words to describe the spider and their emotional response to it (affect-labelling group), neutral words to describe the spider and a way of thinking about it in order to feel less negative about it (reappraisal group), or words to describe objects that could be found in their home and the location of these objects (distraction group). An additional group received no verbalization instructions (exposure alone). At the 1-week post-test, the affect-labelling group demonstrated reduced SCRs in comparison with the other groups, as well as marginally greater approach behaviour than the distraction group. No differences were shown in self-reported fear. Moreover, the percentage of anxiety and fear words used during exposure was correlated with a greater reduction in SCRs.

These results may seem to conflict with those of studies that showed a positive effect of valence combined with exposure. For example, Dour, Brown, and Craske (2016) found a beneficial effect of the combined presence of exposure and positive valence training that aimed to change the valence of spiders towards a more positive evaluation. Nonetheless, the valence was manipulated after exposure in that study, whereas the valence was manipulated during exposure in the present study. This difference between studies suggests that the time at which the valence is manipulated is critical and may induce detrimental effects when performed during exposure and beneficial effects when performed afterwards. Further studies should investigate this issue more carefully.

The proponents of the importance of self-efficacy (Johnstone & Page, 2004; Oliver & Page, 2003, 2008; Penfold & Page, 1999) and of sense of control would predict that the simultaneous presentation of non-schematic positive words might help to improve self-efficacy and therefore produce better therapeutic effects. In the same vein, the proponents of counterconditioning may argue that simultaneously presenting the feared stimuli and the positive valence stimuli may change its affective valence. In contrast with these predictions, our results showed that, on the one hand, the presentation of non-schematic positive concepts does not improve self-efficacy to a larger extent than does the presentation of schematic and non-schematic negative words. On the other hand, the presentation of non-schematic positive concepts was associated with poorer behavioural approaches and more emotional and avoidance responses. It cannot be excluded that self-efficacy plays a role in the behavioural effects of exposure as stated by Bandura (1988). Indeed, all groups improved in self-efficacy and it is reasonable to assume that they all improved in terms of behavioural approach. Unfortunately, as we measured behavioural approach only at the end of the treatment, this cannot be ascertained in the present data. However, our data indicate that the differential impact of our manipulations is not accounted for by changes in self-efficacy. Indeed, the participants that formed images of negative words do not report more confidence in their ability to cope before being confronted to a real spider relative to the non-schematic positive group but exhibited more approach at post-reexposure.

Despite convincing elements regarding the interpretation of the results in terms of a detrimental effect of emotional avoidance shown in the non-schematic positive group, some non-significant results may limit our conclusions. We failed to show a significant effect of the experimental manipulations on the physiological variables and on the self-reported anxious anticipation of spiders in the first session. Surprisingly, no significant between-session effects of the manipulation indicating a detrimental effect of the use of non-schematic positive imagery during exposure were demonstrated from post-exposure to follow-up, and a stronger return of distress could have been expected in the positive non-schematic condition. Moreover, the effect of the condition on emotional and avoidance responses was only marginal at follow-up and did not persist at post-reexposure and the effect of condition at post-reexposure was only significant in regard to behavioural achievement but not in regard to the other variables (SUD and emotional and avoidance responses). Finally, although results are interpreted in terms of emotional avoidance versus acceptance, the experimental procedure did not directly measure or manipulate these strategies. This study is the first to directly manipulate schematicity and valence, offering a clearer view of the mechanisms implied in exposure. Moreover, the repeated measurement of several indicators allowed us to test the many facets of anxiety and the maintenance of the effects at follow-up. However, this study has several limitations. We did not perform a manipulation check that may have ensured that participants adhered to their respective experimental instructions. In addition, the experimental procedure did not include an exposure-alone condition, which prevents us from directly comparing our partial distraction conditions, especially the schematic negative condition to exposure alone. A prior study, however, showed that exposure alone did not stand out from the schematic negative condition (Dethier et al., 2015). Moreover, the present study did not assess positive mood, which may be relevant for determining whether the various conditions induced differential positive moods. Furthermore, the study did not comprise an inter-rater reliability assessment of the diagnostic assessment. In addition, the observed results in terms of heart rate did not allow to distinguish our experimental conditions. Future studies should measure the cardiac activity with electrodes placed on the chest in order to allow the computation of heart rate variability, which is a subtler index of sympathovagal activity. Finally, we recommend the adaptation of the Fear of Spiders Questionnaire in order to provide a more contextualized measure of self-reported symptoms. Indeed, the present formulation of this questionnaires might be too general to capture specific changes in a brief time frame. Despite these limitations, this study demonstrates that the processes in which a participant is involved during exposure are more important than the concurrent content that is attended to during exposure. The acceptance of aversive emotional states is a critical active process implied in successful exposure. Future studies should clearly distinguish what happens during exposure from the longer-term benefits and on the various facets of anxiety. Moreover, distraction studies should strive to specify and distinguish the dimensions underlying distraction, such as valence or schematicity, as well as interactivity, i.e. the extent to which distraction implies interaction with another person.

Chapter 4

Attentional Focus and Interactivity during Exposure in Spider Phobia (Study 3)

This study examines the impact of attentional focus and interactivity on exposure efficacy. One hundred and five spider phobics were exposed gradually to a live spider in two sessions and guided, in a between-subject design, either by a computer voice or the experimenter (Interactivity), either to focus their attention towards the spider and the associated responses or to listen to stories with missing words (Attentional focus). Multilevel measures of anxiety were performed at pre-exposure, post-exposure, 7 days follow-up, and post-reexposure. The results demonstrated strong changes in terms of behaviour, subjective distress, reported symptoms and skin conductance responses following the treatment but no or very moderate impacts were evidenced in regard to Interactivity and Attentional focus. A strong experimenter effect was also evidenced. The manifested interest from the experimenter toward the participant may be a key factor that explains the observed effect in interactive designs.

Attentional Focus and Interactivity during Exposure in Spider Phobia (Study 3)

1. Introduction

Exposure therapy, i.e. the repeated confrontation with a feared stimulus, has been shown to be effective in the treatment of anxiety disorders (Barlow, 2002; Wolitzky-Taylor et al., 2008). The role of attentional focus during exposure though remains unsettled. In a recent meta-analysis, Podină et al. (2013) assessed the comparative efficacy of attentionally focused versus distracted exposure on distress, physiological and behavioural symptoms. This meta-analysis included 15 randomized studies that contrasted those two types of exposure with patients suffering from specific phobia. The results indicated no differences in efficacy between focused versus distracted exposure for distress and physiological variables. Regarding approach behaviour, distracted exposure outperformed focused exposure marginally at post-exposure, and significantly at follow-up. More importantly, moderation analysis evidenced that distraction significantly outperformed focused exposure when the distracter was interactive both for distress reduction and approach behaviour.

Under close scrutiny, it appease that the studies that evidenced a superiority of distracted exposure over focused exposure all used interactive designs.. Those studies used a common design in which the experimenter engaged during exposure in conversations with the participant that either aimed at focusing the attention of the participant on the phobic stimuli or at distracting attention away from the phobic stimuli (Johnstone & Page, 2004; Oliver & Page, 2003, 2008; Penfold & Page, 1999). For example, in the study of Oliver and Page (2003) in which blood-injection fearful participants received exposure, focused exposure consisted in conversations about the syringe and the pictures as well as thoughts, feelings and physiological responses to the stimuli, while distracted exposure consisted in conversations about topics such as studies, plans for the future, leisure activities. The results demonstrated that distracted exposure outperformed focused exposure in terms of fear reduction between sessions, at post-treatment and at one-month follow-up. With a similar design, Oliver and Page (2008) replicated those results and furthermore demonstrated a benefit of distracted exposure over focused exposure in terms of the number of achieved hierarchy steps.

Those conversation-based designs that apparently aim at manipulating the focus of attention may though include confounding variables. Indeed, focused and distracted groups seem to differ on the valence of the task and on a greater manifested interest of the experimenter towards self-relevant aspects of the life of the individual, and an increased sensation of having been taken care of. Those variables may induce an increased expectancy towards therapy, increased efforts to achieve the goals or an increased placebo effect. Moreover, at the experimental level, interactivity increases the risk of an experimenter bias on the performance of the individual. Human and animal studies have demonstrated that experimenters obtained results from their participants that were consistent with the

expectation of the experimenters despite the fact that the null hypothesis was true (Rosenthal, 1979). Interactivity with the participants therefore implies more risks to influence the course of the results. Besides, the results obtained with another type of interactive design did not evidence this benefit of distracted vs. focused exposure. Schmid-Leuz et al. (2007) confronted dental phobics to fear-eliciting stimuli while either focusing on the instruments (focused exposure) or playing puzzle games with the experimenter. Both conditions were similarly effective in terms of heart rate and avoidance (i.e. adherence to the dental treatment schedule) but state anxiety showed a greater decrease in focused exposure than in distracted exposure after one week.

The role of the interactivity with the therapist during exposure remains largely unknown. Most of the information available on this issue stems from the research on the effects of the therapist role in flooding. Marks (1972, cited in Foa et al., 1977) noted in his review that only two of ten studies with a therapist showed flooding to be non-successful, while two out of eight studies that used a tape recorder reported success. More recently, a study of in-vivo exposure with snake phobics demonstrated that participants who performed exposure that was predominantly or exclusively therapist-assisted achieved a greater reduction in fear than participants who realized exposure with less therapist involvement (O'Brien & Kelley, 1980). Interactivity with the therapist therefore seems to evidence better results as compared to tape recordings. It though remains to be tested whether this reduction in anxiety is followed by longer-term clinical outcomes.

The main aim of this study is to disentangle the effects due to attentional focus from the effects due to interactivity by manipulating directly those factors during exposure. Two sessions of 25-min in vivo gradual exposure were given to spider phobics 7 days apart. The participants were allocated to four groups: Non-interactive Focused, Non-Interactive Distracted, Interactive Focused, and Interactive Distracted Exposure. Multimodal measures of exposure were given at pre- and post-exposure. The manipulation of interactivity voluntarily excluded any effect due to a greater manifested interest of the experimenter towards self-relevant aspects of the life of the individual. Consistently with the effects reported in Podină et al. (2013), we hypothesized that distracted exposure would outperform focused exposure only in the interactive groups.

2. Method

2.1 Participants

Participants were recruited through announcements on posters, in electronic mail, in a popular magazine and on social networks. The volunteers who scored over 4 (out of 7) on the Fear of Spiders Questionnaire (FSQ; Szymanski & O'Donohue, 1995) were invited to participate in the study. Because exposure requires to experience sufficient levels of distress during exposure, two participants who expressed a maximal peak subjective distress (see the Measures section) lower than 40 (out of 100) during the complete set of achieved exposure steps were excluded from the study. All participants (n = 105) complied with the A, B, C, D, F and G specific phobia criteria of the *Diagnostic and Statistical Manual of Mental Disorders*

(4th ed., text rev.; DSM-IV-TR; American Psychiatric Association, 2000), as ascertained by the Structured Clinical Interview for DSM-IV-TR Axis I Disorders (First et al., 2002). The E criterion (i.e. significant interference with daily functioning, social activities or relationships or marked distress caused by the phobia) was not retained as an inclusion criterion for this study because it is highly dependent on the living context of the individual. Considering this criterion may lead to exclude participants presenting all the relevant psychological mechanisms, hence unduly limiting sample size. The diagnosis was performed by trained master students in clinical psychology who were supervised by a licensed psychotherapist. The sample consisted of 96 women and 9 men, their age ranging between 18 and 60 years (M = 23.93, SD = 7.37). None of the participants were medicated with psychotropic drugs. All participants gave their informed written consent before starting the survey. A transportation cost compensation of 20 euros was offered to participants who had to travel to the laboratory. The study protocol was approved by the ethical committee of the Psychology Department of the Université catholique de Louvain.

2.2 Measures

2.2.1 Control Measures

The trait version of the State-Trait Anxiety Inventory (STAI-T; Spielberger et al., 1983; French adaptation: Bruchon-Schweitzer & Paulhan, 1993) is a 20-item self-reported measure of anxiety proneness. Cronbach's alpha (α) in the current sample was .89.

A 3-item self-reported measure of mood was used. The items measured on a 7-point Likert-scale the extent to which participants felt respectively tension (reversed item), relaxation, and well-being (α = .77).

2.2.2 Outcome Measures

Behavioural Measure

Exposure was conducted in regard to a 25-step hierarchy adapted from (Merluzzi et al., 1991), from looking and touching a picture of spider to letting a spider walk on one's gloved hand. The number of steps that participants could achieve during exposure was measured. The exposure hierarchy is presented in the supplementary material.

Physiological Indicators and Distress Measures

Physiological indicators and subjective distress were measured in response to sets of pictures (See Material section; 2 minutes in total for each recording set). The Subjective Units of Distress (SUD) Scale (Wolpe, 1958) measured the peak level of distress when viewing pictures on a scale from 0 (no distress) to 100 (extreme distress). Skin conductance (SC) and electrocardiography (ECG) were measured via the Active Two System ® (Biosemi, Amsterdam, Netherlands) at a rate of 1024Hz. For SC, electrodes were placed on the forefinger and middle finger. A bipolar lead pair of electrodes going from manubrium to left axillary/9th rib was used for ECG record. This placement is considered as equivalent to

Einthoven lead II (Thakor & Webster, 1985). Chest placement was preferred in order to minimize movement artefacts (Jennings, Berg, & Hutcheson, 1981). A lead II was preferred for the large R-wave yielded (Bernston et al., 1997). In order to reduce noise, participants were explicitly asked not to move during measurement.

SUD were also measured during exposure for each of the achieved step of the hierarchy (See the Procedure section). Before each change from one step of the hierarchy to the next one, the participant reported the peak level of distress felt during the achievement of this step as well as the final felt distress.

Self-reported Measures

The FSQ (French validation: Delroisse & Philippot, 2007) comprises 18 items (7-point Likert-type scale) and measures the severity of spider phobia symptoms on two factors: emotional and avoidance responses (α = .86, e.g., “If I saw a spider right now, I would feel very panicky”), and anxious anticipation of spiders (α = .60, e.g., “Currently, I am sometimes on the lookout for spiders”).

A Self-Efficacy Scale (SES) was created following the recommendations of Bandura (2006). It consists of items depicting steps of the exposure hierarchy, for which participants reported their confidence in their capacity to perform it on a scale from 0 (cannot do at all) to 100 (highly certain can do) (α = .97).

An Anticipated Distress Scale (ADS) was created in order to measure the distress felt in anticipation of exposure. Participants reported the anticipated expected distress in response to each of the steps of the exposure hierarchy on a scale from 0 (no distress) to 100 (extreme distress) (α = .97).

2.2.3 Control Measures

At the end of the experiment, the participant reported on self-reported single-item measures several features that could potentially differentiate groups: the percentage of time at which gaze was directed on the spider (0-100), the difficulty in maintaining the attention toward the spider (0-100), the valence of the concurrent task (from -4 “Very negative” to +4 “Very positive”), the perceived interest from the experimenter toward the participant (from 1 “No interest” to 7 “A lot of interest”), the efforts to meet experimenter expectancies (from 1 “No effort” to 7 “A lot of effort”), and the treatment credibility (0-100).

The relationship with the experimenter was measured with four adapted items taken from the relationship dimension of the Helping Skills Measure of Hill and Kellems (2002) on a 5-point Likert-type scale. The original term of “therapist” was replaced with “experimenter” (α = .77).

The warmth of the experimenter was measured with three items assessing to which extent the experimenter was perceived as sympathetic, caring, and pleasant on a 8-point Likert-type scale (α = .91).

2.3 Materials

Pictures of spiders and neutral pictures were selected out of the Geneva Affective Picture database (Dan-Glauser & Scherer, 2011). Four set of twelve pictures of spiders with similar arousal mean scores, $F(3, 44) = .005$, ns, were used to assess the SUD and the physiological variables in response to spiders. Twelve neutral pictures were also used to assess the SUD and physiological variables in a resting state. A live spider was used for the exposure. This spider was 4 cm long (Agelenidae).

The verbatim used in distracted exposure consists in well-known child tales (Little Red Riding Hood, Sleeping Beauty…) that were at times interrupted with missing words. The verbatim used in focused exposure consisted in instructing continuously the participant to maintain the attentional focus on the spider (shape, legs, moves) as well as on the emotional and physiological responses (heart beats, breathing…). The participant was also asked to bring the attention back to the spider and the associated responses whenever he/she noticed that the attention focused on something else. The comprehensive verbatim is presented in Supplemental Material. The verbatim was converted into a computer voice by a speech synthesizer called Balabolka (with the voice ScanSoft Dri 40 16 kHz; SAPI5).

2.4 General Procedure

The study comprised two sessions. During each session, the participant performed prolonged exposure. Several measures were taken before, during, and after exposure as depicted on Figure 9. This study has a 2 (interactivity (between subjects)) × 2 (attentional focus (between subjects)) × 4 (assessment time (within subjects)) design.

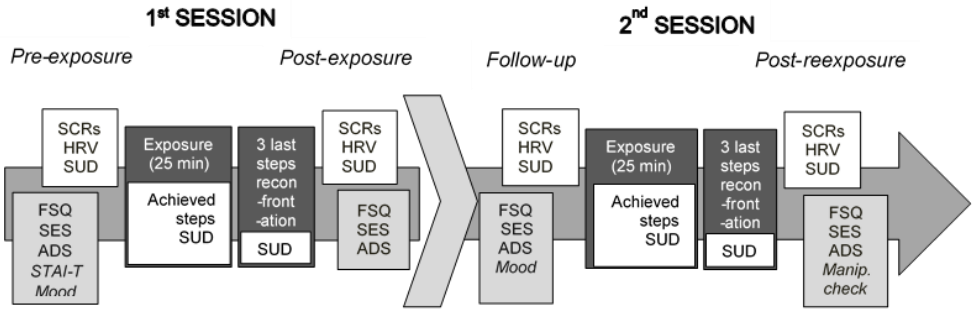

Figure 9. Procedure and measurements. ADS = Anticipated Distress Scale; FSQ = Fear of Spiders Questionnaire; HRV = heart rate variability; SCRs = skin conductance response; Manip. = Manipulation; SES = Self-Efficacy Scale; STAI-T = State Trait Anxiety Inventory (trait version); SUD = subjective units of distress.

At first, the participant completed the FSQ, SES, ADS, STAI-T, and mood scale. SC, HR, and SUD were measured first in response to a set of twelve neutral pictures and then in response to a set of twelve spider pictures (see Materials Section), each presented for 7-s and separated by a 4-s blank screen (after a resting period of 20 s). These measures aimed at

providing an assessment of subjective and physiological reactivity both at rest and when confronted with spider pictures. Participants confronted for 2 min with the spider in a closed container at 3m (3rd step of the hierarchy), reported their peak SUD in that situation and then performed 25-min of prolonged guided exposure that consisted in confronting gradually to a live spider. Each participant was first given instructions about exposure: *"Exposure therapy has proven its efficacy across a large number of studies. In regard to spider phobia, exposure consists in confronting gradually to spiders and in learning to tolerate the experienced distress. During exposure, you will be asked to confront to a live spider, which will generate distress. This distress does not interfere with the course of therapy. You will have the opportunity to decide how far you want to confront to the spider. During exposure, you will be asked to maintain your attention on the spider at any time. Exposure will last 25 minutes. You will start with the easiest steps and then your aim will be to move gradually to the most difficult steps. It is up to you to decide whenever you want to move to the next step. The aim is to move at most across those steps, but you are not obliged to achieve the last step. If at some point, you do not want to move to the next step, you are invited to stay at this step if possible until the end of exposure."*

Participants were randomly allocated to one of the groups that differed in terms of Interactivity and Attentional focus. Interactivity was manipulated via the media that guided exposure. In the interactive groups, exposure was guided by the experimenter. In the non-interactive groups, exposure was guided by a recorded computer voice. The attentional focus was manipulated via the verbatim that guided exposure (See Material Section). Prior instructions were given in order maximize the compliance.

Participants were allocated to one of the four resulting groups:

(1) Non-interactive Focused Exposure (n = 25): the participant was continuously instructed by a computer voice to maintain the attention towards the spider and the associated responses (See verbatim in the Materials section).

> Prior instructions: *"One of the most important thing for the course of exposure is to maintain your attention at any time on the spider. We therefore developed a software that will help you to maintain your attention on the spider. In order to avoid any distraction and as far as possible, I won't intervene during exposure."*

(2) Non-interactive Distracted Exposure (n = 27): the participant was presented via a headphone with a story (recorder by a computer voice) and was asked to fill missing words.

> Prior instructions: *"One of the most important thing for the course of exposure is to maintain your attention on the spider while at the same time being focused on a competing activity. We therefore developed a software that will help you to maintain your attention on other things. Stories will be presented aurally during exposure. At times, those stories will stop and you will have to give a word that fills in the story. There is no bad answer. Your role is to maintain your attention simultaneously on the spider and on the stories that will be presented."*

(3) Interactive Focused Exposure (n = 26): the participant was continuously instructed by the experimenter to maintain the attention towards the spider and the associated responses (See verbatim in the Materials section).

> Prior instructions: "*One of the most important thing for the course of exposure is to maintain your attention at any time on the spider. You will therefore need a coach who will help you to maintain your attention on the spider by guiding you."*

(4) Interactive Distracted Exposure (n = 27): the participant was presented with the stories read aloud by the experimenter and was asked to fill missing words.

> Prior instructions: *"One of the most important thing for the course of exposure is to maintain your attention on the spider while at the same time being focused on a competing activity. You will therefore need a coach who will help you to maintain your attention on other things. Stories will be presented aurally during exposure. At times, those stories will stop and you will have to give a word that fills in the story. There is no bad answer. Your role is to maintain your attention simultaneously on the spider and on the stories that will be presented."*

The participant was given the exposure hierarchy. The participant was asked to start at the third step, i.e. to stand 3 m from spider in a closed container, and to confront to the live spider for 25 minutes. Each participant was free to decide whenever he/she wanted to move to the next step. The instruction was to go as far as he/she could. At each step change, the experimenter wrote the time it occurred and asked the participant to report its peak level of distress (SUD) during the steps as well as its final level of distress at the end of this step. If a participant wasn't willing to move to the next step, he/she was simply instructed to remain in the situation for the remaining time if possible. Exposure was video recorded. After prolonged guided exposure, the participant was asked to reconfront to the 3 last realized steps of the hierarchy. During this reconfrontation, the participant realized exposure without being guided by the computer or the experimenter. This reconfrontation aimed at measuring SUD in a context in which the participant is left alone when exposed. Participants confronted again for 2 min with the spider in a closed container at 3m and reported their peak SUD in that situation. Then, subjective and physiological reactivity were measured in response to a novel set of six spider pictures. The use of different sets allowed us to test the generalizability of potential distress reduction in response to novel spider stimuli. Participants again completed the FSQ, SES and DAS. At the second session, participants completed all the measures before and after 25 minutes of exposure. Finally, the participants completed manipulation check measures.

The mean number of days between sessions was 6.59 (SD = 1.09). At the end of the experiment, the participants were fully debriefed about the objective of the study and oriented to a therapist for those who were willing to engage in therapy. Two experimenters (trained master students in clinical psychology) conducted this study. The experimenters were not blind to hypotheses. Fifty-three participants were tested by the one experimenter while 52 participants were tested by the other experimenter. A comprehensive protocol research with scripts of the instructions and detailed standardized descriptions of each step of the

experiment was given to experimenter in order to ensure the greatest respect of the protocol and in order to avoid any experimenter effect.

3. Results

3.1 Data Preparation

3.1.1 Skin Conductance

SC raw data was analysed with Ledalab (Benedek & Kaernbach, 2010) on MATLAB 8.0 (Mathworks, Natick, MA, USA). No filter or smoothing was applied. A continuous decomposition analysis was performed to distinguish phasic and tonic activity. A response window of 1 to 4 s after stimulus onset and a minimum amplitude criterion of .01 µS were used (Boucsein et al., 2012). Skin conductance responses (SCRs) in response to each of the presented pictures were range-corrected by dividing each response of an individual by his or her maximal response (Lykken & Venables, 1971). Range-corrected SCRs were then square root transformed for reducing skewness. Finally, the range-corrected square root transformed SCRs of each measurement set were averaged in order to provide an index of the electrodermal activity for each of the repeated confrontations with spider pictures (pre-exposure, post-exposure, follow-up and post-reexposure).

3.1.2 *Heart Rate Variability (HRV)*

Pulse peaks were detected with Artiifact (Kaufmann et al., 2011). Signals were visually inspected for false detection. Signals that were not suitable for peak detection were excluded (0.16% of the data). Artefacts were corrected with a linear convolution. Fast Fourier transform was applied on the interbeat intervals. For each participant, a low frequency/high frequency (LF/HF) ratio was calculated and log transformed to correct for skewness of the distribution. As LF reflects sympathetic activity and HF reflects parasympathetic activity, this ratio is an index of the sympathovagal balance (Bernston et al., 1997).

3.2 Statistics

Statistical analyses were performed with SPSS 23 (IBM, Armonk, NY, USA). Preliminary analyses tested the equivalence between dropouts and finishers, group equivalence and a potential experimenter effect. The main analyses tested the effects of the experimental factors (Interactivity and Attentional focus) on the behavioural achievement, the subjective peak of distress during exposure and at reconfrontation, as well as on the measures realized before and after exposure, i.e. the reported severity of symptoms, the reactivity to spider pictures, the subjective distress in response to in vivo confrontation, self-efficacy and anticipated distress. Control variables analyses tested the impact of the experimental factors on the control measures.

3.2.1 Preliminary Analyses

Dropouts

Six participants (5.7%) did not complete the second session. There were no significant differences in dropout frequency between groups, $\chi^2(3) = .592$, $p = .898$ (one in Non-interactive Focusing, two in Non-interactive Distraction, one in Interactive Focusing, and two in Interactive Distraction). Dropouts were compared to finishers on demographic and outcome variables. There were no significant differences between dropouts and finishers on demographic and outcome variables. In regard to self-efficacy, there was no significant difference both at pre-exposure, $t(103) = 1.206$, $p = .231$, and post exposure, $t(103) = -.281$, $p = .779$. In order to test the effect found in Dethier and Philippot (2017; Study 2), we computed a repeated measure ANOVA. This analysis revealed a marginal Time × Finisher status interaction in regard to self-efficacy between pre- and post-exposure, $F(1,103) = 2.975$, $p = .09$. Dropouts increased their self-efficacy marginally less than finishers from pre- to post- exposure.

Group Equivalence

The number of participants per groups ranged from 25 to 27. All groups were similar in gender ratio, $\chi^2(3) = .494$, $p = .920$, and experimenter ratio, $\chi^2(3) = .721$, $p = .868$. Analyses of variance (ANOVAs) with Interactivity and Attentional focus as between subjects variables were conducted for the outcome variables as well as for control measures at pre-exposure in order to test the equivalence between groups. The analyses are presented in Table 6. No significant effect of the experimental factors was evidenced on the variables at pre-exposure except for HRV in response to neutral pictures. Participants who performed exposure in a non-interactive way expressed a higher LF/HF ratio in response to neutral pictures than those who performed exposure interactively. Further analyses implying HRV in response to pictures of spiders will therefore use HRV in response to neutral picture as a covariate.

Experimenter Effect

T-test for independent samples based on the experimenter were conducted on the outcome variables measured during the confrontation to the spider. In regard to the last achieved step, those analyses indicated a marginal difference between experimenters at the first session, $t(96) = 1.910$, $p = .058$, and a significant difference at the second session, $t(97) = 3.133$, $p = .002$. Further analyses implying this variable will therefore use the Experimenter as a covariate. No significant difference between experimenters was evidenced, respectively at the first and second session, for the averaged peak SUD expressed for the three last steps of the hierarchy during exposure, $t_{1st}(103) = .274$, $p = .785$, $t_{2nd}(97) = .540$, $p = .590$, and at reconfrontation without guidance, $t_{1st}(103) = .503$, $p = .616$, $t_{2nd}(97) = .688$, $p = .493$.

Repeated measure ANOVAs with Time (Pre-exposure, Post-exposure, Follow-up and Post-reexposure) as a within-subject variable and Experimenter as a between subjects variable were conducted on the variables measured before and after exposure. The analyses are presented in Table 7. No significant effect of Time or Time × Experimenter interaction

was evidenced for any of those variables. No Experimenter effect was evidenced except for the SUD in response to the spider in a closed contained at 3m. Further analyses implying this variable will therefore use the Experimenter as a covariate.

Table 6. Equivalence at pre-exposure: ANOVAs with Interactivity and Attentional focus as between subjects variables

Variable	Interactivity effect					Attentional focus effect					Interactivity × Attentional focus effect				
	df_n	df_d	F	p	η^2	df_n	df_d	F	p	η^2	df_n	df_d	F	p	η^2
Reported symptoms															
Emotional and avoidance responses	1	101	<.001	.999	<.001	1	101	.020	.888	<.001	1	101	.831	.364	.008
Anxious anticipation of spiders	1	101	.001	.973	<.001	1	101	1.385	.242	.014	1	101	.941	.334	.009
Reactivity to spider pictures															
SUD	1	101	.004	.951	<.001	1	101	.245	.622	.002	1	101	.030	.862	<.001
SCRs	1	100	.002	.966	<.001	1	100	.485	.488	.005	1	100	.008	.930	<.001
HRV	1	100	3.479	.065	.034	1	100	.001	.971	<.001	1	100	.852	.358	.008
Reactivity to neutral pictures															
SUD	1	101	.681	.411	.007	1	101	.115	.735	.001	1	101	.191	.663	.002
SCRs	1	100	1.914	.170	.019	1	100	.752	.388	.007	1	100	.822	.367	.008
HRV	1	100	4.987	.028	.048	1	100	.046	.830	<.001	1	100	1.921	.169	.019
Standing at 3m															
SUD	1	101	.079	.780	.001	1	101	.228	.634	.002	1	101	.234	.630	.002
Anticipated Distress	1	100	1.621	.206	.016	1	100	1.145	.287	.011	1	100	.602	.440	.006
Self-efficacy	1	101	.119	.731	.001	1	101	.008	.928	<.001	1	101	.455	.502	.004
Control variables															
Age	1	101	.573	.451	.006	1	101	.107	.745	.001	1	101	.151	.699	.001
Number of days between sessions	1	95	.246	.621	.003	1	95	.018	.893	<.001	1	95	.018	.893	<.001
Trait-anxiety	1	101	.459	.500	.005	1	101	3.178	.078	.031	1	101	2.913	.091	.028
Mood	1	101	1.615	.207	.016	1	101	.050	.824	.000	1	101	.012	.915	.000

Note. HRV = heart rate variability; SCRs = skin conductance response; SUD = subjective units of distress.

Table 7. Repeated measure ANOVAs with Time (Pre-exposure, Post-exposure, Follow-up and Post-reexposure) as a within-subject variable and Experimenter as a between subjects variable

Variable	Time effect					Time × Experimenter effect					Experimenter effect				
	df_n	df_d	F	p	η^2	df_n	df_d	F	p	η^2	df_n	df_d	F	p	η^2
Reported symptoms															
Emotional and avoidance responses	2	188	56.108	<.001	.366	2	188	.325	.807	.003	1	97	.510	.477	.005
Anxious anticipation of spiders	2	207	17.116	<.001	.150	2	207	.669	.523	.007	1	97	.009	.923	<.001
Reactivity to spider pictures															
SUD	2	235	54.286	<.001	.359	2	235	.063	.962	.001	1	97	2.566	.112	.112
SCRs	3	259	16.242	<.001	.145	3	259	1.379	.252	.014	1	96	.197	.658	.002
HRV[a]	3	250	.147	.916	.002	3	250	2.229	.092	.023	1	93	1.402	.239	.015
Standing at 3m															
SUD	3	248	43.682	<.001	.311	3	248	.986	.390	.010	1	97	5.097	.026	.050
Anticipated Distress	2	213	33.716	<.001	.262	2	213	.942	.400	.010	1	95	.205	.651	.002
Self-efficacy	2	168	101.374	<.001	.511	2	168	.455	.607	.005	1	97	1.197	.277	.012

Note. Greenhouse-Geisser corrections were applied. HRV = heart rate variability; SCRs = skin conductance response; SUD = subjective units of distress.

T-test for independent samples based on the Experimenter were conducted on the control variables. Those analyses indicated no differences between experimenters in terms of the percentage of time at which gaze was directed on the spider, $t(97) = .457$, $p = .649$, the difficulty in maintaining the attention toward the spider, $t(97) = 1.658$, $p = .101$, the valence of the concurrent task, $t(97) = .416$, $p = .678$, the efforts to meet experimenter expectancies, $t(97) = .209$, $p = .835$, and treatment credibility, $t(97) = .266$, $p = .791$. Significant differences between experimenters were though evidenced in regard to the perceived interest toward the participant, $t(97) = 2.408$, $p = .018$, the relationship with the experimenter, $t(97) = 4.525$, $p < .001$, and the warmth of the experimenter, $t(83) = .4.490$, $p < .001$.

Taken together, those analyses revealed that one of the experimenter obtained better results at the behavioural level and lower distress when confronted with the spider than the other experimenter. This experimenter was also evaluated by the participants as expressing more interest toward the participant, as establishing a better relationship and as expressing more warmth than the other participant. Thus, in order to test a potential association between those interpersonal variables and the benefit in terms of approach behaviour or the lower distress when confronted with the spider, we computed Pearson correlations between those variables. Those analyses revealed no link between the last achieved step at the second session and the perceived interest from the experimenter, $r(99) = -.133$, $p = 191$, the relationship with the experimenter, $r(99) = -163$, $p = .106$, and the warmth of the experimenter, $r(99) = -.133$, $p = .188$. No link was evidenced between the distress when confronted with the spider at post-reexposure and the perceived interest from the

experimenter, $r(99) = .169$, $p = .094$, the relationship with the experimenter, $r(99) = .043$, $p = .670$, and the warmth of the experimenter, $r(99) = .084$, $p = .407$.

3.2.2 Main Analyses

Behavioural Achievement

Two-way ANOVAs with Interactivity and Attentional focus as between subjects variables were conducted on the last achieved step of the exposure hierarchy, respectively at the first and second session. The experimenter was entered as a covariate. At the first session, no significant effect of Interactivity, $F(1,100) = 1.035$, $p = .311$, $\eta^2 = .010$, Attentional focus, $F(1,100) = .029$, $p = .864$, $\eta^2 < .001$, and Interactivity × Attentional focus interaction was evidenced, $F(1,100) = 1.155$, $p = .285$, $\eta^2 = .011$. A marginal experimenter effect was though evidenced, $F(1,100) = 3.867$, $p = .052$, $\eta^2 = .037$. Similarly, at the second session, no significant effect of Interactivity, $F(1,94) = 1.826$, $p = .180$, $\eta^2 = .019$, Attentional focus, $F(1,94) = .383$, $p = .537$, $\eta^2 = .004$, and Interactivity × Attentional focus interaction was evidenced, $F(1,94) = 1.129$, $p = .291$, $\eta^2 = .012$. An experimenter effect was though evidenced, $F(1,94) = 10.349$, $p = .002$, $\eta^2 = .099$.

Subjective Peak Distress during Exposure

Two-way ANOVAs with Interactivity and Attentional focus as between subjects variables were conducted on the averaged peak SUD expressed for the three last steps of the exposure hierarchy, respectively at the first and second session. At the first session, no significant effect of Interactivity, $F(1,101) = .028$, $p = .868$, $\eta^2 < .001$, and Interactivity × Attentional focus interaction, $F(1,101) = .345$, $p = .558$, $\eta^2 = .003$, was evidenced. A marginally significant effect of Attentional focus was evidenced, $F(1,101) = 2.828$, $p = .096$, $\eta^2 = .027$. Participants who realized exposure while listening to distractive stories reported marginally lower distress peaks during exposure than those who were instructed to focus on the spider. At the second session, a significant effect of Interactivity was evidenced, $F(1,95) = 4.848$, $p = .030$, $\eta^2 = .049$. Participants who realized exposure while being guided by the experimenter reported lower distress peaks than those who were guided by the computer. No significant effect of Attentional focus, $F(1,95) = .075$, $p = .784$, $\eta^2 = .001$, and Interactivity × Attentional focus interaction was though evidenced, $F(1,95) = 1.337$, $p = .250$, $\eta^2 = .014$.

Subjective Peak Distress during Exposure vs. at Reconfrontation without guidance

Repeated measure ANOVAs with the Context of exposure (During exposure vs. at reconfrontation without guidance) as a within subject variable and Interactivity and Attentional focus as between subjects variables were conducted on the averaged peak SUD expressed for the three last steps of the hierarchy, respectively at the first and second session. At the first session, a significant effect of the Context, $F(1,101) = 57.783$, $p < .001$, $\eta^2 = .364$, and Attentional Focus were evidenced, $F(1,101) = 3.995$, $p = .048$ $\eta^2 = .038$. Participants globally reported less peak distress when confronted for the second time with the spider without guidance than during exposure with guidance. Moreover, participants who realized

exposure while being distracted reported less peak distress than those who were instructed to focus on the spider (both during exposure and at reconfrontation without guidance). No significant Context × Interactivity interaction effect, $F(1,101) = .413$, $p = .522$, $\eta^2 = .004$, Context × Attentional focus interaction effect, $F(1,101) = .720$, $p = .398$, $\eta^2 = .007$, Context × Interactivity × Attentional focus interaction effect, $F(1,101) = .151$, $p = .698$, $\eta^2 = .001$, and Interactivity effect was evidenced, $F(1,101) = .015$, $p = .902$, $\eta^2 < .001$.

At the second session, a significant effect of the Context, $F(1,95) = 44.514$, $p < .001$, $\eta^2 = .319$, and a significant effect of Interactivity were evidenced, $F(1,95) = 4.214$, $p = .043$, $\eta^2 = .042$. Similarly as for the first session, participants globally reported less peak distress when confronted for the second time with the spider without guidance than during exposure with guidance. Moreover, participants who realized exposure while being guided by the experimenter reported less peak distress than those who were guided by a computer voice (both during exposure and at reconfrontation without guidance). No significant Context × Interactivity interaction effect, $F(1,95) = .335$, $p = .564$, $\eta^2 = .004$, Context × Attentional focus interaction effect, $F(1,95) = .003$, $p = .955$, $\eta^2 < .001$, Context × Interactivity × Attentional focus interaction effect, $F(1,95) = 1.597$, $p = .209$, $\eta^2 = .017$, and Attentional focus was evidenced, $F(1,95) = .068$, $p = .795$, $\eta^2 = .001$.

Reported Severity of Symptoms

Two-way repeated measure ANOVAs with Time (Pre-exposure, Post-exposure, Follow-up and Post-reexposure) as a within subject variable and Interactivity and Attentional Focus factors as between subjects variables were computed on the reported severity of symptoms. Greenhouse-Geisser corrections were applied. The results are presented in Table 8. The analyses of emotional and avoidance responses as well as anxious anticipation of spider showed significant Time effects but no significant Time × Interactivity, Time × Attentional focus, and Time × Interactivity × Attentional focus effects. Post-hoc pairwise comparisons with Bonferroni adjustments demonstrated that emotional and avoidance responses decreased significantly from pre- to post-exposure ($p < .001$), and from follow-up to post-exposure ($p < .001$), but not from post-exposure to follow-up (i.e. between sessions, $p > .999$). Anxious anticipation of spiders decreased significantly from post-exposure to follow-up (i.e. between sessions, $p = .001$) and marginally from follow-up to post-reexposure ($p = .077$), but not from pre- to post-exposure ($p > .999$).

Reactivity to Spider Pictures

Two-way repeated measure ANOVAs with Time (Pre-exposure, Post-exposure, Follow-up and Post-reexposure) as a within subject variable and Interactivity and Attentional Focus factors as between subjects variables were computed on the variables measured in response to novel sets of spider pictures. Greenhouse-Geisser corrections were applied. The results are presented in Table 8. The analyses of SUD and SCRs showed significant Time effects but no significant Time × Interactivity[10], Time × Attentional focus, and Time × Interactivity ×

10 For SUD, a marginal Time × Interactivity effect was evidenced. Post-hoc F-test though demonstrated that the simple effect of Interactivity was not significant for each level of Time, namely at pre-exposure, F(1,95)

Attentional focus effects. Post-hoc pairwise comparisons with Bonferroni adjustments demonstrated that SUD decreased significantly from post-exposure to follow-up ($p < .001$), but not from pre-to post-exposure ($p = .584$) and from follow-up to post-reexposure ($p > .999$). SCRs decreased significantly from pre-to post-exposure ($p < .001$), and from follow-up to post-reexposure ($p = .008$), but not from post-exposure to follow-up (i.e. between sessions, $p > .999$). The analyses of HRV showed no significant effect.

Subjective Distress in Response to in vivo Confrontation

A two-way repeated measure ANOVA with Time (Pre-exposure, Post-exposure, Follow-up and Post-reexposure) as a within subject variable and Interactivity and Attentional Focus factors as between subjects variables was computed on the SUD in response to the spider in a closed contained at 3m. The experimenter was introduced as a covariate. Greenhouse-Geisser corrections were applied. The results are presented in Table 8. The analyses showed a significant Time effect and a significant Experimenter effect, $F(1,94) = 4.922$, $p = .029$, $\eta^2 = .050$, but no significant Time × Experimenter, $F(3,237) = .976$, $p = .404$, $\eta^2 = .010$, Time × Interactivity, Time × Attentional focus, and Time × Interactivity × Attentional focus effects. Post-hoc pairwise comparisons with Bonferroni adjustments demonstrated that SUD decreased significantly from pre- to post-exposure ($p < .001$) and marginally from follow-up to post-reexposure ($p = .057$), but not from post-exposure to follow-up (i.e. between sessions, $p = .124$).

Self-efficacy and Anticipated Distress

Two-way repeated measure ANOVAs with Time (Pre-exposure, Post-exposure, Follow-up and Post-reexposure) as a within subject variable and Interactivity and Attentional Focus factors as between subjects variables were computed on self-efficacy and anticipated distress. The results are presented in Table 8. The analyses showed a significant Time effect but no significant Time × Interactivity, Time × Attentional focus, and Time × Interactivity × Attentional focus effects. Post-hoc pairwise comparisons with Bonferroni adjustments demonstrated that self-efficacy increased from pre- to post-exposure ($p < .001$) and from follow-up to post-reexposure ($p < .001$), but not from post-exposure to follow-up (i.e. between sessions, $p > .999$). Anticipated distress decreased from pre- to post-exposure ($p = .009$), from post-exposure to follow-up (i.e. between sessions, $p = .012$), and from follow-up to post-reexposure ($p < .001$).

= .003, p = .960, $\eta^2 < .001$, at post-exposure, F(1,95) = 2.193, p = .142, $\eta^2 = .023$, at follow-up, F(1,95) = .067, p = .796, $\eta^2 = .001$, and at post-reexposure, F(1,95) = .034, p = .854, $\eta^2 < .001$.

Table 8. Repeated ANOVAs with Time (Pre-exposure, Post-exposure, Follow-up and Post-reexposure) as a within subject variable and Interactivity and Attentional Focus factors as between subjects variables

Variable	Time effect					Time × Interactivity effect					Time × Attentional Focus effect					Time × Interactivity × Attentional Focus effect				
	df_n	df_d	F	p	η^2	df_n	df_d	F	p	η^2	df_n	df_d	F	p	η^2	df_n	df_d	F	p	η^2
Reported symptoms																				
Emotional and avoidance responses	2	179	56.454	<.001	.373	2	179	.140	.858	.001	2	179	1.240	.290	.013	2	179	1.520	.222	.016
Anxious anticipation of spiders	2	199	17.196	<.001	.153	2	199	.945	.394	.010	2	199	1.244	.291	.013	2	199	.047	.959	<.001
Reactivity to spider pictures																				
SUD	2	229	55.890	<.001	.370	2	229	2.552	.069	.026	2	229	1.572	.205	.016	2	229	.772	.485	.008
SCRs	3	253	16.219	<.001	.147	3	253	1.252	.291	.013	3	253	.743	.514	.008	3	253	1.691	.175	.018
HRV[a]	3	243	.133	.925	.001	3	243	.497	.663	.005	3	243	.943	.413	.010	3	243	1.221	.302	.013
Standing at 3m																				
SUD[b]	3	237	8.757	<.001	.085	3	237	1.240	.295	.013	3	237	.050	.974	.001	3	237	1.442	.236	.015
Anticipated Distress	2	206	33.080	<.001	.262	2	206	.205	.836	.002	2	206	.220	.824	.002	2	206	.797	.463	.008
Self-efficacy	2	163	100.555	<.001	.514	2	163	1.300	.273	.014	2	163	.256	.741	.003	2	163	.410	.634	.004

Note. Greenhouse-Geisser corrections were applied. [a]With HRV reactivity to neutral pictures as a covariate; [b]With Experimenter as a covariate; HRV = heart rate variability; SCRs = skin conductance response; SUD = subjective units of distress.

3.2.3 Control Variables Analyses

Two-way ANOVAs with Interactivity and Attentional focus as between subjects variables were conducted on the control measures. The results and descriptive statistics are presented in Table 9. The analyses evidenced no significant effect of Interactivity, Attentional focus and Interactivity × Attentional focus interaction for the percentage at which gaze was directed on the spider, the difficulty in maintaining the attention toward the spider, the perceived interest from the experimenter toward the participant, the efforts to meet experimenter expectancies, treatment credibility, the relationship with the experimenter and the warmth of the experimenter. A significant Interactivity × Attentional focus interaction as well as a marginal Attentional focus effect and no significant effect of Interactivity were though evidenced for the valence of the concurrent task. Post-hoc pairwise comparisons with Bonferroni adjustments demonstrated that participants who performed exposure while being guided by a computer voice to focus on the spider reported less pleasantness for the concurrent task than those who were asked to listen to stories told by a computer voice (p = .005). No difference was evidenced in terms of valence of the concurrent task between those who performed exposure while being guided by the experimenter to focus on the spider and those who were asked to listen to stories told by the experimenter.

4. Discussion

This study aimed to examine the respective impact of interactivity and attentional focus during exposure. The results demonstrated strong changes in terms of behaviour, subjective distress, reported symptoms and skin conductance responses following the treatment. Although the absence of control group in the present design does not allow to conclude in terms of efficacy, those results are congruent with the existing evidence of a strong effect of exposure therapy (e.g., Wolitzky-Taylor et al., 2008). Moreover, a strong experimenter effect was evidenced in terms of behavioural achievement (i.e. last achieved step) and in terms of subjective distress in response to in vivo confrontation. Those differences between experimenter were though not associated with interpersonal variables (i.e. perceived interest, relationship, and warmth). The only difference between experimenter that we could observe post hoc on video recordings was that one of the experimenter was more assertive and more confident in the implementation of the treatment than the other experimenter. No inference can though be made from this observation at this stage.

In regard to interactivity and attentional focus, no or very moderate impacts were evidenced. No impact was evidenced on the approach behaviour, on self-reported symptoms, and on the reactivity to spider pictures and to in vivo confrontation. The only observed effects of the experimental factors were on the reported distress during exposure and on the valence of the concurrent task. In regard to the distress during exposure, a marginal and non-persistent effect in favour of focused exposure was evidenced at the first session. Moreover, a significant effect was evidenced in favour of Interactive exposure at the second session. In regard to the valence of the concurrent task, interactive exposure protected from a more negative evaluation of focused exposure as compared to distracted exposure.

Table 9. Descriptive statistics of the control variables and two-way ANOVAs with Interactivity and Attentional Focus as between subjects variables

Control variable	Descriptive statistics			Interactivity effect					Attentional Focus effect					Interactivity × Attentional Focus effect				
	M	*SD*	*Range*	df_n	df_d	*F*	*p*	η^2	df_n	df_d	*F*	*p*	η^2	df_n	df_d	*F*	*p*	η^2
Percentage of time at which gaze was directed on the spider (0-100)	90.808	8.591	60-100	1	95	.235	.629	.002	1	95	1.584	.211	.016	1	95	1.872	.175	.019
Difficulty in maintaining the attention toward the spider (0-100)	28.857	29.735	0-100	1	95	.735	.393	.008	1	95	1.309	.255	.014	1	95	2.336	.130	.024
Valence of the concurrent task (-4 - +4)	.400	2.308	-4 - +4	1	95	.422	.517	.004	1	95	3.915	.051	.040	1	95	4.274	.041	.043
Perceived interest from the experimenter toward the participant (1-7)	5.560	1.520	1-7	1	95	1.020	.315	.011	1	95	.487	.487	.005	1	95	2.209	.141	.023
Efforts to meet experimenter expectancies (1-7)	4.120	1.972	1-7	1	95	2.682	.105	.027	1	95	2.370	.127	.024	1	95	.855	.358	.009
Treatment credibility (0-100)	78.313	17.048	30-100	1	95	.014	.906	<.001	1	95	.209	.649	.002	1	95	.006	.939	.000
Relationship with the experimenter (1-5)	4.283	.554	2.25-5	1	95	.002	.960	<.001	1	95	.326	.569	.003	1	95	.243	.623	.003
Warmth of the experimenter (1-8)	6.983	1.171	3.33-8	1	95	.048	.828	.001	1	95	1.517	.221	.016	1	95	.250	.618	.003

In conclusion, the present study evidenced no solid effect of the attentional focus (focused vs. distracted exposure) contrary with the meta-analysis of Podină et al. (2013) that showed a beneficial effect of distraction at the behavioural level. When looking at it more closely, this beneficial effect of distraction has been mostly influenced by the results of one research team that used a very specific design (Johnstone & Page, 2004; Oliver & Page, 2003, 2008; Penfold & Page, 1999). In those studies, focused and distracted exposure were contrasted by the mean of discussions with the participants that were either related to the spider and the associated responses or to the participant him-/her-self (e.g., plans for the future and leisure activities). It seems that there is something very specific in those studies that may offer a benefit to distracted exposure vs. focused exposure. In other words, it is questionable whether the effect observed in those studies is due to the experimental factor per se or to another variable that is unique to this design. Those studies indeed generate in their distractive groups an increased manifested interest toward the participant, while our study merely manipulated interactivity without inducing this type of bound between the participant and the experimenter. The results of the present study also partially conflict with the results of Schmid-Leuz et al. (2007) that demonstrated a greater decrease in state-anxiety in focused exposure rather than in distracted exposure but no difference in terms of avoidance at the behavioural level. This divergence between results can though be explained by the fact that distracted exposure in the study of Schmid-Leuz et al. (2007) is much more pronounced than in our study. Playing a puzzle game with the experimenter indeed requires visual attention to be shifted away from the fear-eliciting stimuli whereas in our design we strived to maintain visual attention towards the fear-eliciting stimuli both in focused and distracted exposure. In terms of Interactivity, the present study evidenced a benefit of performing exposure while being guided by the experimenter rather than being guided by a computer. Although being guided by the experimenter did not yield benefits on most of the outcome variables, the main benefit was in terms of comfort. It indeed produced a lower distress during exposure.

The main strength of this study is that it is the first that manipulated both interactivity and attentional focus in the same design while excluding the variance due to an increased effort of the experimenter towards the participants. However, this study suffers from several limitations. At first, a strong experimenter effect was evidenced. The variance due to the experimenter may have prevented to evidence effects due to the experimental factors although we have tried to avoid this by controlling for the induced variance in our analysis. The variables that may have induced this experimenter effect remain to be established. Moreover, some of the measures may have induced a floor effect. Indeed, measuring the reactivity to spider pictures as well as in response to a low step of the hierarchy induces less distress than higher steps of the hierarchy in which exposure is realized. The last limit is inherent to a graduated in vivo approach. The distress activation during exposure is an important ingredient of exposure (Craske et al., 2008). This distress activation is though very dependent on the hierarchy step to which exposure is pushed to. Because the participants are let free to decide to which step they want to confront to, the dose of exposure may vary across participants and therefore induce variance. Moreover, it seems problematic that the last achieved step of the hierarchy is both an outcome variable and the dose of the treatment.

PART II

EXPOSURE PRACTICES AND KNOWLEDGE

AMONG TRAINED PSYCHOTHERAPISTS

Theoretical models and empirical research in regard to exposure practices have evolved tremendously. As a consequence, nowadays, the clinical literature sometimes comprises contradictory recommendations. It therefore remains uncertain whether the recommendations of the most recent models have been translated into clinical practice. This study examines various exposure procedures in daily clinical practice. Ninety-nine psychotherapists completed an online survey assessing the frequency of use of exposure practices, the therapists' knowledge of the recommendations of the literature and the potential correlates of the use of the practices. The results demonstrate that some procedures are used despite a poor empirical support. The use of those procedures was associated with therapists' literature knowledge, with the therapists' concerns in regard to exposure therapy or with their personal tendency to feel uncomfortable when confronted with clients' distress. Those results are discussed in terms of guidelines that may help to bridge the gap between research and clinical practice.

Exposure Practices and Knowledge among Trained Psychotherapists (Study 4)

1. Introduction

Exposure therapy, which consists in the repeated confrontation to a feared stimulus, has a long history in behaviour and cognitive therapies, from systematic desensitization (Wolpe, 1968) to what is called nowadays exposure therapy. Various theoretical models of exposure have been proposed. Each considers different ingredients to be responsible for therapeutic effects and diverging recommendations in terms of practice have therefore been formulated by the proponents of those models. Several models are proposed in order to account for exposure effects, four of which, detailed hereafter, bares important impacts in terms of clinical recommendations.

The habituation-based model highlights the importance of fear reduction during exposure. Habituation refers to a decrement in the physiological component of fear in response to repeated exposure to fear-eliciting stimuli. This decrement would rely mainly on neurophysiological mechanisms (Groves & Thompson, 1970). The concept of habituation has been integrated in the emotional processing theory in which it is considered as a critical index of successful exposure (Foa & Kozak, 1986). It has also been integrated in the rationale given to the patient in exposure protocols and has produced the recommendation to confront gradually to anxiety and to stay in a given situation until anxiety declines. The use of relaxation during exposure also derives from this model.

The cognitive model of exposure emphasizes the role of cognitive changes. This model considers that clinical improvements are possible only if there is a change in the cognitions determining the aversive response. Those improvements could be either achieved by cognitive techniques such as cognitive restructuring (i.e. an intervention aimed at modifying distorted cognitions) or indirectly by exposure techniques (Beck, 1976; Clark, 1986). This model has led to the use of cognitive restructuring prior to exposure. Moreover, it has conducted to an important emphasis on the role of belief disconfirmation consequences in exposure therapy (Salkovskis et al., 2007).

The inhibitory learning model considers that the mechanism responsible for a successful exposure is not the removal of a dysfunctional association but rather the creation of a new association that inhibits this conditioned association (Bouton, 1993). Craske et al. (2008) suggested that exposure therapy could be optimized if the core process of inhibitory learning was maximized during exposure. Several recommendations (see Craske et al., 2014) have therefore been proposed. Introducing variability in regard to the modality, company, place and time of the day is recommended in order to increase this inhibitory learning. Moreover, the patient is asked prior to exposure to identify the expectation related to a given situation and the likelihood for this expectancy to happen. Then, an exposure trial designed to violate this specific expectation is implemented and a debriefing is conducted in order to disconfirm

the expectancy. Furthermore, the inhibitory learning model recommends promoting the attentional focus on the stimulus and the removal of safety signals.

Finally, in the acceptance models, the toleration of an aversive state, as opposed to suppression or control attempts, is considered as providing an opportunity to recover from painful emotional states (Barlow et al., 2004; Greenberg, 2002; Hayes et al., 2006; Segal et al., 2002). This approach gives a key role to the attitude that the client should adopt during exposure therapy. The patient is taught to develop an acceptance and a non-judgmental observation of emotions and physical sensations during exposure.

In parallel to the theoretical developments, a considerable number of studies have been conducted. Empirical research has provided contradictive evidence for the habituation and the cognitive models. Habituation has not been supported as a central mechanism in exposure. Fear reduction during exposure indeed does not predict long term outcomes (Baker et al., 2010; Kircanski, Mortazavi, et al., 2012; Plendl & Wotjak, 2010; Prenoveau et al., 2013; Rescorla, 2006). Moreover, sustained arousal may actually better predict long-term results (Culver et al., 2012). In regards to the cognitive model, Longmore and Worrell (2007) concluded in their literature review that there is little empirical support for the role of cognitive change as a causal factor on the clinical outcome achieved in cognitive behaviour therapy. Research has yet provided supportive evidence in favour of the inhibitory learning model and it is now recognized as being a central mechanism in exposure (Craske et al., 2008; Craske et al., 2014). In regards to the acceptance models, although there is suggestive evidence that acceptance strategies may alleviate anxious symptoms (Salters-Pedneault et al., 2004), further research is needed in order to establish a solid causal relation between acceptance and clinical improvements in exposure therapy.

A synthesis of the models and clinical recommendations as well as empirical support towards the exposure procedures is provided in Table 10. The support toward the procedures was established by the first author and two experts (Pierre Philippot and François Nef) who have a good knowledge of the literature. Moreover, a literature review has been conducted regarding each of those procedures. The experts evaluated independently the procedure as being supported or not by the literature. Whenever there was dissension between experts, more literature research was conducted before a final decision on the status of the support of the literature. Finally, some modifications have been made following the recently published review of Weisman and Rodebaugh (2018).

Table 10. Clinical recommendations of models as well as empirical support towards the exposure procedures

Procedures	Theoretical models support				Literature	
	Habituation	Cognitive Change	Inhibitory Learning	Acceptance	Recent clinical recommendations	Empirical support
Gradualilty	++	∄	-	∄	+-	Ø
Variability	+	∄	++	∄	+	++
Expectancy salience	∄	++	++	∄	+	Ø
Acceptance	∄	∄	∄	++	+	+
Distress relief	-	-	-	-	-	Ø
Removal of safety signals	+	+	+	∄	+	+
Stimulus Attention	+	+	++	+	+	+-
Prior cognitive restructuring	∄	++	--	-	+-	Ø
Relaxation	+	∄	-	-	Ø	Ø

Note. ∄ No recommendation; Ø No support; ++ Strong support; + Support; (+) Suggestive evidence; - Contraindicated; -- Strongly contraindicated; +- In debate.

Graduality is defined as the fact of confronting the patient gradually to anxiety and to repeat the same exposure trial until anxiety has declined. This procedure mainly derives from the habituation-model. As mentioned in the previous paragraph, habituation has not been supported as a central mechanism, while the inhibitory learning model has gained empirical support. The inhibitory leaning model recommends varying the intensity of exposure across time (Craske et al., 2014). From an empirical point of view, Hodgson, Rachman, and Marks (1972) demonstrated (though with a very limited sample) that patients who confronted the most distressing situations from the start of therapy achieved the same gains that patients who confronted less distressing situations before confronting the most distressing ones. Moreover, Kircanski, Mortazavi, et al. (2012) demonstrated no difference between a gradual approach of exposure and a variable approach of exposure (i.e. random order in terms of difficulty) with participants with high contamination fear. Though those differences were not significant, the effect sizes at two-week follow-up suggested lower subjective fear in the variable group. Similarly, Lang and Craske (2000) demonstrated benefits to a variable over a gradual approach. Participants with fear of heights were exposed to height. In the variable condition, the participants exposed randomly in terms of floors. In the gradual condition, the participants exposed to the same balconies repeatedly before moving to the next floor. The variable condition led to less anxiety one month later despite higher peaks levels of anxiety during exposure. Most exposure protocols though rely on a gradual approach, though authors such as Barlow et al. (2010) have stressed the fact that the immediate reduction of distress is not the goal of exposure. Some authors have advocated that despite the evidence showing no benefit of a gradual approach, a gradual approach should though be used in order to improve compliance (Swinson, Antony, Rachman, & Richter, 1998). The rationale of those authors is that a gradual approach would yield more compliance and therefore produce better results. To our knowledge, no study has tried to evaluate the effects of a gradual approach over a

non-gradual approach in terms of compliance. As a conclusion, it seems that moving very gradually from one step to another is not supported by empirical studies, though practical reasons related to compliance that remain to be tested may justify the use of graduality.

Variability is the fact of introducing variability in exposure in regard to the stimuli, the modality (in vivo, in imagery …), the fact to be accompanied or not, and the place and time of the day at which exposure occurs. Variability is mainly supported by the inhibitory learning model (Craske et al., 2014). Based on the evidence that variation increases the storage strength of learned information (Bjork & Bjork, 1992), the procedure aims at increasing the storage strength of information. Besides the evidence presented in the previous paragraph in regards to intensity variability, Shiban, Schelhorn, Pauli, and Mühlberger (2015) demonstrated that spider phobic participants demonstrated significantly better short-term and long-term outcomes from virtual exposure to multiple stimuli rather than single stimulus exposure. Moreover, variability of the contexts of exposure is considered as having the potential of preventing context renewal, i.e. the return of fear after successful extinction, when the phobic stimulus is encountered in a context that differs from the context in which exposure was conducted (Mineka, Mystkowski, Hladek, & Rodriguez, 1999). Context variability demonstrated its efficacy in counteracting context renewal in rodents (e.g., Gunther, Denniston, & Miller, 1998), in human laboratory studies (Bandarian-Balooch & Neumann, 2011; Bandarian-Balooch, Neumann, & Boschen, 2012; Krisch, Bandarian-Balooch, & Neumann, 2018) as well as in a clinical analog study with exposure therapy (Vansteenwegen et al., 2007). Note though that the effect was not found in one study on rodents (Bouton, García-Gutiérrez, Zilski, & Moody, 2006) and in one study on humans (Neumann, Lipp, & Cory, 2007).

Expectancy salience is the fact of identifying fearful expectancies and their violations. This can be achieved both by identifying clearly the expectancies before exposure and by debriefing after exposure whether the anticipated outcome occurred or not. This procedure is mainly supported by the cognitive and the inhibitory learning models (Craske et al., 2014). It is based on the idea that learning is focused around whether the expected negative outcome occurs or not (Craske et al., 2014; Rescorla & Wagner, 1972). Unfortunately, although this procedure is well supported by an empirically grounded theory (Weisman & Rodebaugh, 2018), to our knowledge, no study of exposure have examined whether identifying clearly the expectancies and debriefing whether the anticipated outcome occurred or not improved exposure or not.

Acceptance is the fact of encouraging the patient to adopt an attitude of acceptance and non-judgmental observation of the emotional experience during exposure. The use of acceptance has been promoted by the acceptance models (Barlow et al., 2004; Greenberg, 2002; Hayes et al., 2006; Segal et al., 2002) and has been recently encouraged in the clinical literature. Some studies demonstrated that acceptance during exposure has some advantages over suppression. Eifert and Heffner (2003) compared the effect of acceptance vs. control during exposure to a carbon dioxide inhalation on the avoidance of aversive interoceptive stimulation with anxiety sensitive participants. The results demonstrated that acceptance induced less behavioural avoidance, less reported fear and cognitive symptoms and less

catastrophic thoughts, as compared to control context or no-instruction conditions. In the same line, Levitt et al. (2004) compared the effects of acceptance vs. suppression of emotion during exposure with patients with panic disorder exposed to a carbon dioxide inhalation. The results demonstrated that the acceptance group was significantly less anxious and less avoidant than were the suppression or control groups in terms of subjective anxiety and willingness to participate to a second exposure, but not in terms of self-reported panic symptoms and physiological measures.

Distress relief is the fact of alleviating the intensity of exposure when the patient reports distress during exposure. It is discouraged by most theoretical models and in the clinical recommendations. Although to our knowledge, no clinical study has evaluated the fact of using distress relief during exposure, distress relief is considered as an escape and is therefore discouraged on a theoretical basis.

The removal of safety signals is the fact of ascertaining that the patient uses of safety signals as least as possible and to prevent to reassure a patient whenever he/she seeks for reassurance. It is encouraged by most models and in the clinical recommendations. An extensive body of clinical and clinically-analogue research has demonstrated that safety behaviours yield poorer long-term outcomes compared to exposure alone (see Helbig-Lang & Petermann, 2010 for a comprehensive review). As an example, Sloan and Telch (2002) exposed claustrophobic participants to a claustrophobic chamber regarding three conditions: guided threat focus and reappraisal, safety-behaviour utilization, and exposure only. The results demonstrated that the participants who were encouraged to use safety-behaviours during exposure demonstrated more fear at post-treatment and follow-up as compared to those who were encouraged to focus on threat and reevaluate their core threat during exposure. It should be noted however, that some studies failed to show a detrimental effect of safety behaviours (e.g., Rachman, Shafran, Radomsky, & Zysk, 2011; van den Hout, Engelhard, Toffolo, & van Uijen, 2011). Those studies are though considered as comprising methodological limitations such as behavioural approach ceiling test effects, the lack of control groups or the use of samples likely characterized by few safety behaviours in daily life (Weisman & Rodebaugh, 2018). It has been further argued that those differences between studies may been explained by the evidenced distinction between the availability and utilization of safety behaviours (Weisman & Rodebaugh, 2018), the mere perception of availability of safety behaviours having shown to be detrimental to exposure (Powers, Smits, & Telch, 2004). Although more research is needed, the removal of safety signals is still considered as being minimally supported by research (Weisman & Rodebaugh, 2018). When safety behaviours are detected, it is still recommended to gradually phase them out. Craske et al. (2014) insist on the fact that the gradual aspect of phasing out is recommended only in order to reduce treatment attrition. The immediate removal is preferred when the patient is willing to.

Stimulus attention is the fact of promoting attentional focus toward the distressing stimulus and to discourage the use of distraction. Most models recommends to focus attention threat (except the socio-cognitive model of Bandura (1988) that tolerates its use provided that it may increase mastery experiences). An extensive body of research investigated the impact

of focusing attention on threat vs distracting attention away during exposure. Those studies have led to inconsistent findings with studies showing a detrimental effect of distraction (Grayson et al., 1982; Haw & Dickerson, 1998; Kamphuis & Telch, 2000; Mohlman & Zinbarg, 2000; Raes et al., 2009), a beneficial effect of distraction (Johnstone & Page, 2004; Oliver & Page, 2003, 2008; Penfold & Page, 1999) or no significant difference between distraction and attentional focus (Antony et al., 2001; Rose & McGlynn, 1997; Telch et al., 2004). A meta-analysis by Podină et al. (2013) demonstrated no differences in efficacy between focused versus distracted exposure for distress and physiological variables. Regarding approach behaviour, distracted exposure outperformed focused exposure marginally at post-exposure, and significantly at follow-up. Moderation analysis evidenced that distraction significantly outperformed focused exposure when the distracter was interactive both for distress reduction and approach behaviour. The fact that the studies that evidenced a superiority of distracted exposure over focused exposure all used interactive designs (communication with the therapist) though raises questions in regard to the actual ingredients of the observed beneficial effect. More research is needed in order to have a better understanding of the mechanisms implied in those effects.

Prior cognitive restructuring is the identification and modification of distorted beliefs prior to exposure. The use this procedure is recommended by the cognitive model. Based on the most recent advances of the research on extinction, the inhibitory learning model has though recommended not to use cognitive restructuring prior to exposure because it could reduce the expectancy of an aversive outcome and mitigate extinction learning (Craske et al., 2014). There has been a long history of conflicts regarding the role of cognitive changes in exposure therapy. The empirical literature has provided inconsistent results regarding the fact that adding cognitive restructuring has beneficial effects or not. In a meta-analysis, Norton and Price (2007) demonstrated no difference between exposure alone vs exposure plus cognitive therapy. Deacon et al. (2012) demonstrated that adding cognitive techniques did not improve the benefits of interoceptive exposure among a sample of individual with high sensitivity to anxiety. To summarize, it seems that there is no consistent empirical proof of the benefit of adding prior cognitive restructuring. The use of this practice is though discouraged on a theoretical basis.

Relaxation is the use of relaxation during exposure. The use of relaxation techniques in combination with exposure date from the emergence of systematic desensitization. The main hypothesis was that relaxation would work through counterconditioning. This explanation and the mechanisms postulated as underlying systematic desensitization have proven to be erroneous. Those techniques are discouraged by the inhibitory learning model because they may serve as safety signals and by the acceptance model because they may be considered as avoidance. The use of this technique has though been very controversial in the literature (Levin & Gross, 1985). Deacon et al. (2012) demonstrated that relaxation (i.e. ventral breathing) did not add benefits to interoceptive exposure alone among a sample of individual with high sensitivity to anxiety. The results of a study conducted by Schmidt et al. (2000) suggested that adding breathing techniques may lead to poorer results that exposure alone among patients suffering from panic attacks. To summarize, there is suggestive evidence that

relaxation may have detrimental effects and there is no consistent empirical proof towards its beneficial effect. Moreover, the fact that it may serve as a safety signal goes against its use.

The theoretical models at times overlap and at times conflicts in terms of recommendations regarding exposure procedures. As a consequence, the clinical literature nowadays comprises sometimes contradictory recommendations in regard to exposure. For example, as presented in the previous paragraph, the cognitive change model recommended the use of cognitive restructuring prior to exposure, while it is discouraged by the inhibitory learning model.. Still, most clinical protocols still recommend using cognitive restructuring prior to exposure. Another example is that graduality in exposure has been recommended in the habituation model, while it has been contraindicated in the inhibitory learning model that recommends conducting randomly the items of a hierarchy in order to increase variability.

It remains uncertain nowadays whether these recommendations have been translated into clinical practice or if previous (but empirically disconfirmed) recommendations are still used. Besides their knowledge of the literature, how therapists reach clinical decisions among such complex and contradictory recommendations is unknown. Further, it has been demonstrated that some therapists hold negative beliefs about exposure therapy (Deacon et al., 2013). Those beliefs may have an important impact on the exposure practices. One can easily imagine for example that therapists holding reservations about exposure therapy may use softer practices that aim at preventing patients from being confronted with intense aversive states (distress relief) whereas such practices are not in line with recent recommendations. Farrell, Deacon, Kemp, Dixon, and Sy (2013) manipulated the beliefs of therapists in training in regard to exposure therapy. The results demonstrated that participants with induced negative beliefs about exposure delivered the treatment more cautiously.

The aims of this study are (a) to assess the frequency of use of various exposure procedures in the daily clinical practice, (b) to evaluate the therapist's knowledge of the recommendations of the literature, (c) to assess whether the frequency of use of the procedures is associated with potential correlates: knowledge of the literature, concerns and appraisal about exposure, confidence in exposure abilities, past difficulties with exposure, attitude towards empirically based practice, empathic concern and years of practice. We expected that exposure procedures may be associated with the knowledge of literature recommendations. Moreover, we hypothesized that exposure procedures that aim at reducing the experienced distress may be associated with concerns about exposure therapy and with personal difficulties in sustaining patients' suffering.

2. Methods

2.1 Participants

Psychotherapists who practice exposure were recruited through announcements by electronic mail. The announcements were forwarded by French-speaking professional associations that promote behaviour and cognitive therapies and by directors of training programs in psychotherapy. Ninety-nine participants completed the study online. The sample

consisted of 66 women and 33 men, their age ranging between 25 and 73 years (M = 41.66, SD = 10.96). 47.5% of the participants were practicing in France, 26.3% in Belgium, 21% in Switzerland, 3% in Canada, and 2% in Luxembourg. In regard to their basic training, 2% of the participants hold a bachelor in psychology, 64.4% a master in psychology, and 13.1% a PhD in psychology. 5.1% were medical practitioners, 13% were psychiatrists and 2% hold a nurse degree. 93.9% had fulfilled a post-graduate psychotherapy training. The survey was completed on a voluntary basis and anonymously. All participants gave their informed written consent before starting the survey. A feedback on the latest recommendations of literature was provided at the end of the survey. The study protocol was approved by the ethical committee of the Psychology Department of the Université catholique de Louvain. Twelve participants did not fill in the survey until the end.

2.2 Measures

2.2.1 Practices Frequency of Use

The participants were asked to evaluate the frequency of use (expressed from 0% to 100% of the cases) of a list of 22 exposure practices created for the present study. This list of exposure practices has been designed in order to capture the variety of practices among therapist. The practices that were too complex or probably poorly understood by clinicians were not retained. The items are presented in Table 11. The items measuring the exposure practices were regrouped in procedures: graduality (5 items), variability (4 items), expectancy salience (2 items), acceptance (2 items), distress relief (2 item), removal of safety signals (2 items), and stimulus attention (3 items). Two procedures that concern very specific techniques were measured by single items: cognitive restructuring and relaxation. Some items were reversed items. Cronbach's alphas (α) demonstrated an acceptable or good internal consistency for most of the dimensions, i.e. graduality (α = .79), variability (α = .76), expectancy salience (α = .59), acceptance (α = .69), and distress relief (α = .78), removal of safety signals (α = .54). The stimulus attention dimension though demonstrated a very poor internal consistency (α = .12). Items of this scale will be analysed separately.

2.2.2 Knowledge of the Literature Recommendations

The participants also reported their knowledge of the recommendations of the literature in regards to a similar list of 22 exposure practices on a non-continuous categorical scale with the following answer options: (1) "Yes, the literature recommends this practice" (i.e. this practice is empirically grounded or conforms to the recommendations of the literature for theoretical reasons), (2) "No, this practice is not supported by the literature", (3) "The literature has not concluded in regards to this practice" (Debate), (4) "I don't know".

2.2.3 Additional Variables

Concerns about exposure were measured with 11 items generated in order to capture the experienced fears of the therapist while using exposure therapy, e.g., item 1 "Whenever I use exposure therapy, I feel like I lack empathy" or item 11 "Whenever I use exposure therapy,

I fear symptom deterioration. The items were rated on a 6-point Likert-type scale (from 1 "Totally disagree" to 6 "Totally agree"). A high internal consistency has been demonstrated in the present sample (α=.87). The scale is presented in Appendix 5.A.

The positive appraisal of exposure was measured via a single item: "Generally speaking, exposure is a treatment strategy that I like". This item was rated on a 6-point Likert-type scale (from 1 "Not at all" to 6 "Totally"). The confidence in exposure abilities was measured via a single item: "To what extent to you feel confident in your ability to use exposure therapy with your patients?" The participants were asked to give a number between 0 (not confident) to 100 (extremely confident). Past difficulties with exposure were measured via a single item: "I found myself in important difficulties during exposure". The item was rated on a 4-point Likert-type scale (1 "Never", 2 "Once or twice", 3 "From three to five times", and 4 "More than five times".

The modified practice attitudes scale (MPAS; Chorpita, Weisz, Higa, et al., unpublished measure, 2004; translated in French by us) measures the attitudes towards evidence based practice (e.g., item 1 "I am willing to use new and different types of treatments if they have evidence of being effective.", item 5 "A problem with evidence-based treatments is that you need to learn a different program for each diagnosis or problem area."). The items were rated on a 5-point Likert-type scale (from 0 "Not at all" to 4 "To a very great extent"). Borntrager, Chorpita, Higa-McMillan, and Weisz (2009) demonstrated a good construct validity and internal consistency, also demonstrated in our sample (α=.77). The scale is presented in Appendix 5.B.

Empathic concern is one of the dimensions of the Interpersonal Reactivity Index (Davis, 1980; French translation: Gilet, Mella, Studer, Griihn, & Labouvie-Vief, 2013). This dimension that comprises 7 items measures the participant tendency to experience feelings of concern or compassion for others (e.g., item 20 "I am often quite touched by things that I see happen", or item 22 "I would describe myself as a pretty soft-hearted person"). The items were rated on a 5-point Likert-type scale (from 1 "Does not describe me well" to 5 "Describes very well". An acceptable internal consistency has been demonstrated in the present sample (α=.68). The participants also evaluated the years of practice by giving a number in response to this item: "Since how much years do you practice exposure therapy?"

3. Results

Statistical analyses were performed with SPSS 23 (IBM, Armonk, NY, USA). The results for each of the items are presented in Table 11. The dimensions were created in accordance with a theory-based approach rather than data-driven approach[11], because the scale comprises very different items and because of the fact that some items covaries in terms of frequency does not mean that it make sense to group the items on a procedural point of view. For the

[11] Factor Analysis have though initially been conducted. The structure that emerged was hardly exploitable as such. Because of the knowledge of the therapists regarding those practices is partial, it is not surprising that the dimension that came out of the exploratory factor analysis do not correspond to the dimensions of a theory-driven approach.

dimensions of graduality, variability, expectancy salience, acceptance, and distress relief, removal of safety signals, the analyses were realized in regard to the dimensions.[12] In order to compute the frequency of use of a procedure, the frequency of use of the practices that belong to a same procedure were averaged. The frequency of reversed items was subtracted from 100. In order to compute the frequency for each answer in regard to literature knowledge, the frequency of each answer was averaged within a same procedure. The frequency of "yes" and "no" of reversed items were interchanged.

Given that the literature knowledge is composed of non-continuous categorical variables and in order to use regressions, this measure was reduced in two scores. The frequency of ignorance was computed within each dimension by dividing the number of "I don't know" responses by the total number of item of the dimension. The support toward a procedure was computed as such:

$$Support = \frac{Nb\ of\ "Yes"\ answers\ -\ Nb\ of\ "No"\ answers}{Nb\ "Yes"\ answers + Nb\ of\ "No"\ answers + Nb\ of\ "debate"\ answers}$$

Note. Nb = Number. The number of "yes" and "no" answers were interchanged for reversed items. The individuals that answered "I don't know" for all of the items of a dimension (and therefore had a null denominator) were given a support score of 0.

For each procedure, a linear regression with the "enter" method was conducted with the global mean frequency of use of the procedure as dependent variables and with the support toward the procedure, the ignorance of literature recommendations in regard to the procedure and the additional variables (described in the Measure section) as predictors. For single item procedures, the mere frequency of use was introduced as the dependent variable. Pearson correlations between the predictors used in the regressions were computed. The presence of multicollinearity was evaluated with the variance inflation factor (VIF) and the tolerance factors. According to Allison (1999), when the VIF is over 2.5 and the tolerance score below .40, the presence of multicollinearity is confirmed. In the conducted regression, the VIF never exceeded 2.5 and the tolerance factor was never inferior to .40, suggesting that no collinearity-related problem is present in those regression analyses. The indices of multicollinearity are presented in Appendix 5C. The results of the regression are presented in Tables 12 and 13. The strong correlation between the confidence in exposure abilities and the positive appraisal of exposure must be taken into consideration for interpreting the regressions.

In the next section, frequencies over 80% will be qualified as "very frequently" or "vast majority. The frequencies from 70 to 80% will be qualified as "quite frequently" or "majority". The frequencies from 40 to 60 % will be qualified as "moderate". The frequencies from 20 to 30% will be qualified as a "substantial minority". The frequencies from 10 to 20% will be qualified as a "minority" or as "poorly". The frequencies from 5% to 10% will be qualified as "small minority". The frequencies below 5% will be qualified as "very few" or "very small minority".

[12] For the Attention Stimulus dimension, the items were treated individually because of poor internal consistency.

Table 11. Practices frequency of use and literature knowledge

Practices		Literature knowledge				
Item	Frequency of use (%) M (SD)	Item	Frequency for each answer			
			Yes	No	In debate	I don't know
Graduality		The literature recommends…				
I make sure that the patient confronts gradually to anxiety	84.1 (23.5)	…that the patient confronts gradually to anxiety	83.9	8.0	5.7	2.3
I make sure that the patient realizes exposure gradually following a hierarchy	83.3 (23.8)	…to realize exposure gradually following a hierarchy	79.3	6.9	8.0	5.7
I make sure that the patient moves very gradually from one step to another in the hierarchy	78.6 (24.8)	…to make sure that the patient moves very gradually from one step to another in the hierarchy	65.5	13.8	11.5	9.2
I encourage the patient to repeat the same exposure trial until fear has decreased	84.3 (22.6)	…to repeat the same exposure trial until fear has decreased	80.5	5.7	4.6	9.2
I interrupt exposure whilst fear is still present[r]	20.4 (25.8)	…not necessarily to wait that fear has diminished in order to stop exposure[r]	14.9	62.1	9.2	13.8
Variability						
I make sure that the patient realizes exposure by varying the modality: interoceptive, imaginal, in vivo	65.0 (30.6)	…to vary exposure modality: interoceptive, imaginal, in vivo	71.3	6.9	5.7	16.1
I make sure that the patient exposes sometimes alone, sometimes in my presence, and sometimes in the presence of other people	74.6 (28.2)	…that the patient exposes sometimes alone, sometimes in my presence, and sometimes in the presence of other people	70.1	5.7	5.7	18.4
I make sure that the patient exposes sometimes in familiar places and sometimes in unfamiliar places	73.5 (28.8)	…that the patient exposes sometimes in familiar places and sometimes in unfamiliar places	72.4	1.1	8.0	18.4
I make sure that the patient exposes at different times of the day or of the week	79.1 (27.0)	…that the patient exposes at different times of the day or of the week	78.2	2.3	6.9	12.6

Practices		Literature knowledge				
Item	Frequency of use (%) M (SD)	Item	Frequency for each answer			
			Yes	No	In debate	I don't know
Expectancy salience						
I make sure that the patient identifies clearly his/her fearful expectancies	80.5 (23.0)	…that the patient identifies clearly his/her fearful expectancies	75.9	1.1	1.1	21.8
After exposure, I realize a debriefing during which I ask the patient to assess the discrepancy between the expectancy and what really happened	81.6 (24.4)	….to realize a debriefing during which the patient assesses the discrepancy between the expectancy and what really happened	74.7	1.1	3.4	20.7
Acceptance						
I encourage the patient to adopt an acceptation attitude in regard to his/her experience during exposure	81.1 (24.1)	…to adopt an acceptation attitude in regard to the experience during exposure	78.2	3.4	4.6	13.8
I encourage the patient to adopt an attitude of non-judgmental observation on his/her emotional experience	75.6 (29.9)	…to adopt an attitude of non-judgmental observation on the emotional experience	75.9	2.3	6.9	14.9
Distress relief						
When the patient expresses an important distress, I lower the intensity	59.3 (32.9)	…to lower the intensity when the patient expresses an important distress	47.1	17.2	5.7	29.9
If the patient expresses distress, I alleviate exposure	55.1 (32.5)	…to alleviate exposure if the patient expresses distress	28.7	28.7	14.9	27.6
Removal of safety signals						
I make sure that the patient uses of safety signals at least as possible	58.0 (35.7)	….that the patient uses of safety signals at least as possible	52.9	5.7	6.9	34.5
I refuse to reassure a patient when he/she seeks for reassurance	48.9 (31.3)	…to meet the reassurance request of the patient[r]	5.7	65.5	6.9	21.8
Stimulus Attention						

Practices		Literature knowledge				
Item	Frequency of use (%) M (SD)	Item	Frequency for each answer			
			Yes	No	In debate	I don't know
I make sure that the patient focuses attention towards what triggers distress during exposure	72.1 (29.2)	…that the patient focuses attention towards what triggers distress during exposure	80.5	3.4	3.4	12.6
I make sure that what triggers distress and discomfort is salient for the patient (consciously perceived and identified as such) during exposure	79.7 (19.2)	….to make what triggers distress and discomfort salient for the patient (consciously perceived and identified as such) during exposure	74.7	2.3	4.6	18.4
I ask the patient to distract from what frightens him/her during exposure[r]	12.4 (21.8)	….to distract from what frightens him/her during exposure[r]	4.6	82.8	4.6	8.0
Cognitive restructuring						
I realize cognitive restructuring before exposure	53.9 (34.8)	…to do cognitive restructuring before exposure	40.2	23.0	10.3	26.4
Relaxation						
I make sure that the patient uses relaxation techniques during exposure	48.6 (35.4)	…the use of relaxation techniques during exposure	32.2	40.2	13.8	13.8

Table 12. Linear regressions with the frequency of use as a dependent variable

Procedures		Standardized betas of independent variables										
	R^2	Support toward the procedure	Ignorance of literature recommendations	Concerns about exposure	Positive appraisal of exposure	Confidence in exposure abilities	Past difficulties with exposure	Positive attitude towards EBP	Empathic concern	Years of practice	Totally ignore (%)	Correlation between Support and Ignorance
Graduality	.456**	.552***	-.135	.039	.029	.118	-.126	.103	.244**	-.067	2.3	-.278**
Variability	.380**	.204*	-342***	.124	.346**	.033	-.046	.126	.148	.165	2.3	.064
Expectancy salience	.256**	.299*	-.247*	-.001	.113	.088	.092	-.141	.074	<.001	9.2	.088
Acceptance	.260**	.283*	-.254*	.126	.148	.123	.079	-.067	.037	.061	6.9	-.014
Distress relief	443**	.594**	.077	.203*	-.248*	.168	.068	.089	.150	.107	17.2	.041
Removal of safety signals	.284**	.302**	-.239*	-.050	.098	.063	-.126	-.126	-.066	.141	13.8	-.098
Stimulus Attention												
I make sure that the patient focuses attention towards what triggers distress during exposure	ns											
I make sure that what triggers distress and discomfort is salient for the patient (consciously perceived and identified as such) during exposure	.254**	.043	-.233	-.210	-.058	.432**	.148	-.132	.206*	-.229*	18.4	-.693**
I ask the patient to distract from what frightens him/her during exposure[r]	.215*	.298*	.050	.124	-.022	.056	-.141	-.060	.005	.235*	7.1	.451**
Cognitive restructuring												
I realize cognitive restructuring before exposure	.552**	.506**	-.110	-.031	.077	-.055	.103	-.007	.012	.031	26.4	-.133
Relaxation												
I make sure that the patient uses relaxation techniques during exposure	.542**	.706**	-.181*	.023	.055	.101	-.132	-.067	-.019	.020	13.8	.038

Note. *<.05; **<.01; ***<.001; ns= non-significant

Table 13. Pearson correlations between correlates

	Concerns about exposure	Positive appraisal of exposure	Confidence in exposure abilities	Past difficulties with exposure	Positive attitude towards EBP	Empathic concern
Positive appraisal of exposure	-.321**	-				
Confidence in exposure abilities	-.377**	.658**	-			
Past difficulties with exposure	.071	.086	-.095	-		
Positive attitude towards EBP	-.267*	.244*	.143	-.162	-	
Empathic concern	.180	.057	-.022	.113	-.069	-
Years of practice	-.194	.156	.256*	.137	-.148	-.079

Note. EBP = Empirically-Based Practice

3.1 Graduality

Graduality is used very frequently (81.9%). In sharp contrast with recent literature conclusions, a majority of respondents believed that this procedure is supported by the literature (74.3%). A small minority of therapist think that this procedure is not supported by the literature (9.9%), that the literature is in debate (7.8%) or ignore what is recommended in the literature (8.0%). The support toward the procedure and empathic concern were significant predictors of the frequency of use of graduality. No other predictors were revealed significant.

3.2 Variability

Variability is used quite frequently (73.0%). In line with recent literature conclusions, a majority of respondents think that this procedure is supported by the literature (72.9%). A very small minority of therapist think that this procedure is not supported by the literature (4.0%) and a small minority think that the procedure is in debate (6.6%). A minority of the therapist ignore the recommendations of the literature in regard to this procedure (16.4%). The support toward the procedure, the ignorance of the literature recommendations (negatively) as well as the positive appraisal of exposure were significant predictors of the frequency of the use of variability.

3.3 Expectancy Salience

Expectancy salience is used very frequently (81.1%). In line with recent literature recommendations, this procedure was mainly thought to be supported by the literature (75.3%). Very few therapists think that this procedure is not supported by the literature (1.1%) or that the literature is in debate (2.3%). A substantial minority of the therapists ignore the recommendations of the literature in regard to this procedure (21.3%). The support toward the procedure and the ignorance of the literature recommendations (negatively) were significant predictors of the use of expectancy.

3.4 Acceptance

Acceptance is used frequently (78.3%). This procedure was mainly thought to be supported by the literature (77.0%). A very small minority of the therapists think that this procedure is not supported by the literature (2.9%) and a small minority think that the literature is in debate (5.7%). A minority of the therapists ignore the recommendations of the literature in regard to this procedure (14.4%). The support toward the procedure and the ignorance of the literature recommendations (negatively) were significant predictors of the frequency of the use of acceptance.

3.5 Distress Relief

Distress relief was moderately used by therapists (57.2%), although this procedure is not recommended and at the most contraindicated by the models and by recent clinical recommendations. The knowledge of the literature concerning this procedure is scattered. 37.9% of therapists think that this procedure is supported by the literature, while 23.0% think that it is not supported. 10.3% think that this procedure is in debate. 28.7% of the therapists ignore the recommendations about this procedure. The support toward the procedure, the concerns about exposure therapy and the positive appraisal of exposure (negatively) were significant predictors of the frequency of use of distress relief.

3.6 Removal of Safety Signals

Even though, this procedure is supported by the literature, the removal of safety signals ismoderately used (53.4%). Slightly more than a half of therapists think that this procedure is supported by the literature (59.2%). A small minority of therapist think that this procedure is not supported by the literature (5.7%) or is in debate (6.9%). 28.2% of therapists ignore the recommendations of the literature about this procedure. The support toward the procedure and the ignorance of the literature recommendations (negatively) were significant predictors of the frequency of the use of acceptance.

3.7 Stimulus Attention

The items of this procedure were treated individually because of poor internal consistency. The practice measured by the item 'I make sure that the patient focuses attention towards what triggers distress during exposure' is used quite frequently (72.1%). A vast majority of therapist think that the practice is supported by the literature (80.5%). Very few therapists think that this practice is not supported by the literature (3.4%) or that the literature is in debate (3.4%). A minority of therapists ignore the recommendations of the literature concerning this practice (12.6%). There was no significant predictor of the frequency of use of this practice.

The practice measured by the item 'I make sure that what triggers distress and discomfort is salient' is used quite frequently (79.7%). This practice is mainly thought to be supported by the literature (74.7%). Very few therapists think that this practice is not supported by the literature (2.3%) or that the literature is in debate (4.6%). A minority of therapists ignore the

recommendations of the literature concerning this practice (18.4%). The confidence in exposure abilities, the empathic concern and the years of practice (negatively) were significant predictors of the frequency of use of this practice.

The practice measured by the reversed item 'I ask the patient to distract from what frightens him/her during exposure" is poorly used (12.4%). A vast majority of therapists think that this practice is not supported by the literature (82.8%). Very few therapists think that the practice is supported by the literature (4.6%), that the literature is in debate (4.6%), and a small minority ignore the recommendations of the literature about this practice (8.0%). The support toward the practice and the years of practice were significant predictors of the frequency of use of this practice.

3.8 Cognitive Restructuring

Cognitive restructuring prior to exposure is moderately used (53.9%), although there is no empirical support toward this practice in the literature. The knowledge of the literature about this procedure is very scattered. 40.2% of therapists think that this procedure is supported by the literature, while 23.0% think that the procedure is not supported. 10.3% think that this practice is in debate. 26.4% of the therapists ignore the recommendations concerning this procedure. The support toward this practice was a significant predictor of its frequency of use.

3.9 Relaxation

Relaxation during exposure is moderately used (48.6%), although there is no empirical support toward this practice in the literature. The knowledge of the literature about this procedure is scattered. 32.2% of therapists think that this procedure is supported by the literature, while 40.2% think that the procedure is not supported. 13.8% think that this procedure is in debate. 13.8% of the therapists ignore the recommendations about this procedure. The support toward the practice and the ignorance of the literature (negatively) were significant predictors of the frequency of use of this practice.

4. Discussion

The aim of this study was to assess the frequency of use of exposure procedures among therapists, to evaluate their knowledge of the recommendations of the literature concerning those procedures, and to evaluate the association between the frequency of use and various correlates.

The results demonstrate that some procedures were used in contrast with the recommendations of the literature. Graduality, i.e. confronting the patient gradually to anxiety and to repeat the same exposure trial until anxiety has declined, is used very frequently among practitioners even though there is no empirical support for this procedure. As presented in the introduction, the main model recommending this procedure, i.e. habituation, has been challenged by empirical evidences (Baker et al., 2010; Culver et al.,

2012; Kircanski, Mortazavi, et al., 2012; Plendl & Wotjak, 2010; Prenoveau et al., 2013; Rescorla, 2006). Moreover, the most recent model with supportive evidence, i.e. inhibitory learning, does not recommend using graduality but rather to randomly perform the items of a hierarchy in order to increase variability, and to encourage intense exposure since the beginning. Note though that practical reasons related to compliance may justify the use of graduality. This aspect, however, remains to be tested. Our results show that the use of this procedure is associated with therapists' attributed literature support and with their personal tendency to feel uncomfortable when confronted with others' distress (i.e. empathic concern). It therefore seems that this procedure is used more largely by therapists who hold the belief that it is recommended by the literature and those who feel particularly bad when confronted with their patients' distress. Those results suggest that the therapists should be aware of their personal tendency to feel uncomfortable when confronted with the distress of the patient. The decision of using graduality should not rely on a distress avoidance tendency but rather on the best interest of the patient. There should be a real concern for this issue in the training of therapists and more importance should be given to ability of accompanying the patient confronted with distress.

Distress relief, i.e. the fact of alleviating the intensity of exposure when the patient reports distress during exposure, although not recommended by the models and by recent clinical recommendations, was moderately used among therapists. The use of this procedure is associated with the belief that literature supports this procedure (characterized by highly discordant views between therapists on the support of the literature toward the procedure and a high rate of ignorance), with concerns about exposure therapy, and with a less positive appraisal of exposure. The fact that concerns about exposure are related to exposure implementation is very challenging. Given that those concerns were not correlated with past difficulties with exposure, it seems that those concerns do not rely on past experiences but rather on a a-priori. More information should be given to therapists in regards to the empirical results related to those concerns. Lilienfeld, Ritschel, Lynn, Cautin, and Latzman (2014) contributed extensively to this effort by identifying potential biases of the therapists and by providing a synthesis of empirical data that may help in deconstructing those biases.

Prior cognitive restructuring was moderately used. Although clinical recommendations do not converge on this issue, prior cognitive restructuring has not been consistently supported by empirical studies and is contraindicated by the inhibitory learning model. Similarly, relaxation is used moderately although there is no empirical support toward this procedure.

Some procedures were used, but not systematically, although recommended by the literature, suggesting that there is still room for improvement in regard to those procedures. This is the case for variability, expectancy salience and acceptance procedure and the removal of safety signals. Given that the use of those procedures is related with their knowledge of the literature and that the ignorance of literature is quite high among therapists, more efforts should be done in order to increase the knowledge of those procedures. The item analyses of the Stimulus attention dimension showed that distraction was not used frequently, and that

therapist most frequently make sure that the attention is focused during exposure. The regressions showed no clear pattern.

More generally, the present results suggest that the use of a procedure is mainly associated with knowledge of the literature. Moreover, this knowledge is characterized by discordant support toward the procedures between therapists and by some degree of ignorance for some of the procedures. Given that literature knowledge is not optimal and that this knowledge seems highly associated with the use of procedures, it seems that more efforts should be made in order to translate the results of recent research into clinical practice. This could be achieved both by clarifying and updating clinical guidelines and protocols and by improving the training given to therapists.

The main strength of this study is to be the first to assess the various exposure procedures among therapists and their correlates. It evidenced for some of the procedures a gap between the latest recommendations and what is made practically in the field. It also pointed out some levers that could help to bridge the gap between research and practice. Although most attempts to bridge this gap have strived to adjust the clinical practice in regard to the advances of research, we believe that a complementary way to bridge this gap is to design research questions that better suit with therapists concerns. For example, even though recent models suggest that cognitive restructuring should not be conducted prior to exposure, is it acceptable to use it when confronted with a refusal of the patient to conduct exposure? Or, is it acceptable to conduct exposure gradually whenever it matches with the patient preferences? Moreover, our literature review has shown that there is a lack of clinical studies concerning some procedures, although they are recommended based on well-established models (mainly based on lab studies: e.g., expectancy salience). Those procedure would gain credibility, especially in the eyes of clinicians, if their efficacy was proven in clinical studies that were closer to the conditions and context in which the daily clinical practice is realized. Lab studies have of course their own value in orienting the practices. Translating recommendations from lab studies to clinical practice though ideally requires clinically analogy studies in which the feasibility and impact of those recommendations is evaluated. Another interest of this study is to provide the therapist and their supervisors with an inventory of practices and a tool to discuss on which basis the decision making between exposure procedures may be made.

However, this study suffers from several limitations. First, from a psychometrical point of view, some of the procedures did not include enough items. In addition, some of the dimensions evidenced a poor internal consistency. This may be due to a poor understanding of the meaning of some items. The fact that some procedures were not familiar and relevant according to the therapists may also have induced this poor internal consistency. Moreover, it may have missed unexplored practices, because our list of practices is not exhaustive. Furthermore, we cannot exclude a potential selection bias of the participants. Whereas the participation was made on a voluntary basis, the participants with less confidence in their knowledge and abilities may have chosen not to participate. This may have led to an overestimation of the literature knowledge and of the use of good practices. Similarly, there may be a social desirability bias in the reporting of the practices. Nonetheless, it is important to note that because the literature is not unequivocal concerning certain practices, having

doubts as a therapist about a practice may be representative of a good knowledge of the literature. Ignorance of the literature should not therefore be considered as a default per se. Our position is though that this is indicative of a challenge for research to provide more evidence to clinicians and for clinicians to try to access the best literature about those procedures. Another limitation of this study is that it did not take into account the fact that decision-making in therapy is not the mere result of the therapist but the mutual result of what is proposed by the therapist and the values and preferences of the patient (Spring, 2007). For example, in regards to graduality, it may be that the therapist is aware of the recommendations of Craske et al. (2014), but cannot apply them with the patient because the patient is not willing to do it. Future studies may strive to assess what has been proposed to the patient and the decision that has been made collegially. Moreover, future studies should evaluate the effects of the use of graduality on compliance.

General discussion

General discussion

The main aim of this thesis was to investigate attentional focus in exposure. Theoretical models hold opposite predictions regarding the impact of distraction on exposure outcomes. Past studies have yielded contradictory results. We identified three factors potentially involved in distraction and designed studies that aimed at manipulating specifically those factors in order to test their respective impact. In three studies conducted for this purpose, spider phobics performed a dual task. They were exposed to spider stimuli while focusing at the same time on stimuli that differed in the factors implied in distraction. The first study manipulated schematicity. The second study manipulated schematicity and valence. The third study manipulated interactivity and schematicity. A visual summary of the factors manipulated in the studies is presented in Figure 10. In the following section, we will review the impact of each of those factors and try to infer from those the potential mechanisms implied in exposure.

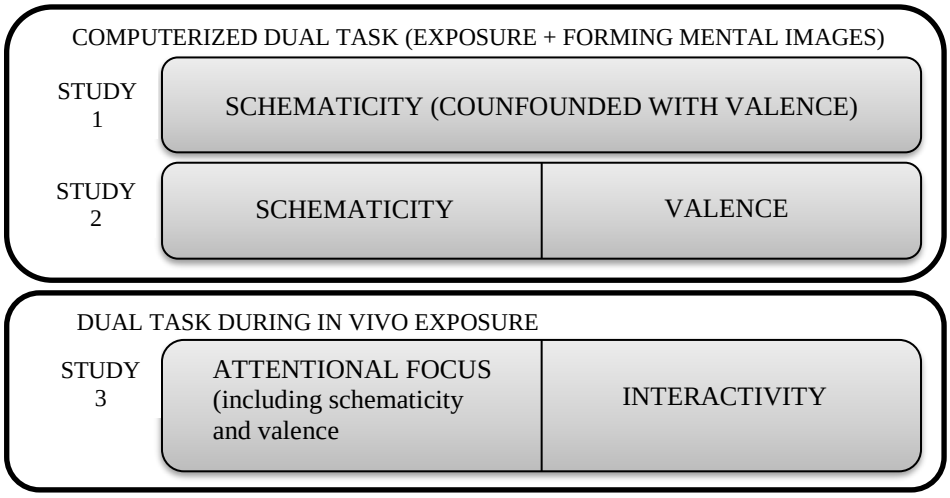

Figure 10. Summary of the manipulated factors across studies

1. Distraction factors effect

1.1 Schematicity

Schematicity has been manipulated in the first study, in which spider phobics were asked to form mental images of schematic and non-schematic words. The results were initially interpreted (in the discussion of the article) in terms of schematicity. They showed that the activation of non-schematic concepts during exposure leads to a return of distress at follow-up. Moreover, the activation of schematic concepts decreased emotional and avoidance

responses. The results were interpreted as the fact that schematicity plays a key role in the maintenance of distress reduction between sessions. However, the second study (see in the next paragraph) calls for a degree of caution in interpreting those results in terms of schematicity. Indeed, in the first study, we did not control for valence, and the schematic and non-schematic cue words may have differed in terms of valence. The demonstrated superior effect of schematic vs. non-schematic exposure may therefore be due to valence and not to schematicity.

Schematicity has been manipulated the more purely in the second study, which examined the respective impact of schematicity and valence of mental images that spider phobics were required to form during exposure to spider pictures. Three experimental groups (schematic negative, non-schematic negative and non-schematic positive) were contrasted in order to test the respective influence of schematicity and valence as moderators of the effect of distraction on exposure efficacy. A synthesis of the contrasts is provided in Table 14. The results demonstrated that schematicity was supported as a moderating variable only in regard to the self-reported severity of symptoms (emotional and avoidance responses), while it was not supported in regard to subjective distress during habituation, skin conductance and behavioural approach. In contrast, valence was supported as a moderating variable in all cases. Those results have led us to conclude that schematicity has less impact in distraction than previously expected and that this impact may have been erroneously attributed to schematicity while it was actually due to valence.

The third study evaluated the impact of attentional focus and interactivity on exposure. Spider phobics were exposed gradually to a live spider in two sessions and guided, in a between-subject design, either by a computer voice or by the experimenter (Interactivity), either to focus their attention towards the spider and the associated responses or to listen to stories with missing words (Attentional focus). Schematicity has therefore been manipulated in the sense that the additional task was either to focus on the elements of the fear schema or to listen to unrelated elements. This manipulation is though less specific than the manipulations in the previous studies. Moreover, the task in the distracted group (.i.e. listen to stories) was assessed after the study as more pleasant than the task in the attentionally focused group (.i.e. focus their attention towards the spider and the associated responses). Valence and schematicity were therefore confounded factors. Consequently, we cannot conclude on the role of schematicity based on this third study.

Table 14. Synthesis of the contrasts of valence and schematicity realized in the second study

	Schematicity	*Valence*
Within-session		
Subjective distress during habituation	Not supported	Supported
Generalizability of Skin conductance responses	Not supported	Supported
Reported symptoms (Emotional and avoidance responses)	Supported	Supported
Between session		
Reported symptoms (Emotional and avoidance responses)	Supported	Supported
End of Treatment		
Behavioural Avoidance Task	Not supported	Supported

Note. Contrasts were realized only on the variables that showed an effect of the Condition

1.2 Valence

Valence has been successfully distinguished from schematicity in the second study. The results demonstrated that participants who were required to form schematic mental images during exposure displayed similar results to those of participants who were required to form non-schematic negative images. In contrast, when compared to those participants, participants who were required to form non-schematic positive mental images demonstrated a stronger habituation of subjective distress during exposure. However, when confronted to new spider pictures, there was no difference with the other groups. Moreover, those participants (of the non-schematic positive group) also demonstrated more avoidance when confronted with a real spider at post-reexposure and poorer declines in emotional and avoidance responses. The contrasts performed on subjective distress during exposure, on behavioural avoidance and, to a lesser extent, on SCRs did favour valence as a moderator of the effect of distraction on exposure efficacy. Those results were interpreted in terms of distress toleration. Participants in the non-schematic positive group may have engaged in more avoidance from emotional aversive states than participants of the non-schematic negative and schematic groups. Our conclusion is that valence may be a key factor implied in distraction.

1.3 Interactivity

Interactivity has been manipulated in the third study, which is the first that evaluated interactive vs. non-interactive exposure. In the interactive group, exposure was guided by the experimenter while it was guided by a computer voice in the non-interactive group. The results evidenced that participants who realized exposure while being guided by the experimenter reported lower distress peaks for the three last steps of exposure than those who were guided by the computer. However, those results were only present in the second session and not in the first one. Whereas no other indicator demonstrated a similar benefit of interactive distraction, we cannot conclude on its superiority based on this single effect. We found no significant impact of interactivity on exposure efficacy. O'Brien and Kelley (1980) showed that participants who performed predominantly-therapist-assisted exposure achieved a greater reduction in fear than participants who realized exposure with less therapist involvement. The present results demonstrate that except from an effect on distress peaks for

the three last steps of exposure (in the second session only), there is no benefit of interactive exposure over non-interactive exposure on the other indicators.

Those results also partially conflict with the meta-analysis of Podină et al. (2013) that demonstrated that distracted exposure outperformed focused exposure when the distracter was interactive in terms of distress reduction and behavioural approach. Of note, we manipulated interactivity in a very strict sense as compared to previous studies. Any potential confounded effect due to a greater manifested interest of the experimenter towards self-relevant aspects of the life of the individual was voluntarily prevented. Those results therefore suggest that the benefit of interactivity (demonstrated in the meta-analysis) is due to another variable that is unique to the design of previous studies using interactive distraction and all originating from the same laboratory (Johnstone & Page, 2004; Oliver & Page, 2003, 2008; Penfold & Page, 1999). It is likely that interactivity between the experimenter and the participants may imply more opportunities to influence the course of the results. The fact that the participants are aware of the expectancies of the experimenter and that they develop relationships with the experimenter may push them to comply with the instructions and therefore to obtain the greatest benefit of exposure. We initially proposed that the manifested interest toward the participant and the relationship with the experimenter may have accounted for the effect observed in previous studies. The fact that those variables were not correlated with the indices of exposure efficacy in the third study though goes against this hypothesis.

2. Mechanisms implied in exposure: implications for the models

Out of the three postulated factors postulated as being part of distraction, only one of them, namely valence, has shown to have a strong impact on the efficacy of exposure. Surprisingly, the present work suggests that the principles that underlie successful exposure rely less on the content of the information that is processed during exposure than on the focus on negative affect and the capacity to tolerate it. Emotional aversive state toleration seems to be a crucial factor in exposure efficacy. The maximal efficacy of exposure may rely on two conditions: (1) activation of the fear of spiders and (2) maintenance of the confrontation with an aversive emotional state. These conditions suggest that the critical matter for successful exposure rests more in the process that is being engaged, namely emotional acceptance or tolerance of aversive affect, rather than the specific content of the emotional information being attended to. Partial distraction does not seem to be harmful, as long as it does not entail escape of the negative affect induced by exposure to the phobic stimulus. Those conclusions are consistent with the toleration/acceptance models (Barlow et al., 2004; Greenberg, 2002; Hayes et al., 2006; Segal et al., 2002). This interpretation is also consistent with the observations of Tabibnia et al. (2008), who confronted spider phobics with images of spiders on a screen, followed by the presentation of a cross (exposure only group), or negative words unrelated to spiders (negative label group), or of neutral or slightly positive words (neutral label group). The results demonstrated that the presentation of unrelated negative words after the exposure to the feared stimuli lead to a greater diminishment of SCRs as compared to exposure only and the presentation of a neutral label. Maintaining the confrontation with the

emotional aversive state rather than escaping it therefore seems to be an important active ingredient of exposure.

The present work does not add support to the emotional processing theory (Foa & Kozak, 1986). Based on this model, the main assumption would be that the maximal efficacy would be achieved when the activation of the fear structure is the strongest (i.e. in the schematic group). Our results demonstrated that it was not the case (Study 2). While focusing on the phobic stimuli, focusing at the same time on schematic elements does not give better results than focusing on non-schematic elements if they are negative. Surprisingly, schematicity, i.e. the maximal matching of the elements that are in the scope of attention with fear structure elements, does not seem to be a key factor for successful exposure. Of note, it does not mean though that schematicity is not an important ingredient of exposure. Those conclusions only concern schematicity of a partial distractor. The basic ingredient postulated by the EPT, namely the activation of the fear structure, was present both in the schematic and non-schematic groups because in every group, the participants focused on spider stimuli. More than challenging profoundly the EPT, those results suggest that the role of another factor, namely acceptance and tolerance of distress, may have been underestimated in the model. Similarly, the inhibitory learning model (Craske et al., 2014) mainly focused on the role of specific variables such as expectancy violation, deepened extinction, multiple contexts, etc… Of note, our data does not allow to confirm or infirm the importance of those factors. The activation of an aversive state though seems to be more important than initially postulated in the model.

The present work demonstrated no impact of the attentional focus on self-efficacy. Combined with the fact that no solid benefit of distracting attention away from the phobic stimulus (apart from a short-term distress relief that showed to be detrimental on the longer run), those results suggest that distracting attention away from threat during exposure may diminish distress in the moment but does not help in providing a higher sense of self-efficacy or better therapeutic outcomes. The fact that our results did not support the socio-cognitive model in terms of distraction though does not mean that self-efficacy does not play a key role more generally. Indeed, we did not manipulate self-efficacy itself but only evaluated the effect of the attentional focus on self-efficacy. Moreover, our results demonstrated that self-efficacy plays a key role in adherence to treatment. Dropouts indeed reported less self-efficacy than finishers (at the first session both at pre- and at post-exposure) in the first study. Moreover, dropouts increased their self-efficacy significantly less than finishers from pre- to post- exposure in the second study. A similar but marginal effect was found in the third study. Finally, we cannot exclude that diverse types of distraction impact differently on the exposure outcome. The core principle of the social cognitive model is that the most important is to design experiences that trigger the feeling of being able to deal with a situation (i.e. mastery experiences). Later on, it has been argued that distraction during exposure would reduce distress, allowing participants to sustain the phobogenic situation and consequently to restore their sense of self-efficacy (Johnstone & Page, 2004; Oliver & Page, 2003, 2008; Penfold & Page, 1999). This later claim has been discarded by our data. If we stick to the core principle of the model, our manipulations yet may not provide an experience in which the participants

are developing self-efficacy. In other words, performing dual tasks may provide the feeling that they are failing, because their attention is limited, and this may give them the feeling that things are getting out of control. A different kind of distraction, that leads to more self-efficacy, may provoke beneficial effects.

3. Defining distraction in a larger theoretical perspective

The theoretical models we referred to so far are models that postulated a specific role of distraction in exposure. While trying to define distraction more specifically, we may improve our understanding by referring to a larger theoretical perspective that defines working memory and attention determinants. Such a theoretical perspective has been provided by Peschard and Philippot (2015). Those authors propose to bridge the gap between the recent findings of cognitive psychology and research on anxiety disorders. Their model aims at explaining how the numerous sources of information compete and impact on the attentional focus. A graphical representation of the model is provided in the Figure 11.

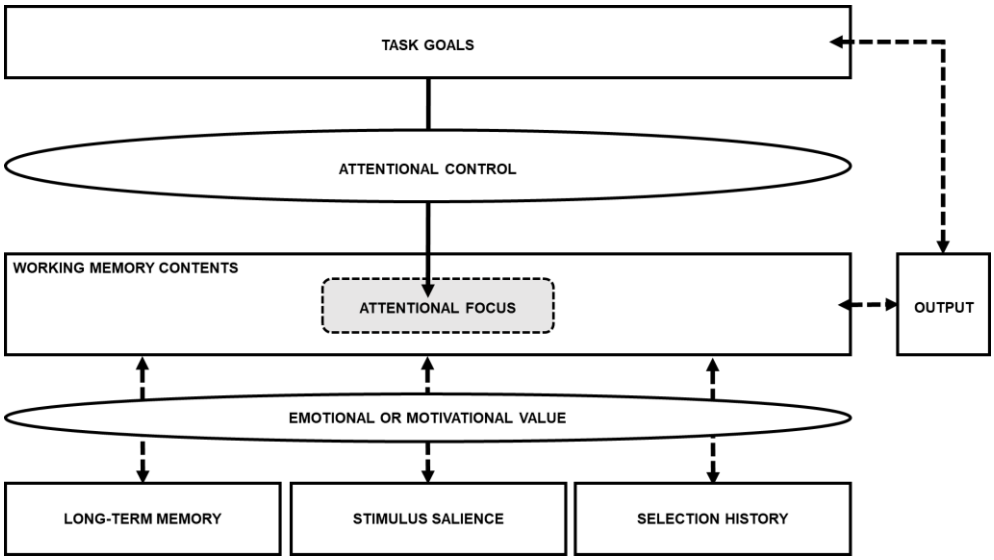

Figure 11. Overview of the conceptual framework of the processes influencing the working memory content, proposed by Peschard and Philippot (2015, p.2; reproduced with authors permission)

The model postulates that a myriad of inputs compete for entering in the working memory because of its limited capacity. Working memory would serve as an interface where different, and sometimes contradictory, sources of internal and external information compete to be the transient focus of attention. The authors argue that the information that accesses the working memory depends on the availability of attentional control and the strength of multiple influences such as task goals, stimulus salience, selection history and long-term memory. In this model, working memory is defined as a "temporary cognitive store located at the

intersection between information conveyed through the senses and information retrieved from previous experiences" (p.3). The focus of attention is defined as the transient content if working memory. Task goals have an impact on the allocation of attention by the keeping task priorities and relevant information in a highly active state. Moreover, salient distractors can automatically catch attention when they possess task-relevant attributes. Another influence is the stimulus salience. Attention can switch quickly from the current goals to give the priority access to working memory to highly relevant sensory inputs characterized by low-level perceptual properties (e.g., new motions, novelty, abrupt onset) or evolutionary motives (i.e. biological threats to survival such as spiders). The attentional focus is also dependant on the previously selected information (i.e. selection history). Finally, long-term memory also has the potential of influencing attentional focus, for instance through the emotional/motivational value of memory traces.

In this perspective, when a spider phobic is confronted to spider stimuli, the most influential source of information competing for the access of working memory would be stimulus salience. Spider stimuli spontaneously occupy the attentional focus because they represent a threat. While threat is occupying the attentional focus, it automatically triggers an action tendency that consists in escape. In this framework, partial distraction during exposure could be defined as an escape that consists in giving some working memory attention to elements that are not related to the distress associated with the presence of the stimulus. Two elements are important in this definition. On the one hand, distraction is considered as escape rather than avoidance because it is an attempt to diminish the intensity of the aversive experience and not an attempt of not being confronted with the situation before its occurrence. On the other hand, what is escaped is not the stimulus itself, but the distress that is provoked in the presence of the stimulus. In other words, the discriminative stimulus is the distress rather than the phobic stimulus. The function of distraction is to diminish distress. For this reason, distraction could be considered as a cognitive escape. Distraction is possibly induced though tasks goals such as in the studies that are part of this thesis. The results that have been evidence regarding the role of valence suggests that the distractor offers more escaping potential when it is positive in valence. It would mean that the potential of escape is dependent upon the difference in valence between the feared stimulus and the distractor.

This integrated model also allows us to point at which level the previous models of exposure postulate an effect of exposure. The graphic representation of Peschard and Philippot (2015) has therefore been adapted in Figure 12.

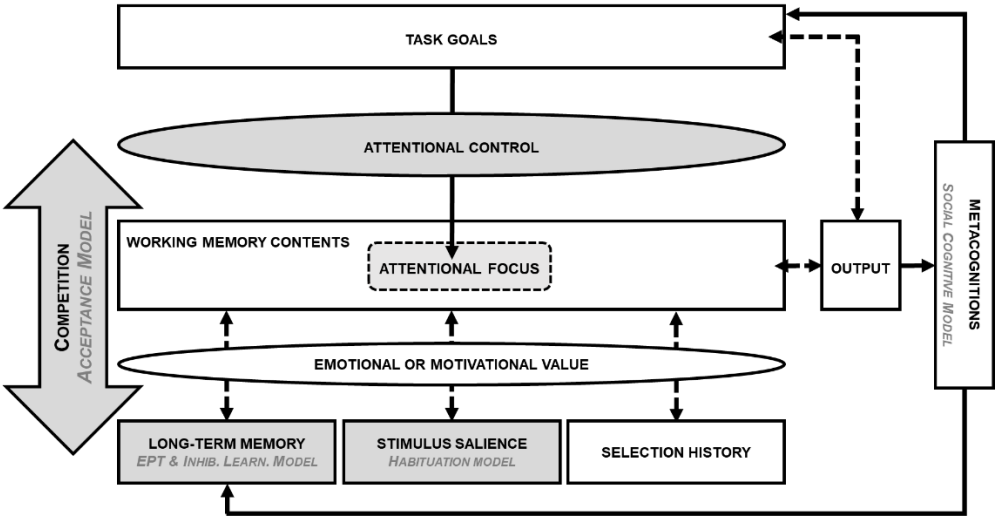

Figure 12. Adaptation of the conceptual framework of the processes influencing the working memory content adapted to the context of exposure

The habituation model postulates that distraction prevents a change at the level of stimulus salience. The repeated confrontation to fear eliciting stimuli would produce a decrement of the salience of the feared stimuli and therefore a decrease of the fear response. EPT and the inhibitory learning model postulate that distraction has a detrimental impact on long-term memory. In EPT, the core mechanism supposedly consists in a change of the fear representation structure. In the inhibitory learning model, the core mechanism consists in the creation in long-term memory of a new association that inhibits the previous association. According to those models, distraction would hinder those core mechanisms that happen in the long-term memory. The social cognitive model postulates a beneficial change of distraction in terms of metacognitions (i.e. self-efficacy). Metacognitions have been added to the model of Peschard and Philippot (2015). The output of the attentional focus would influence the metacognitions regarding the sense of being able to cope with distress. Those metacognitions would then be stored in long-term memory and have an impact on task goals. Distraction, through its output (i.e. making the patient able to deal with distress), would reinforce the feeling of being able to cope with the distress. The acceptation model postulates that distraction has a detrimental effect because it prevents a competition between information that is automatically activated and information that is strategically activated. In this model, changes following exposure therapy result from the inhibition, through attentional control, of what is automatically activated by long-term memory association and by stimulus salience. This competition between what is automatically activated and strategically activated (i.e. attentional control) has been described in the model of Hirsch and Mathews (2012). Distraction would prevent this competition to occur because of the fact that the focus of attention would be placed on other elements than distress (i.e. escape).

In summary, the models differ regarding the level at which they postulate distraction to have an impact. Some of them pretend that distraction impacts at the level of long-term

memory representation (EPT and inhibitory learning model), while others pretends that it impacts at a meta-level (acceptance model and social cognitive model).

In terms of future perspectives, measuring the level at which the changes occur empirically would allow us to put the models in competition. If the changes occur at the long-term memory level, exposure should influence the connexions between concepts. This could be tested with priming designs in which words vs non-words with ambiguous characters would be presented after prime words. The reaction times following the presentation of the prime and the concept would provide information regarding the associations between concepts. If the changes occur at the meta-level, exposure should influence the implicit representation of one-self (social-cognitive model) or of the emotion (acceptance model). Designs such as the extrinsic affective Simon task (i.e. a modified Implicit Association Task; De Houwer, 2003) could be used in order to test the associations between the self (e.g., "ME") and the ability to deal with those situations (e.g., "IN CONTROL" vs "FREAKED") as well as between emotions and the attitude towards emotions (e.g., "TOLERABLE" vs "UNTOLERABLE").

4. Confrontation with existing studies

4.1 Regarding distraction

The results of the first and second studies are consistent with previous studies that evidenced a detrimental effect of distraction (Grayson et al., 1982; Grayson et al., 1986; Haw & Dickerson, 1998; Kamphuis & Telch, 2000; Mohlman & Zinbarg, 2000; Raes et al., 2009; Rodriguez & Craske, 1995). At the opposite, those results conflict with those of studies that evidenced a beneficial effect of distraction (Johnstone & Page, 2004; Oliver & Page, 2003, 2008; Penfold & Page, 1999). Besides, the third study, that manipulated distraction less precisely, is consistent with the studies that evidenced no difference between focused exposure and distracted exposure. It therefore remains to be explained why some studies evidenced a beneficial effect of distraction while our results and the results of others demonstrated the opposite. Moreover, another question that arise is why some studies evidenced a significant effect while other studies showed no difference between attentional focus and distraction (both in the present project and more generally in the literature).

A potential answer to the first question has been evoked earlier. It seems that the observed benefit of distraction (or interactivity) (Johnstone & Page, 2004; Oliver & Page, 2003, 2008; Penfold & Page, 1999) may be due to another variable that is unique to the design of those studies. Although we are not able at this stage to identify this variable, we believe that more efforts should be done in order to identify the mediator of this effect. A part of the answer may be related to the specific function of distraction that may vary across studies. In their critical review of the inhibitory learning model, Weisman and Rodebaugh (2018) proposed to take into account the function of distraction. Given that expectancy violation is very critical to exposure, they posit that the most important question is whether distraction is taking away from the patient the opportunity to learn that the situation or stimulus is not as bad as anticipated. They propose that in some cases, being distracted might help to acknowledge

that the situation is not as bad as anticipated, for example when distraction consists in having an informal chit-chat talk with the experimenter. Distraction, in this case, may serve as maximizing discrepancies Having those chit-chat talks may serve as fear antagonistic actions. A fear antagonistic action is an action that is in direct opposition to the fear action tendencies associated with anxiety and they may potentially increase the mismatch between the expectancy and the real outcome. Wolitzky and Telch (2009) demonstrated that the addition of fear antagonistic actions augmented the efficacy of exposure. Eighty-eight participants with acrophobia were confronted to height. In addition to exposure, some participants conducted fear antagonistic actions such as moving the head in all directions while standing at the railing, running towards the edge and leaning over it as they approached, … The results demonstrated that exposure plus fear antagonistic actions led to significantly greater improvements on behavioural and questionnaire measures at post-treatment and follow-up. It should be noted however, that in contrast to the experiments in which interactive distraction had a facilitative effect, the fear antagonistic actions used in this study are likely to increase distress. Further study should test whether the use of fear antagonistic actions that also have the potential to diminish distress also have such a beneficial effect on exposure. If this explanation happened to be correct, it would potentially explain why we did not evidence any effect of interactive distraction in our study (Study 3), while other studies (Johnstone & Page, 2004; Oliver & Page, 2003, 2008; Penfold & Page, 1999) demonstrated a beneficial effect. Our manipulation of interactivity (Study 3), i.e. filling in stories, has likely less the potential to be in direct opposition of action tendencies than having a banal talk with the experimenter.

Regarding the second question, the reason why some studies evidenced a significant effect while other studies showed no difference between attentional focus and distraction may rely on the fact that distraction is composed of other more specific variables (e.g., schematicity, valence, interpersonal variables). The present results suggest that considering distraction as a whole does not capture the complexity of the implied phenomena. Manipulating those variables more specifically improved our understanding of distraction in demonstrating that distraction is detrimental to exposure only when the distractor is different in valence from the feared stimuli.

4.2 Experiential escape vs. acceptance and distress toleration

Our results suggest that the critical feature of distraction is not distraction from the phobic stimulus, but rather emotional escape. In other words, partial distraction does not seem to be harmful, as long as it does not entail escape of the negative affect induced by exposure to the phobic stimulus. This interpretation is consistent with the research that showed a positive effect of acceptance in affect regulation (see the Introduction for a more comprehensive description of the studies or Salters-Pedneault et al., 2004). Eifert and Heffner (2003) demonstrated with highly sensitive participants that performing exposure to carbon dioxide inhalation in an acceptance context led to less behavioural avoidance, less intense fear and cognitive symptoms and fewer catastrophic thoughts as compared with a control context.

Similarly, Levitt et al. (2004) showed with panic disorder patients that performing exposure to carbon dioxide inhalation while trying to accept emotions led to less anxiety and less avoidance as compared to exposure alone or exposure while trying to suppress emotions. Finally, England et al. (2012) demonstrated with participants with public-speaking anxiety that exposing with an acceptance rationale led to greater diagnostic remission by 6-weeks follow-up than exposing with an habituation rationale.

4.3 Valence

Our results may seem to conflict with those of studies that showed a positive effect of valence combined with exposure. For instance, Dour et al. (2016) exposed 61 spider fearfull participants to a live spider for 10 exposure 38-sec trials. The participants then watched a 7-min video that either depicted spiders positively by providing education on the usefulness of spiders and telling a story of a personnified spider who saved her animal friends from being killed (positive valence training group) or that was related to geography without any mention of spiders (control group). The participants were exposed again and realized a BAT after 8 days . At 15 days, spontaneous recovery was evaluated (valence and fear ratings) and the participants were shown a reinstatement video depicting a tarantula eating a white mouse. The results demonstrated that the positive valence training group demonstrated less subjective fear at test of spontaneous recovery and less behavioural avoidance after resinstatement. Change in valence predicted subjective fear at spontaneous recovery and after resintstatement but did not predict behavioural avoidance after reinstatement. The authors concluded on a beneficial effect of the combined presence of exposure and positive valence training.

In the study of Zbozinek and Craske (2017), 62 participants underwent habituation, acquisition and extinction on Day 1. During habituation, the participants were presented with the CS+ and CS- (images of Caucasian male and Asian female with neutral facial expression; counterbalanced between participants). During acquisition (pavlovian conditioning), the CS+ was presented with electrical shocks (US) while no electrical shocks was presented with the CS-. During extinction, the CS+ and CS- were presented with no shock (US). At Day 8, participants engaged in another extinction test phase followed by re-acquisition (the CS+ was presented again with the shock (US)). The Positive and Negative Affect Schedule (Watson & Clark, 1999) was used in order to measure positive and negative affect at several occasions during the experiment. The results demonstrated that higher positive affects before and after extinction were associated with less CS+ fear during reacquisition as measured by skin conductance responses and US expectancy. At the opposite, negative affect was not associated with reacquisition of fear on any measure. The authors concluded that strategies designed to raise positive affects prior to or after exposure therapy may lessen the chances of return of fear. Positive affects may enhance the encoding, rehearsal and retrieval of long-term memory.

Although those results may seem to conflict with our results, valence was manipulated or measured before or after exposure in those studies, whereas the valence was manipulated during exposure in the present study (second study). This observation suggests that the time

at which valence is manipulated or measured is critical and may induce detrimental effects when performed during exposure and beneficial effects when performed afterwards. Although Zbozinek and Craske (2017) concluded that positive affects during exposure may be associated with less reacquisition, the present study suggests that it is not the case. Further studies should investigate this issue more carefully.

5. Inconstancies between studies

The conclusions drawn from the results cannot make us forget the inconsistencies found in our results. In this section, we will review these inconsistencies and bring potential explanations.

5.1 First versus second study

The first and the second study were inconsistent in regard to the variables and the time of measurements at which effects were observed, although the results were in favour of focused exposure in both cases. The first study demonstrated an effect of the experimental factors (schematicity and potentially valence) mainly between sessions. The activation of non-schematic concepts (potentially neutral and positive) during exposure led to a return of distress while the activation of schematic (negative) concepts led to no return of distress and to a decrease of emotional and avoidance responses. The second study demonstrated an effect of the experimental factors (mainly valence) during exposure and at the end of the treatment. The activation of negative concepts led to a weaker decline in subjective distress during exposure and to more behavioural approach at the end of the treatment. The absence of behavioural effect in the first study could be explained by the fact that the BAT was repeated several times. Moreover, one could argue that those differences between studies are due to differences regarding the factors that were manipulated. Schematicity and valence were indeed confounded in the first study while they were manipulated separately in the second study. This explanation though does not seem to be sufficient to explain why the absence of return of distress evidenced in the first study for the schematic group has not been evidenced in the second study. The time between sessions could also be an explanation. The first study used an average delay between sessions of 16 days, while the second study used an average delay of 6 days. It is though very unlikely that a return of distress would not appear after 16 days (Study 1) while it appeared earlier on (after 6 days in Study 2).

5.2 First and second vs. third study

Attentional focus did not have any impact in the third study. How can we bring it together with the detrimental effect of distraction evidenced in the first and second study? Schematicity and valence indeed demonstrated an effect in favour of negative schematic and negative non-schematic imagery over positive imagery. Moreover, if we look at the processes that have been postulated namely toleration of an aversive state, the prediction would be that participants who realized exposure while listening to stories would benefit less from exposure than the participants who were constantly asked to maintain their attention (in Study 3). We

should therefore have observed a negative effect of listening to stories vs. focusing on the spider. How could we explain that it was not the case? A first explanation is that the manipulation was not sufficiently powerful to induce an effect. In terms of salience, the visual spider stimuli may be much more salient than the story they were asked to listen to. Therefore, only poor attentional focus may have been effectively allocated to this concurrent task in the third study while the manipulation in the first and second study may have allowed a better experimental control. Another explanation comes from the fact that the manipulation in the third study is less specific and therefore may have manipulated other components than schematicity and valence. Listening to stories may involve other mechanisms than merely forming mental images of words.

6. Therapist practices and clinical implications

The fourth study evaluated the frequency of use of exposure procedures among therapists and their knowledge of the literature in regard to those procedures. The results demonstrated that confronting the patient gradually to anxiety and repeating the same exposure trial until anxiety has declined was associated with the personal tendency of therapists to feel uncomfortable when confronted with other's distress. Those results suggest that the therapists should be aware of their personal tendency to feel uncomfortable when confronted with the distress of the patient. The decision of using graduality should not rely on the therapist's distress avoidance tendency but rather on the best interest of the patient. There should be a real concern for this issue in the training of therapists. More importance should be given to ability of accompanying the patient confronted with distress.

Moreover, the fact of alleviating the intensity of exposure when the patient report distress has been shown to be associated with concerns about exposure therapy. Given that those concerns were not correlated with past difficulties with exposure, it seems that those concerns do not rely on past experiences but rather on an a-priori. Our recommendation is that more information should be given to therapists in regards to the empirical results related to those concerns. Lilienfeld et al. (2014) contributed extensively to this effort by identifying potential biases of the therapists and by providing a synthesis of empirical data that may help in deconstructing those biases.

Of note for our interests, the results demonstrated that most therapists make sure that the attention of the patient is focused on the feared stimulus during exposure. Moreover, promoting acceptance during exposure was used frequently but not systematically by therapists. Our empirical results though suggest that therapists should promote acceptance during exposure. We propose several ways to improve this attitude. At first, the rationale given to the patient before exposure should include information in regard to the key role of acceptance for a successful exposure. The therapist could explain that staying in touch with the distress provoked by the stimuli is an important ingredient of exposure, though the natural tendency may be to move away from the stimuli. Alleviating distress by focusing on positive elements would not help to develop acceptance and is therefore contraindicated. Finally, the therapist should debrief the patient carefully in order to identify potential positive elements

that were activated in order reduce distress. Moreover, when signs of distraction towards positive elements are evidenced, the therapist could instruct the participant to form mental images of negative schematic words in order to prevent that some part of attention is focused on positive elements. The present results suggest that negative non-schematic words could also be used. Because there is no benefit of using non-schematic words over schematic words, we though recommend using schematic words for practical reasons and precautionary principle. The patient may indeed not understand why he/she should form mental images of negative words while he/she would be more incline to understand why forming mental images related to feared stimuli. Moreover, because this study is the first that evaluated the effect of negative non-schematic words, we should be cautious in regard to potential side effects. Nonetheless, we suggest that the acceptance of the patient during exposure is only possible if the therapist is able to support the experienced distress of the patient during exposure. The results suggested that the practices of therapists could be influenced by their tendency to feel bad when confronted with the patient's distress (Study 4). Therapists should therefore be helped in order to be able to support the patient distress.

The results of the present work suggest that there is no benefit or detrimental effect of interactivity during exposure. Drawing conclusion from this effect is though premature as the results are contradictory. Besides, those results may be used in order to promote automatized self-help exposure without the intervention of a therapist. Of note, in a real setting of exposure, the presence of a therapist though brings many other beneficial aspects: guidance, individual design of the exercises, subtle avoidance tracking, etc.

7. Limitations and future perspectives

7.1 Limitations of an interpretation in terms of acceptance

As described earlier, despite convincing elements regarding the interpretation of our results (Study 2) in terms of acceptance/toleration, some inconsistent elements may limit our conclusion. At first, we failed to show a significant effect of the experimental manipulations on the physiological variables and on the self-reported anxious anticipation of spiders in the first session. Surprisingly, no significant between-sessions effects of the manipulation indicating a detrimental effect of the use of non-schematic positive imagery during exposure were demonstrated from post-exposure to follow-up, and a stronger return of distress could have been expected in the positive non-schematic condition. Moreover, the effect of the condition on emotional and avoidance responses was only marginal at follow-up and did not persist at post-reexposure and the effect of condition at post-reexposure was only significant in regard to behavioural achievement but not in regard to the other variables (SUD and emotional and avoidance responses). Finally, although results are interpreted in terms of emotional avoidance versus acceptance, the experimental procedure did not directly measure or manipulate these strategies

7.2 Methodological issues and challenges

The research conducted on exposure therapy encompasses some recurrent methodological issues and challenges. We will review and discuss each of them in the following section.

The first challenge is the enormous heterogeneity between participants in regard to the steps of exposure that they are ready to achieve in in vivo designs. Some participants would be ready from the start to approach very closely a spider while others would touch a picture with a lot of difficulties. Choosing a single exposure task for all the participants is very difficult. If the step is too high, some participants would simply refuse to achieve it. If the step is too low, there is no sufficient activation of fear. In the third study, a gradual design has been used in order to counter this design. The participant was asked to start with standing at 3 m from spider in a closed container, and to confront to the live spider for 25 minutes. Each participant was free to decide whenever he/she wanted to move to the next step. The instruction was to go as far as he/she could. This gradual design though has the disadvantage of making the interpretation more difficult. The last achieved step can indeed both be interpreted as the result of exposure and as an index of the efforts of the participants to confront or as an index of the dose of exposure. The last achieved index therefore confounds an ingredient of exposure (efforts to confront or dose) with the outcome of the manipulation. Using a gradual design therefore does not allow to solve the heterogeneity problem between participants.

Another issue is the test retest fidelity of behavioural avoidance tasks (BAT). Repeating a BAT is an exposure per se. This measure therefore tends to decrease spontaneously across its repetition. In the first study, we repeated the BAT across time. This repetition of an in vivo exposure may though have diluted the effect that we were trying to evaluate, i.e. the effect of exposure to pictures of spider. The confrontation to a real spider is often considered as harder than watching pictures of spider. The effect of the measure may therefore impact the process that we were trying to manipulate. In the second study, we used a BAT only at the end of the treatment in order to avoid such a repetition effect. This option though has the disadvantage of assuming the there was no pre-existing difference between participants on this variable. At this stage, it seems that there is no solution to this issue and that a choice has always to be made between taking the risk of ignoring pre-existing differences and diluting the effects of the experimental variables with the effect of the test itself.

Another issue to which we have been confronted is related to the fact that anxiety encompasses several components: physiological, subjective and behavioural components. There is no consensus in the literature about which component should be considered as the most important. Some authors consider that the behavioural achievement is the most important because it is responsible for functional impairment. Others consider that the subjective component is the most important one because it affects patients. Others will consider that the physiological component is the best index because it is more reliable. It has though been observed that those components of anxiety do not always correlate. The issue may then arise when those various measures of anxiety do not converge. How can we

interpret that there is no behavioural effect when a subjective effect appears, or that there is a subjective effect but no physiological effect? On which index should we rely on in order to conclude on the efficacy?

The awareness from the experimenters of the hypotheses and conditions may influence the course of the experiment and therefore the data (Rosenthal, 1979). In the present studies, making the experimenter unaware of the conditions was not achievable for technical reasons. For example, in the third study, the manipulation either implied for the experimenter to be involved in exposure or to run the audiotaped instructions. Making the experimenter unaware of the hypotheses would have been possible technically, but not in terms of pedagogy. The experimenters ware trained master students. Their inclusion in a research protocol requires to involve them from the beginning the design of the experimental protocol. Comprehensive research protocols were used in order to avoid any experimenter effect. We cannot though exclude that the fact that experimenters were not blind to conditions and hypotheses influenced the course of results.

Moreover, as stated earlier, it may well be that our manipulation induced a sense of failing because of the difficulty of managing two tasks at the same time. Measuring self-efficacy in regard to performing the dual tasks would have allowed us to test whether self-efficacy is improved or not by the manipulation.

Nonetheless, the E criterion of the DSM-IV-TR (i.e. significant interference with daily functioning, social activities or relationships or marked distress caused by the phobia) was not retained as an inclusion criterion. because it is highly dependent on the living context of the individual and that it may therefore limit the sample of the study. Therefore, one could argue that our sample is not representative of patients with specific phobia diagnosis. The fact that participants do not experience those impacts in daily life may indeed influence the course of exposure therapy. The motivation of the participants that experience those daily functioning issue may be higher. Consequently, those participants may engage more efforts in exposing themselves to the phobic stimuli. Excluding those participants has though the disadvantage of limiting the sample and therefore the power of studies. Further analysis should be conducted in order to compare the participants who complete this criterion and those who do not complete it in terms of the dose of exposure that those participants are ready to achieve.

7.3 Future perspectives

As stated earlier, some differences between the studies on distraction remain to be explained. We have stressed that the evidenced benefit of distraction (or interactivity) mainly comes from studies with a similar design (Johnstone & Page, 2004; Oliver & Page, 2003, 2008; Penfold & Page, 1999). This effect may therefore be due to another variable that is unique to it. Although we are not able at this stage to identify the variable(s) that is(are) responsible for this effect, future studies should strive to disentangle the mediator of this effect by manipulating systematically the variables that may differ between designs. Moreover, the present results suggest that distraction should not be considered as a whole but

as composed of more specific variables. Future studies should manipulate those factors more precisely. Using eye tracking when confronted to phobic stimuli (i.e. spider pictures) has been done in a previous study (Hermans, Vansteenwegen, & Eelen, 1999). Future studies assessing the effects of distraction should use this technique in order to observe potential subtle changes over time in the attentional focus. Observing what happens when instructions are given in regard to the attentional focus may bring important information in regard to the compliance with instructions.

Only few studies have assessed the role of acceptance during exposure, though acceptance is recommended in the most recent clinical protocols. To our knowledge, none of those studies have been conducted with spider phobics. Manipulating both acceptance vs suppression and the attentional focus in a design with spider phobics may allow us to better understand the processes at play. Some studies evidenced a beneficial effect of positive valence prior and after exposure, while our results suggest that the fact of being in touch with negative affects during exposure is critical for its success. It therefore seems that there is balance that changes over time regarding the positivity/negativity needed for the process of successful exposure. Future studies should explore this issue by manipulating the time (prior, during or after) at which positive or negative induction should be incorporated to exposure therapy.

Moreover, the fact that we observed an experimenter effect (Study 3) suggests that more research should be conducted in order to understand which variables are responsible for those differences. Few experiments have studied the role of interactive factors during exposure. Most studies are conducted as such there is no impact of interactivity. In the clinical practice, exposure though happens in an interactive design in which information between the therapist and the patient are exchanged. The impact of those factors should be carefully evaluated.

Given that the reality is often more complex than the theoretical models, we could question whether using models is useful or not in making progresses in scientific research. One could ask oneself whether the models do not conceal the relevant issues by orienting our attention. Our position is that models are useful and that their risks can be minimized. Models have their own value given their predictive power and their capacity to evidence underlying processes. This view is consistent with conception of Salkovskis (2002) regarding empirically grounded interventions (presented in Figure 13). In this conception, clinical practice is the core element of clinical science. It is both the target of the work of clinical scientist and a source of information about the involved processes. The phenomenology of clinical practice helps the clinical scientists to develop theories and models regarding the underlying processes. In turn, the models help the clinical scientists to understand the phenomenology. The combination of both clinical practice and the models give information about the outcome measure that should be targeted in outcome research. The link from outcome research to the models is though weak. The effectiveness of a treatment indeed tells us nothing about the processes that are involved. The impact of outcome research is greater when treatments are not effective. Another way for outcome research to inform regarding the models is when this research includes measure concerning the processes. Finally,

experimental studies (lab studies) have their own value in evaluating the models. As a conclusion, we believe that when models are used in light of the phenomenology of clinical practice and when their processes are empirically tested, the risk of concealing relevant issues is diminished.

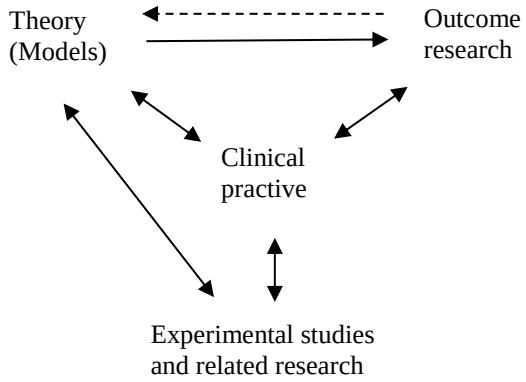

Figure 13. Factors involved in Empirically Grounded Clinical Interventions (adapted from Salkovskis, 2002, p. 5).

Finally, our efforts to further our understanding of clinical issues has led to two observations. On the one hand, the issue of distraction is not solved. Clinical research is challenging. Much more efforts are needed in order to close this debate. On the other hand, searching the literature for empirical evidence concerning the impact of the exposure procedures has led to the recognition that there is a lack of clinical data regarding the procedures that are promoted by the new dominant theoretical models. Although well supported on a theoretical ground or by lab studies, some procedures have not yet been soundly tested with patients in procedures similar to the therapeutic setting. Translating recommendations from theory or lab studies to clinical practice though ideally requires clinical analog studies in which the feasibility and impact of those recommendations is evaluated. Bridging the gap between research and clinical practice should not confine to adjust the clinical practice of therapists. Research questions should be partially designed in order to respond to therapists concerns. There are times in clinical practice when the recommendations of the literature may conflict with the necessities of the practice. The inhibitory learning model suggests for instance that graduality should not be used in order to improve variability of the exposure steps. Is it though acceptable to conduct exposure gradually whenever the patient is not willing to expose in an ungradual way? The therapist is often forced to compose with various necessities. Studies should challenge those necessities. We believe that those issues are the most challenging problems that prevents from bridging the gap between research and clinical practice, especially given that those studies need large samples, are time and effort consuming, and that there is poor support of research funding for clinical research. This challenge can only be overcome by coordinated efforts from researchers and therapists in designing the most urging questions that need to be addressed and by multicentre data collection. The implications of clinical procedures have

tremendous impacts in terms of public health. Improving the quality of empirical evidence regarding those procedure is the cornerstone of improving the quality of treatment and reducing the impact of anxiety disorders.

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Annex 1

Table A1. Summary of the studies that manipulated focused vs distracted exposure

Authors	Participants	Design	Exposure	Conditions	Measures	Results	Conclusion	Limitations
Grayson et al. (1982)	OCD with washing rituals (n=16) (patients)	Counterbalanced design: -1st group: 1. D, 2. AF (n=10) -2nd group: 1.AF, 2. D (n=6)	In vivo 2 x 90 min over two consecutive days To hold a contaminant object (the most feared one)	D: Playing video games with the therapist (with one hand). Maintained tactile sensation; cognitive AF: Conversation about the contaminant and the discomfort it aroused	HR: during 20 secs after initial contact and each 10 min + last minute of adaptation SUDs: 20 secs after initial contact and each 10 min	WSH: Equal BSH: Group 2> Group 1 (only for subjective fear)	Return of fear with distraction AF is more efficient than D	No behavioural measure Small sample
Grayson et al. (1986)	OCD with washing rituals (n=17) (patients) (DSM-III criteria)		Idem	Idem	Idem	More WSH on SUD for D than for AF (non-significant) WSH on HR for AF but not for D No BSH	When attention is distracted, habituation of HR is inhibited No replication of the previous study	No behavioural measure Small sample
Craske et al. (1989)	Panic Disorder with moderate to severe Agoraphobia (n=30) (patients) (DSM-III-R criteria)		11 treatment sessions (4-6 clients with 2 therapists; weekly): -psychoeducation (corrective information) -aided in vivo exposure -self-directed progressive exposure (3 times/week)	AF: instruction: effective treatment requires direct exposure to somatic sensations. Monitoring sensation on a scale; identifying distraction and using thought stopping to interrupt it. D: instruction: effective treatment requires learning to focus upon external environment. Developing distraction strategies: task relevant (surveying prices of items in a store, driving at set distances from road line markings) and task irrelevant (spelling pronouns backwards while riding as a car passenger); using thought stopping	Pre-treatment, Post-treatment and at 6-12 months follow-up: -BAT (% of items completed, SUDs) -Self-monitoring records for 2 weeks (level of anxiety 4 times/day, number of panic episodes, …) -Composite measure of clinically significant change	BSH (excepted on the behavioural approach and frequency of panic) No main differences between conditions High end state status: Post-treatment: D>AF; Follow-up: D<AF(ns)	Behavioural approach: ceiling effect Frequency of panic: variability Mild advantage of distraction at post-treatment (reversed trend at follow-up; ns) Explanation: instruction impact variation; Focus attention upon internal states= distraction; Both groups equally	Manipulation check based on self-report No physiological measure Behavioural ceiling effect

Authors	Participants	Design	Exposure	Conditions	Measures	Results	Conclusion	Limitations
			-guided in imago exposure	to interrupt internal focusing of attention			increase sense of controllability	
Craske, Street, et al. (1991)	Snake and spider phobics (n=19) (students)	Counterbalanced design: 1st group: Natural – AF – D – Baseline 2nd group: Natural – D – AF - Baseline	In vivo 4 x 6 min Tarantula spider or corn snake Light detection task: covert attention toward the stimuli at all time Proximity to the snake associated with a fear level of 5 (between moderate and strong)	Natural: No specific instruction regarding the focus of attention Focus: instruction: to think about the characteristics of the snake or spider, and their own subjective and physical reactions (repeated every 30 secs; audiotape) Distract: instruction: to listen to passages of intrinsic interest value about the effects of exercise on sex and longevity and placing check marks on a sheet of paper. Baseline: the subject is removed from the experimental room and engaged in unrelated conversation	SUDS (every 2 min) HR Self-report after each session (average level of fear, % time spent focusing upon their own physical sensations and characteristics of the phobic stimuli	Significant increase of SUD in focused exposure. At 2, 4 and 6 min, $SUD_F > SUD_D$, $SUD_F > SUD_N$, $SUD_D = SUD_N$ HR: no time effect; no condition effect (not even with baseline)	Focused exposure produces a higher subjective fear than distraction At the subjective level distracted and natural exposure seem equivalent	Participants were not clinically fearful
Arntz and Lavy (1993)	41 spider phobics	2 (Elaboration vs. Non-Elaboration) x 2 (Pre vs Post-exposure)	2.5-hour hierarchical exposure in vivo	Elaboration (Attentional focus): attend to and describe the objective feature of the spider constantly to the therapist. (During exposure, the therapists asked questions: e.g., “How many legs?,…”). Non-elaboration: No instruction regarding attention. The therapist tried to prevent attending to specific information by saying that this information was not important, by repeating the exposure rationale and stimulating to continue the exposure.	BAT	No difference between conditions	Elaboration did not potentiate either short term or long-term effects	It is superfluous to elaborate on the phobic stimulus. The optimal processing of phobic stimulus information seems to occur spontaneously
Rodriguez and Craske (1995)	Students with marked animal fears (spider, snakes, rats) (n = 60)	3 (distraction level: HD, LD, ND; BETWEEN) x 2 (exposure intensity: LI vs HI; BETWEEN) x	In vivo Python snake, tarantula spider and rat	Low intensity (LI) exposure: instruction: approach the animal until the fear level is moderate High intensity (HI) exposure: instruction: approach the animal until a strong fear is experienced	HR SUDs BAT (approach distance and fear ratings)	Retrospective ratings of attention: Similar in both groups=> HD-LG group Between session:	Distraction interfered with fear reduction	Participants were not clinically fearful Brief duration of exposure No real follow-up

Authors	Participants	Design	Exposure	Conditions	Measures	Results	Conclusion	Limitations
		2 (time: starting point vs endpoint; WITHIN)		High distraction (HD): positive and negative slides projected on the wall + Instruction: you'll be tested on them later Low distraction (LD): neutral slides projected on the wall No distraction (ND): no slides		HR increased across time (no group differences in HR) In HI, ND lead to a greater decrease of SUDs and to approach the animal more closely (trend: p=.055) Groups did not differ at the LI level. No differences between groups in terms of return of fear		
Rose and McGlynn (1997) Study 1	Snake phobics (n = 20) (students) (DSM-IV criteria)	2 (distraction: AF vs D; BETWEEN) x 3 (time: pre-treatment, post-treatment, follow-up; WITHIN)	In vivo 6 x 5 min (2 min rest) Corn snake The distance between the participant and the snake was gradually reduced across sessions via a conveyor	AF: instructions: to pay close attention to the snake and focus on its shape, texture, colour, size and position. D: to listen to an audiotape about leadership and goal setting and to monitor the number of times two keywords are spoken.	HR SUDs BAT (closest distance and fear ratings)	4/5 subjects who manifested return of fear had been exposed under distraction (not sign)	Only suggestive evidence that distraction is associated with return of fear	This study tries to predict return of fear and does not compare groups on other outcome variables Very small sample
Study 2	Spider phobics (n = 18) (students) (DSM-IV criteria)	Idem	Idem with tarantula spiders	Idem	Idem	4/6 subjects who manifested return of fear had been exposed under distraction (not sign)	Idem	Idem
Haw and Dickerson (1998)	Students with mild spider anxiety (n =62)	4 (treatment conditions: ACP, VSSP, VSSP/ACP, control; BETWEEN) x time (pre-treatment, post-treatment, after	Computerized exposure Black widow spider	Articulary control process (ACP) group: presentation of a printed word next to the picture. The participant had to read it aloud. Visuospatial sketchpad (VSSP) group: participants were required to track a black dot as its position alterned on either side of the feared stimulus.	SUDs HR	All groups experienced a similar reduction in HR and self-reported anxiety. From post-treatment to follow-up, greater increase in anxiety in the distractions groups than the control groups on HR, relaxation and calmness.	Similar anxiety reduction across the groups. Consistent with the claim that maintenance of treatment effects is best served by AF than by D.	Not clinically fearful participants

Authors	Participants	Design	Exposure	Conditions	Measures	Results	Conclusion	Limitations
		10min at rest; WITHIN)		VSSP/ACP group: participants were required to track the position of a word. Control group: plain exposure.				
Penfold and Page (1999)	Students with mild blood-injection fear (n = 39)	3 (condition: F, D, Exposure alone; BETWEEN) x 3(time: pre-exposure, during exposure, post-exposure)	10 min Syringe filled with stage blood and two photographs of mutilated faces presented on a computer screen. Maintained visual contact	Focusing: conversations about the syringe and pictures and about their thoughts, feelings and physiological responses. Distraction: Conversations about neutral topics such as studies, plans for the future, leisure activities, etc Exposure alone	SUDs BAT Visual attention (probes: ISI = 30-90sec) Perceived control	BAT scores did not change from pre-test to post-test SUDs in BAT: No difference in change across the 3 groups At 5 and 10 min, subjects in the D-group reported lower SUDs than subjects in the F-group and the Exposure alone group. Subjects with low initial perceived control exhibited the greatest reduction in distress	BAT: unsensitive to change, too easy	Non-clinical sample No behavioural effect No follow-up measure Brief duration of exposure
Kamphuis and Telch (2000)	Claustrophobics (n = 58) (students)	2 (GTR: yes vs. no; BETWEEN) x 2 (Cognitive load distracter: yes vs. no; BETWEEN) x 3 (time: pre, post, 2 weeks follow-up; WITHIN)	30 min In vivo Remain in a narrow corridor	Guided threat reappraisal (GTR): attend any available information pertinent to their identified core threat. Cognitive load distracter (CLD): engage in a demanding dual process cognitive load distraction task (CENTRAL EXECUTIVE): depress a button each time an odd or an even number occurred and add the sum of the last two number before a click (strings of numbers presented through headphone)	HR and SUDs (in BAT and during exposure) BAT 1: treatment chamber BAT 2: other chamber Self-efficacy Perceived danger High end-state functioning (HEF)	HR: no sign. reductions across time in the four groups. Subjective fear. BAT1: greater fear reduction among GTR than CLD (with control group and GTR+CLD group at an intermediate position) Initial fear activation was lower for CLD than for GTR. BAT2 similar pattern but not significant. Idem for HEF	Consistent with emotional processing theory. Fear reduction was hampered by having participants engage in a cognitively demanding distraction task. But no difference in generalization…	Non-clinical sample No behavioural effect No generalization the effect

Authors	Participants	Design	Exposure	Conditions	Measures	Results	Conclusion	Limitations
Wood and McGlynn (2000) Study 1	Claustrophobics (n=12) (students)	2 (attentional focus vs distraction) x 3 (time: start point, endpoint and 1-week follow-up)	In vivo MRI exposure. 30 min	Attentional focus: instructed to focus on the MRI, the visual aspects and sounds (repeated every 90 secs; audiotape) Distraction: presented with audiotaped segments of a popular novel + count how many times a specific name is mentioned	HR SUD	No impact of attentional focus on return of fear		
Study 2	Claustrophobics (n=10) (students) that could not enter completely in the MRI (Study 1)	Idem	Idem	Idem	BAT	No impact of attentional focus on BAT		
Mohlman and Zinbarg (2000)	Spider fearful individuals (n = 72)	2 (Visual attention: T vs P; BETWEEN) x 2 (Cognitive attention; T vs P; BETWEEN) x 3 (time: pre, post, 3-4 weeks follow-up; WITHIN)	30 min In vivo Tarantula or plant (spayed with water at some point to induce movement)	VisT-CogT: view the tarantula and answer about the tarantula VisT-CogP: view the tarantula and answer about the plant VisP-CogT: view the plant and answer about the tarantula VisP-CogP: view the plant and answer about the plant (audio-taped questions about the stimulus appearance and behaviour and their responses to it)	SUDs and HR in exposure and BATs	Significantly steeper decline on fear ratings for VisTCogT than for VisTCogP and VisPCogP. HR: no sign result.	The combination of visual and cognitive attention on the feared stimulus and the feared responses lead to greater subsequent reduction	Non-clinical sample No behavioural effect
Antony et al. (2001)	Spider phobics (n = 60) (DSM-IV criteria)	2 (Condition: Focus vs Distract; BETWEEN) x 2 (Coping style: blunters vs monitors) x 3 (time: pre, mid, post; WITHIN)	60 min In vivo Exposure and modelling	Focus condition Distract condition: instruction: listen to the content of an educational audiocassette on world geography	BAT (number of steps, SUDs and HR)	Participants improved in all groups on HR, subjective fear and behavioural testing. No effect of group condition or coping style (monitors, vs blunters)	Distraction does not seem to be harmful	BAT may have contaminated the distraction group. No follow-up
Oliver and Page (2003)	Blood injection fearful participants (n = 48) (students)	3 (condition: F, D, Exposure alone; BETWEEN) x	3 x 10 min (weekly intervals) In vivo	Focusing: conversations about the syringe and pictures and about their	SUDS (while seeing pictures)	Exposure plus distraction showed the greatest within and between session fear	Conversation is a distraction that can increase perceived	Non-clinical sample

Authors	Participants	Design	Exposure	Conditions	Measures	Results	Conclusion	Limitations
		3(time: 0, 5, 10 min; WITHIN) x 3 (session: 1, 2, 3) + follow-up (one month)	Syringe filled with stage blood and two photographs of mutilated faces presented on a computer screen. Maintained visual contact	thoughts, feelings and physiological responses. Distraction: Conversations about neutral topics such as studies, plans for the future, leisure activities, etc Exposure alone	Visual attention (probes: ISI = 30-90sec)	reduction at post treatment and at follow-up	control over anxiety and assists anxiety reduction	No behavioural effect No follow-up measure Blood injection fear may be peculiar among anxiety disorders
Johnstone and Page (2004)	Spider phobics (n = 27) (students) (DSM-IV criteria)	2 (condition: F, D; BETWEEN) x 3 (session: 1, 2, 3; WITHIN) + 2 (condition) x 2 (3rd session vs follow-up)	3 x 10 min (weekly intervals) In vivo Spiders Maintained visual contact	Focusing: Stimulus-relevant conversations (phobic stimulus, spiders in general and experience of anxiety) Distraction: Stimulus-irrelevant, personally-relevant conversations (vacation, studies, …)	SUDs BAT SC, Blood pressure, HR	Distraction led to a greater subjective anxiety reduction within and between sessions (and at follow-up), to a more rapid decrease in **behavioural avoidance** and to more self-efficacy. Only participants with low initial anxiety experienced reduction in subjective anxiety in Focusing. Self-efficacy predicted behavioural achievement. Physiological arousal: complex.	Attention does not need to be directed at the phobic stimulus for anxiety reduction to occur.	No objective check of the experimental manipulation Short exposure durations
Telch et al. (2004)	Participants with marked claustrophobic fear (n = 60) (students)	4 (conditions; BETWEEN) x 2 (time: pre post)	30 min of self-guided in exposure in a chamber	TW: attend to threatening words and images (presented through headphone) NW: attend to neutral words and images SR: perform a demanding cognitive load task (a modified Seashore Rhythm Test: discriminate similar and different pairs of sounds) EO: Exposure only	BAT HR SUDs	HR: no sign difference No difference between TW and NW. A lower proportion of participants in the SR condition met the criteria for clinically significant change than in the EO condition. At post –treatment the SR group showed less subjective fear.	Distraction has a detrimental effect on exposure	No follow up

Authors	Participants	Design	Exposure	Conditions	Measures	Results	Conclusion	Limitations
Schmid-Leuz et al. (2007)	Dental phobics (n = 63)	2 (conditions) x 3 (time: pre, post, follow-up)	60 min Acoustic stimuli related to dental treatment, cotton pads on the table, 4 dental instruments	Focusing: instruction: fear will diminish if they remain in the presence of the stimuli for a long enough time. Pick up the instrument, examine it closely and consider its function. Distraction: fear will diminish if they lean to distract. Play puzzles games with the therapist.	HR SUDs	No significant differences across groups on HR and behavioural avoidance. State anxiety (STAI) Greater decrease in Focusing than Distraction	Both treatment conditions were similarly effective	Lack of manipulation check Massive distraction
Oliver and Page (2008)	Blood-injury-injection fearful participants (n = 50)	5 (conditions) x 4 (time: pre, during, post, one-month follow-up)	3 weekly exposure sessions Syringe filled with stage blood and two photographs of mutilated faces presented on a computer screen. Maintained visual contact	Internal focus: conversation: physiological reactions associated with the feared stimuli External focus: conversation: pictures and syringe Internal distraction: conversation: non-threatening, neutral aspects of the internal environment (feet sensations) External distraction: conversation: non-threatening, neutral topics of the external environment (future, leisure activities, …) Exposure alone	BAT SUDs	Distraction: greater fear reduction (especially for external distraction). Greater number of achieved steps on a behavioural avoidance scale at post treatment (external distraction at follow-up). At follow-up: greater increase in perceived control.	External distraction facilitates the effect of fear reduction and behavioural approach increases.	
Raes et al. (2009)	Healthy participants (n = 41) (students)	2 (condition: low load vs high load) x 2 (time: pre, post) x 2 (anxiety: low vs high)	Acquisition: CS+ (angry face) is paired with a US (white noise). Extinction: The US is no longer presented after the CS+ Digits must be reported after exposure.	Low load: one repeated digit (e.g., 7777777) High load: six different digits (e.g., 619845)	SUDs SC	SC: Low anxiety group: low load: full extinction; high load: higher SCRs to the CS+. High anxiety group: no sign difference	It suggests that extinction is not automatic but requires cognitive resources	Results are limited to SC and in low anxious participants

AF = Attention Focusing; D = Distraction; F = Focusing; N = Natural; HR = Heart Rate; SUDs = Subjective Unit of Discomfort; WSH = Within session habituation; BSH = Between session habituation; BAT: Behavioural avoidance testing

Annex 2

Optimal Attentional Focus during Exposure in Specific Phobia: A Meta-analysis

Over the last 30 years, researchers have disagreed over the consequences of diverting attention from threat for exposure efficacy, which is an important theoretical and clinical debate. Therefore, the present meta-analysis assessed the efficacy of attentionally focused exposure against distracted and attentionally uninstructed exposure regarding distress, behavioral, and physiological outcomes. We included 15 randomized studies with specific phobia, totaling 444 participants and targeting outcomes at post-exposure and follow-up. Results indicated no difference between the efficacy of distracted exposure as opposed to focused or uninstructed exposure for distress and physiology. For behavior, at post-exposure, results were marginally significant in favor of distracted as opposed to focused exposure, while at follow-up results significantly favored distraction. However, concerning behavior, uninstructed exposure was superior to distraction. Moderation analyses revealed that, regarding distress reduction and approach behavior, distracted exposure significantly outperformed focused exposure when the distracter was interactive (g = 1.010/g = 1.128) and exposure was spread over the course of multiple sessions (g =1.527/g =1.606). No moderation analysis was significant for physiological measures. These findings suggest that distraction during exposure could be less counterproductive than previously considered and even beneficial under certain circumstances. Theoretical implications and future directions for research are discussed.

Reference

Podină, I. R., Koster, E. H. W., Philippot, P., Dethier, V., & David, D. O. (2013). Optimal attentional focus during exposure in specific phobia: A meta-analysis. Clinical Psychology Review, 33(8), 1172-1183. doi:10.1016/j.cpr.2013.10.002

Attentional Focus during Exposure in Specific Phobia: A Meta-analysis

1. Introduction

Exposure therapy is a widely used and effective treatment for anxiety disorders (McNally, 2007). In many treatment packages for anxiety, exposure is considered a crucial component, which involves confronting the feared stimulus or situation (e.g., a thought, a sensation, an animal) until fear related to that stimulus subsides. Though exposure is used on a large scale in cognitive and behavioral therapies for anxiety disorders (Norton & Price, 2007), there is much debate around the factors that facilitate or impede symptom reduction in exposure (McNally, 2007). One factor that has been subjected to a wealth of research is optimal attentional focus during exposure therapy, which according to some views plays a major role in exposure efficacy (Craske et al., 2008). However, as results of studies have been inconsistent, this research has diminished with negative implications for theory and practice in terms of providing answers to questions regarding optimal attentional focus during exposure. Up to date, only narrative reviews of the literature have been published (Rodriguez & Craske, 1993; Ellis, 2012). More systematic attempts to examine the available data are lacking. In an attempt to investigate attentional focus as a mechanism of change for evidence based exposure interventions (David & Montgomery, 2011), we sought to examine the influence of attentional focus on the efficacy of exposure therapy through systematic review of the literature and meta-analysis. Given that most available data on this precise question addressed specific phobia, in order to draw clear cut conclusions, we specifically targeted this disorder.

1.1 Theoretical Background

Current leading models of exposure (e.g., emotional processing theory, Foa & Kozak, 1986; inhibitory learning, Bouton, 1993; Craske et al., 2008), suggest that attentional processing of threat information is important for fear reduction to take place. Therefore, we will briefly discuss the role of attentional focus in exposure theories below.

On the one hand, Foa and Kozak (1986) proposed a neo-behavioral account, which improved upon earlier habituation and extinction explanations of fear reduction by detailing how exposure changes fear representation in memory. Central to this account is emotional processing during exposure treatment, evidenced by the following: (1) activation of the fear network reflected in physiological arousal and self-reports of fear; and (2) within/between-session habituation, reflected in lower fear during sessions and across sessions. Via exposure therapy, emotional processing (i.e., changes in the fear structure) occurs when non-threat information is incorporated in the fear network, meaning that: (a) the non-threat significance is attached to feared stimuli (i.e., conditioned stimuli, CS) and fear responses (i.e., conditioned response, CR); (b) (b) pathological associations between CS and CR are

loosened, leading to symptom reduction (Foa, Huppert, & Cahill, 2006). Sensory encoding of threat during exposure, by means of attentional focus for example, is viewed by Foa and Kozak (1986) as a prerequisite for emotional processing, thus for symptom reduction.

On the other hand, in contrast to emotional processing theory, the inhibitory learning account (Bouton, 1993; Craske et al., 2008) suggests that the mechanism of exposure lies not in eliminating the CS-US negative association (US: e.g., a dog bite), but in acquiring and reinforcing a new safe representation of the CS (e.g., the dog doesn't bite). Namely, during exposure, fear subsides as a result of a mismatch between the patient's expectation (e.g., to be bitten by the dog) and the outcome (e.g., actually not being bitten by the dog) (Arch & Craske, 2012). Through such mismatches new representations about the CS are formed. Attentionally focusing on the CS (e.g., a dog) during exposure is important in allowing non-threatening information about the CS to be noticed and processed (e.g., "the dog doesn't bite me") and subsequently develop new non-threatening CS-noUS associations (e.g., dog - no dog bite) (Bouton, 1993; Craske et al., 2008).

1.2 Operational Definition of Attention Allocation During Exposure

In examining the role of attentional focus in exposure efficacy typically a between subjects design is used, comparing the efficacy of focused (i.e., allocated attention to threat during exposure) vs. distracted exposure (i.e., diverted attention from threat during exposure). It is important to specify how focused and distracted exposure therapies have been operationalized in previous research. Therefore, we will briefly discuss these concepts here.

Focused exposure is defined as deliberately paying attention to either the external features of the feared stimulus (e.g., a spider) and/or to the internal sensations of fear and anxiety (e.g., pounding heart in panic disorder) during exposure (Oliver & Page, 2008), depending on the type of anxiety disorder (Mulkens, Bögels, de Jong, & Louwers, 2001). For instance, in social anxiety and specific phobia, oftentimes external attention to the phobic stimulus is recommended (Bögels, Mulkens & de Jong, 1997; Mulkens et al., 2001), while in panic disorder internal attention to sensations is considered a standard component of exposure (Craske, Street, & Barlow, 1989). Irrespective of threat stimulus orientation (i.e., inward or outward), attentional resources during exposure should be fully engaged visually and/or cognitively with the feared stimulus (Mohlman & Zinbarg, 2000). Therefore, many manipulations of attentional focus entail looking at the feared stimulus (e.g., Oliver & Page, 2003; 2008), whereas other manipulations involve allocating both visual and cognitive resources to process the attended stimulus (e.g., Mohlman & Zinbarg, 2000). All in all, these task-related differences might be reflected in the mixed results that focused exposure literature is confronted with (for review, see Parrish, Radomsky, & Dugas, 2008).

Distraction in this context can be broadly defined as the "lack of attention to the perceived source of threat" (Sy, Dixon, Lickel, Nelson, & Deacon, 2011, p. 306). Distracted exposure is frequently regarded as a form of safety behavior that would prevent the encoding of non-threat information (Foa & Kozak, 1986). In empirical research, distracted exposure can be

clustered into visual/cognitive distraction (Mohlman & Zinbarg, 2000), high /low cognitive load (Raes, De Raedt, Verschuere, & De Houwer, 2009), and inward/outward distraction (Oliver & Page, 2008). Visual distraction involves looking at a location other than the location of the feared stimulus, while cognitive distraction involves a threat irrelevant task (e.g., memorizing digits) that interferes with cognitive resources allocated to the threat stimulus (e.g., Mohlman & Zinbarg, 2000). The extent to which a secondary task during exposure interferes with symptom reduction depends on the cognitive load imposed by the distracter (e.g., Telch et al., 2004; Rodriguez & Craske, 1995), which can be more or less resource demanding. In addition, the distracting task can encompass internal orientation to the person's fear irrelevant reactions or external orientation to the non-threatening aspects of the stimuli (e.g., Oliver & Page, 2008). Moreover, these variations across distraction tasks may contribute to the mixed results noticed in studies investigating distracted exposure (Parrish et al., 2008).

1.3 Methodological Considerations

Within the broad framework just outlined, studies have used a wide range of methodologies to manipulate attentional focus during exposure. Several important methodological issues in the relevant studies need to be discussed.

First, there are debates over whether patients need to focus visually and/or cognitively on threatening stimuli. Some studies employ visual focus on the threat stimulus (e.g., Rodriguez & Craske, 1995), while others use combined visual and cognitive attention to threat during exposure (e.g., Mohlman & Zinbarg, 2000). Also, in order to be able to verify the focus of attention, some tasks require participants to verbalize features of feared stimuli, not only to be visually exposed to them (Johnstone & Page, 2004; Penfold & Page, 1999, Schmid-Leuz, Elsesser, Lohrmann, Johren, & Sartory, 2007; Oliver & Page, 2003, 2008). This is important, since verbalizing experiences may also have anxiety-reducing effects by themselves (Tabibnia, Lieberman, & Craske, 2008).

Second, one of the shortcomings of most studies that use attentional instructions during exposure is the lack of an objective manipulation check to assess whether participants followed the attentional instructions (Penfold & Page, 1999; Oliver & Page, 2003, 2008). Few studies employed other measures than post exposure self-report to check for attentional focus, which according to Mohlman and Zinbarg (2000) renders some results questionable. Therefore, in most studies, we do not know to what extent participants' diverted attention from or allocated attention to the threat (Schmid-Leuz et al., 2007). Because of this issue, some studies included verbal report of threat/distracter features or response latency to onscreen distracter displayed on opposite sides from threat during exposure (Mohlman & Zinbarg, 2000; Penfold & Page, 1999; Oliver & Page, 2003, 2008).

Table A2.1. Characteristics of studies included in meta-analysis

Study	Mean Age	% of Female Participants	Exposure Pair	N Participants per Exposure Pair	Clinical Status	Interactive Non-Interactive Distraction	Follow-up Interval (weeks)	Number of exposure sessions (No.)	Exposure Duration in min. per Session	Outcome Measure
Antony et al., 2001	28.5	82.0%	**D-F**	60	diagnosed	Non-interactive		single session	60	SUDs, SPQ, BAT Steps, HR
Arntz and Lavy, 1993	32.5	100%	U-F	41	analogue		More than one month (52)	single session	150	SUDs, SPQ, Phobic Anxiety Scale
Johnstone and Page, 2004	17.5	96.3%	**D-F**	27	diagnosed	Interactive	One month (4)	multiple sessions (3)	10	FSQ, BAT-Steps, Diastolic/Systolic Blood Pressure, HR, SCL
Kamphuis and Telch, 2000	18.6	86.2%	U-D	28	analogue	Non-interactive	Less than one month (2)	single session	30	SFR, HR
Mohlman and Zinbarg, 2000	27.6	79.16	**D-F**	36	diagnosed	Non-interactive	One month (4)	single session	45	SFGQ, SPQ, HR
Oliver and Page, 2003	21.0	84.3%	U-D U-F **D-F**	24	analogue	Interactive	One month (4)	multiple sessions (3)	10	SUDS, MQ
Oliver and Page, 2008	18.1	94.0%	U-D U-F **D-F**	20	analogue	Interactive	One month (4)	multiple sessions (3)	10	MQ, BAT Steps*
Penfold and Page, 1999	18.7	75%	U-D U-F **D-F**	26	analogue	Interactive		single session	10	SUDs, BAT Steps
Rodriguez and Craske, 1995	18-21	85.0%	U-D	28	diagnosed	Non-interactive		single session	15	SFR, BAT Steps
Rose and		100%	**D-F**	20	diagnosed	Non-interactive	One month (4)	single	30	SUDs, SFR, HR, SC

McGlynn,1997.1[1]								session		
Rose and McGlynn,1997.2[2]		100%	**D-F**	19	diagnosed	Non-interactive	One month (4)	single session	30	SUDs, SFR, HR, SC
Schmid-Leuz et al., 2007	35.0	55.5%	**D-F**	63	diagnosed	Interactive	Less than one month (1)	single session	60	SUDs, DAS, STAI-S, STAI-T, HR
Telch et al., 2004	18.9	83.0%	U-D	30	analogue	Non-interactive		single session	30	VAS Peak Fear, HR
Wood and McGlynn,2000.1[1]			**D-F**	12	analogue	Non-interactive	Less than one month (1)	single session	30	SUDs, HR
Wood and McGlynn,2000.2[2]			**D-F**	10	analogue	Non-interactive	Less than one month (1)	single session	30	BAT Steps

Notes. [1] = study 1; [2] = study 2; *= BAT steps data available only for D-F comparison; U-D = uninstructed-distraction; U-F = uninstructed-focus; D-F = distraction-focus; BAT = Behavioral Approach Task; DAS = Dental Anxiety Scale (Corah, 1969); FSQ = Fear of Spiders Questionnaire (Szymanski & O'Donohue, 1995); HR = Heart Rate; MQ = Mutilation Questionnaire (Klorman, Weerts, Hastings, Melamed, & Lang, 1974); SC = Skin Conductance; SCL = Skin Conductance Level; SFGQ = Spider Fears Generalization Questionnaire (Craske, Mohlman, Yi, Glover, & Valerie, 1995); SFR = Subjective Fear Rating; SPQ = Spider Phobia Questionnaire (Klorman et al., 1974); STAI -S/ STAI-T = State-Trait Anxiety Inventory-State/State-Trait Anxiety Inventory-Trait (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983); SUDs = Subjective Units of Discomfort Scale (Wolpe, 1958); VAS = Visual Analogue Scale.

Third, symptom return at follow-up is one of the major issues exposure therapy is confronted with (Boschen, Neumann, & Waters, 2009). Emotional processing theory suggests that safety behaviors during exposure, like distraction, may increase the risk of relapse due to limited processing of threat during exposure. Whether distraction facilitates only temporary symptom reduction, but has detrimental effects later on, can be assessed only at follow-up. Despite this importance of follow-up assessment, few studies performed follow-up to test the long-term efficacy of different forms of attention allocation during exposure (see Table A2.1).

In summary, when examining the effects of attention allocation to exposure efficacy it is important to consider the methodological issues presented here.

1.4 Overview of the Present Study

Despite an ongoing debate that dates back to more than 30 years ago (Grayson, Foa, & Steketee, 1982), up to now no meta-analysis has been published on the efficacy of distracted vs. focused exposure on anxiety related symptoms. Inconsistencies in the literature with respect to results, methodology, and distraction/attentional focus definitions, as well as increasing interest in the interplay between attention and exposure (McNally, 2007; Foa et al., 2006; Parrish et al., 2008) provide the impetus for the current meta-analysis. The present investigation sought to establish the relative efficacy of different attention allocation instructions during exposure on distress, physiological and behavioral symptoms related to anxiety experience by patients with specific phobia.

The purpose of the present study is twofold. First, the goal is to investigate differences in efficacy between focused exposure, distracted exposure, and uninstructed exposure (i.e., without any instruction about attention allocation) with respect to distress, behavior, and physiology by means of two by two comparisons at post exposure and follow-up. The key comparison in the current study is the one between exposure with focused attention and exposure with distracted attention. However, it is possible that both forms have a different efficacy compared to uninstructed exposure. Therefore, we added specific comparison between the attentionally instructed exposures and uninstructed exposure. Second, the goal is to investigate potential moderators of the difference in efficacy between focused and distracted exposure with respect to distress, behavior, and physiology. Previous research and theory has suggested several potential moderators among which are the clinical status of the sample, level of interaction within distraction tasks, number of exposure sessions, and follow-up length (Craske et al., 2008; Foa et al., 2006). We are discussing these moderators below.

1.4.1 Clinical Status of the Sample.

In order to consider either one of the forms of attention allocation during exposure relevant in clinical settings, it is necessary to see whether they reduce symptoms in clinical samples. In addition, there are studies indicating that healthy and clinical samples respond differently to attention allocation when exposed to threatening stimuli, meaning that healthy individuals process the threat stimulus less than clinical samples when distracted (Straube,

Lipka, Sauer, Mothes-Lasch, & Miltner, 2011). This is also a potential moderator for theoretical reasons, as there is an extensive literature which shows a strong link between anxiety levels and attentional control in threatening situations (for a review, see Eysenck, Derakshan, Santos & Calvo, 2007). Hence, clinical samples may be less able to comply with attentional instructions. As attentional focus during exposure has been examined in clinical, as well as clinically-analogue samples, we can review whether clinical status moderates the efficacy of attentionally instructed/uninstructed exposure.

1.4.2 Level of interaction within distraction tasks.

To illustrate the variability within distraction tasks, several studies used interactive distraction demands (e.g., patient-therapist communication on threat unrelated topics, see Table A2.1), or non-interactive distraction demands (e.g., listening to documentaries on headphones while counting key words with no interaction between patient and therapist, see Table A2.1). In pain related research this distinction is relevant, as interactive distraction is more effective than non-interactive distraction in terms of pain tolerance and pain threshold (Wohlheiter & Dahlquist, 2013). It is plausible that the superior efficacy of interactive distraction as opposed to non-interactive distraction can be encountered in fear reduction literature, for two main reasons. First, interactive distraction is considered to be more clinically relevant, being frequently recommended by therapists in clinical practice (Penfold & Page, 1999). Second, several characteristics of interactive distraction are relevant to fear reduction. It requires ongoing stimulation (e.g., finding conversation arguments) and is more ecological than non-interactive distraction, mirroring real-life situations (e.g., a conversation). In contrast, non-interactive distraction might be more stressful in that it mimics evaluation related situations (e.g., the participant has to report, at the end of the exposure, the number of keywords identified in a recording). Noteworthy, interactive distraction provides an ongoing manipulation check over the course of the intervention, keeping the person constantly distracted during exposure (e.g., via conversation). As we have identified several studies using strategies varying in levels of interactivity, we can review whether interactive/non-interactive distraction moderates the efficacy of exposure under various attentional focus conditions.

1.4.3 Number of exposure sessions.

The issue of single vs. multiple exposure sessions is well investigated in terms of efficacy. Öst, Brandberg, and Breitholtz (2001) have shown that, for some anxiety disorders, like specific phobia, multiple sessions are not necessarily superior to one session exposure with respect to fear reduction. However, for other anxiety disorders, multiple sessions are needed, as it has been argued that between-session habituation is necessary for recovery in anxiety disorders, like post-traumatic stress disorder (for review, see Craske et al., 2008). It is plausible that attentional focus has different effects within-session versus between exposure sessions. That is, distraction may initially lower within-session fear levels, but could hinder emotion processing and thus be associated with smaller fear reduction between exposure sessions, making the number of sessions a potential moderator.

1.4.4 Follow-up length.

Studies vary widely in the duration between post exposure assessment and follow-up. The issue of follow-up length in anxiety disorders is considered highly relevant as estimates suggest that up to 30% of individuals, depending on anxiety disorder, experience return of symptoms, predominantly fear (for review see, Craske & Mystkowski, 2006). In line with the impact that attentional focus may have in relation to the number of exposure sessions, the length of follow-up may also be important in showing differences between focused and distracted exposure at shorter relative to longer follow-up durations.

2. Method

2.1 Literature search

Potentially relevant studies were identified following a systematic search of the PsychInfo and Medline databases through September 2012, using the following keywords: “exposure-only’’, ”exposure alone”, “attentional focus’’, “distraction’’, paired with “exposure”, “anxiety”, and “fear”. We also systematically searched the references within the most recent articles (Oliver & Page, 2008; Schmid-Leuz et al., 2007), and reviews on the topic of attention allocation during exposure (McNally, 2007; Foa et al., 2006; Parrish et al., 2008).

2.2 Selection of studies

The search procedure led to the identification of 37 records (see Figure A2.1). After removing duplicates, the remaining studies were analyzed in detail for relevance based on their abstract. Following the exclusion of irrelevant publications (i.e., the screened abstracts indicated reviews related to the topic or lack of an exposure intervention in anxiety), a total of 29 potentially relevant articles were inspected for relevance based on their full-text. Only studies fulfilling the following criteria were included into the meta-analysis: (a) assessed distress (i.e., fear, anxiety, subjective units of distress) and/or behavioral, physiological symptoms at post exposure and/or follow-up; (b) were English-language publications; (c) included samples with high anxiety or clinically diagnosed anxiety; (d) had sufficient data to compute between-group effect sizes; (e) participants were randomly assigned to at least two out of the three targeted experimental groups (i.e., focused, distracted, and/or uninstructed exposure) and (f) focus and distraction tasks were performed during exposure; (g) dealt with specific phobia. Fifteen articles satisfied the inclusion criteria (see Figure A2.1).

Moreover, the studies had to include standard therapeutic forms of exposure therapy. As such we did not include extinction studies, or eye-movement desensitization and reprocessing (EDMR) (Rogers & Silver, 2002). Random allocation to conditions was essential for between group comparisons. Therefore, crossover design studies were excluded to avoid potential carryover effects. Exposure paired with other forms of therapy or add-ons (e.g., breathing exercises) was discarded. Importantly, not all the remaining and included studies had the comparison of different forms of attention allocation during exposure as primary objective. We are discussing these cases below.

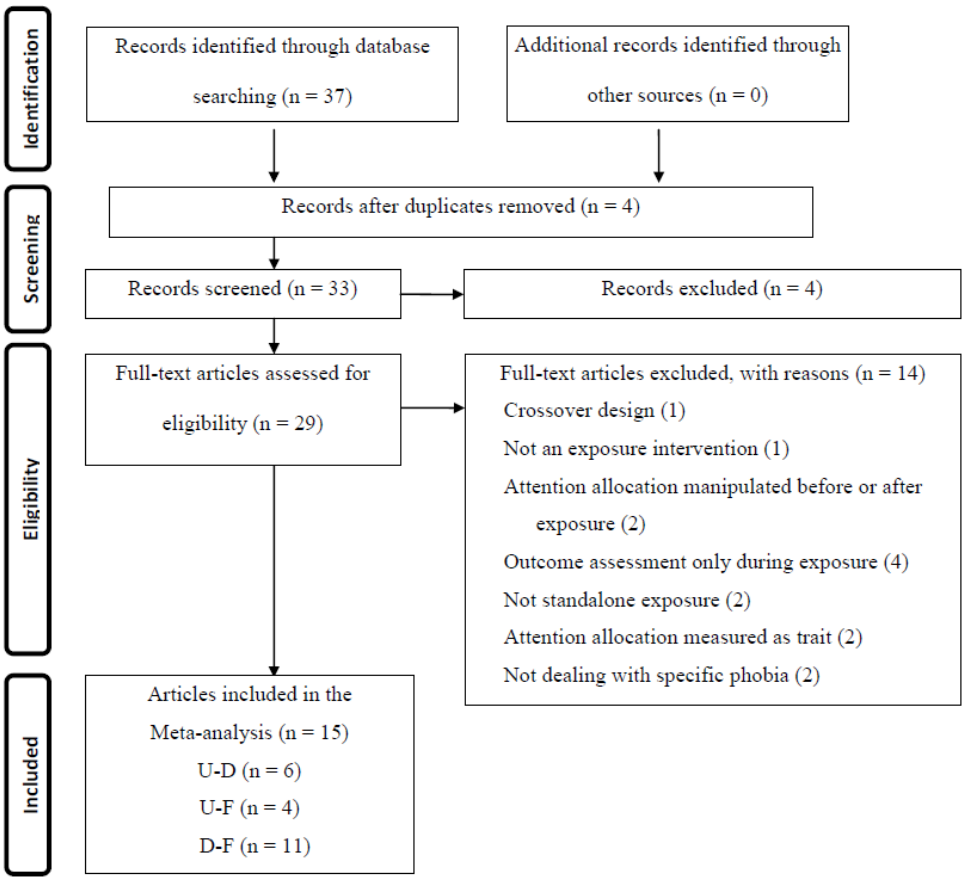

Figure A2.1. Flow diagram. Flow diagram of study selection process.

The majority of the selected studies compared target exposure groups against each other or against other conditions irrelevant to our purposes. In the latter case, we took into consideration only relevant data to our target interventions. For instance, Kamphuis and Telch (2000) compared uninstructed exposure to distracted exposure, exposure plus reappraisal, and distracted exposure plus reappraisal. Since exposure plus reappraisal or distracted-reappraisal was not within the focus of our review, we discarded these two conditions and kept data sets from uninstructed exposure and distracted exposure group.

There was one study in which focused exposure was not labeled accordingly. To be specific, Arntz and Lavy (1993) investigated elaboration of threat during exposure. As described by these authors, elaboration required attending, processing, and describing the features of the phobic stimulus. Because this procedure is similar to other attentional focus tasks (e.g., Oliver & Page, 2003, 2008), we included the elaboration task into the category of focused exposure.

2.3 Procedure

For each included study, we retained the following variables: study identification data (author, year of publication), mean age of the participants, percentage of female participants per study, number of participants per comparison, number of exposure sessions, session duration, clinical status of the sample, interactive/non-interactive distraction, follow-up length (in weeks), and outcome measures (see Table A2.1, as well as subsequent paragraphs for the coding of these variables).

Outcome measures were classified into one of the following three clusters:

Distress. Following Powers and Emmelkamp (2008), distress includes anxiety related-specific distress and general distress. This outcome includes self-reports of anxiety, fear related questionnaires, as well as situational and general distress estimates (see Table A2.2)

Behavior. The behavioral outcome included the level of behavioral approach (e.g., number of steps completed during the behavioral approach test, BAT) (see Table A2.2).

Physiology. Measures assessing physiological responding include: heart rate, skin conductance, systolic and diastolic blood pressure, self-reported blushing responses, and so on (see Table A2.2).

Table A2.2. Coding categories for dependent measures: distress, physiological, and behavioural outcomes

Domain	Measure
Distress	SUDS; SPQ; FSQ; SFGQ; MQ; DAS; Phobic Anxiety Scale; VAS Anxiety; SFR; STAI-S; STAI-T; VAS Peak Fear
Physiology	HR; SC; SCL; Diastolic/Systolic blood pressure
Behavior	BAT Steps

Notes. BAT = Behavioral Approach Task; DAS = Dental Anxiety Scale (Corah, 1969); FSQ = Fear of Spiders Questionnaire (Szymanski & O'Donohue, 1995); HR = Heart Rate; MQ = Mutilation Questionnaire (Klorman, Weerts, Hastings, Melamed, & Lang, 1974); SC = Skin Conductance; SCL = Skin Conductance Level; ; SFGQ = Spider Fears Generalization Questionnaire (Craske, Mohlman, Yi, Glover, & Valerie, 1995); SFR = Subjective Fear Rating; SPQ = Spider Phobia Questionnaire (Klorman et al., 1974); STAI -S/ STAI-T = State-Trait Anxiety Inventory-State/State-Trait Anxiety Inventory-Trait (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983); SUDs = Subjective Units of Discomfort Scale (Wolpe, 1958); VAS = Visual Analogue Scale.

Moderators were classified into one of the following four clusters:

Clinical status of the sample. Since all the included studies had participants who experienced diagnosed or undiagnosed anxiety, we split this moderator into clinical samples (i.e., participants diagnosed with an anxiety disorder) and analogue samples (i.e., undiagnosed participants with elevated symptoms of anxiety).

Level of interaction within distraction tasks. We split this moderator into interactive distraction and non-interactive distraction. Interactive distraction involves patient-therapist communication on topics unrelated to the feared stimulus. In contrast, non-interactive distraction does not involve patient-therapist communication (e.g., listening to a documentary recording and counting key words).

Number of exposure sessions. Following Wolitzky-Taylor, Horowitz, Powers, and Telch (2008), we split the number of exposure sessions into single exposure session and multiple exposure sessions (i.e., two or more sessions).

Follow-up length. In the targeted distraction-focus studies, follow-up intervals ranged from 1 to 4 weeks (see Table A2.1). We split the follow-up interval into less than one month (i.e., varying from 1 to 3 weeks) and one month, which was based on inspection of the typical length of follow-up duration in the included studies. This decision is in line with other meta-analyses (e.g., Covin, Ouimet, Seeds, & Dozois, 2008), which also split the follow-up interval depending on the available follow-up range.

For effect size estimates we chose Hedges's g, a coefficient which controls for variations in sample size among studies (Hedges & Olkin, 1985). Just like the traditional Cohen's d coefficient, a value between 0.2-0.5 indicates a small effect size, a value between 0.5-0.8 indicates a medium effect size, and a value of 0.8 or larger points to a large effect size (Cohen, 1988). The effect sizes were coded so that in an uninstructed-distracted and uninstructed-focused exposure pair a positive value points to a result in favor of uninstructed exposure, while in a distracted-focused exposure pair a positive value indicates results in favor of distraction. In order to view g scores in a more intuitive manner, we computed percentages for each main average effect size for distress, behavior, and physiology, as well as for significant moderation effects. Following McGough and Faraone (2009), we converted g scores into Cohen's d and related the resulting scores to the table of percentages depicted for each effect size. For instance, according to McGough and Faraone (2009), an effect size of 0.6 corresponds to a percentage of 73% (i.e., individuals in group X had higher/lower values than 73% of the individuals in group Y).

For each comparison per outcome, we computed two effect sizes, one at post exposure and one at follow-up. As for the calculation of effect sizes for distress, behavior, and physiology, the following data were used: means and standard deviations, when these were available; Cohen's d reported in the study; between-group t values and sample sizes; between group p values and degrees of freedom. In addition, when a study reported multiple outcomes per cluster (i.e., distress, behavior, or physiology cluster), we computed an average effect size of those outcomes at a given point in time (i.e., post-exposure and/or follow-up).

For all sets of computed effect sizes we followed the random effects model, which assumes that studies come from populations in which the effect size differs. To examine the degree to which effect sizes differ among studies, we tested for heterogeneity of effect sizes using the Q statistic and the I^2 statistic (Borenstein, Hedges, Higgins, & Rothstein, 2009). Q statistic is an index of the heterogeneity in effect sizes, comparing true heterogeneity to random error. A statistically significant Q pin points to a true heterogeneity in effect sizes

beyond random error. I^2 statistic is similar to Q statistic, but indicates the proportion of observed heterogeneity and, unlike Q, is not sensitive to the number of studies (Borenstein et al., 2009).

To address publication bias, we generated a funnel plot and visually inspected for publication bias. The underlying assumption of the funnel plot is that smaller effect sizes with smaller sample sizes are more susceptible to error. If a publication bias is present, the funnel plot will be asymmetrical, with studies clustered unevenly above or below the mean. In addition, we used Duval and Tweedie's trim-and-fill procedure (Duval & Tweedie, 2000) that approximates the probable number of missing studies that would correct for publication bias, computing an effect size without publication bias. These analyses, along with the rest of the examinations, were run using Comprehensive Meta-Analysis (Version 2.2.046; Borenstein, Hedges, Higgins, & Rothstein, 2005).

3. Results

3.1 Between-group analysis for distress

For brevity purposes, when comparing in a two-by-two manner distracted exposure, focused exposure, and attentionally uninstructed exposure, we abbreviated these contrasts to: uninstructed-distraction, uninstructed-focus and distraction-focus pair.

First, we computed average post exposure and follow-up effect sizes for distress in the distraction-focus pair considering data reported in 10 (N = 307) and 8 studies (N = 221), respectively. At both intervals, a study by Johnstone and Page (2004) had values exceeding 2 SDs above the average effect size and was, therefore, considered an outlier[1]. This study was excluded from further analysis. At both post ($g = .242$, $p = .177$, 95% CI = [-.110; .594]) and follow-up ($g = .101$, $p = .721$, 95% CI = [-.454; .656]) pooled effect sizes for distress indicated no differences between conditions. Also, at post exposure, $Q(8) = 17.241$, $p = .028$, $I^2 = 53.599$, and follow-up, $Q(6) = 21.693$, $p = .001$, $I^2 = 72.342$, there was evidence of heterogeneity in results. There was no statistically significant difference between post exposure and follow-up average effect size for distress in the distraction-focus pair, $Q(1) = 1.700$, $p = .192$.

Second, we computed an average post exposure and follow-up effect size for distress in the uninstructed-distraction pair on data reported in 6 (N = 156) and 3 studies (N = 72). In both post and follow-up intervals there was no outlier. Results showed no significant difference in terms of distress between distraction and uninstructed condition at post exposure, $g = -.088$, $p = .818$, 95% CI = [-.831; .656] and follow-up, $g = -.747$, $p = .248$, 95% CI = [-2.016; .521]. There was evidence of heterogeneity at post exposure, $Q(5) = 28.405$, $p < .001$, $I^2 = 82.398$, and follow-up $Q(2) = 15.065$, $p < .001$, $I^2 = 86.724$. Also, there was no statistically significant difference between post exposure and follow-up average effect size for distress in the uninstructed-distraction pair, $Q(1) = .748$, $p = .387$.

[1] The results presented here did not differ significantly when the outlier was included.

Third, in terms of distress, we computed an average effect size for uninstructed-focus pair at post exposure (k = 4, N = 111) and follow-up (k = 3, N = 85). In the absence of outlying studies, pooled effect sizes indicated no significant differences between uninstructed and focused exposure with respect to distress at post exposure (g = .033, p = .894, 95% CI = [-.451; .517]) or follow-up (g = -.032, p = .875, 95% CI = [-.426; .363]). There was no evidence of heterogeneity, assessed for post exposure, Q (3) = 5.573, p = .134, I^2 = 46. 166, and follow-up, Q (2) = 1.218, p=.544, I^2 = .000. Also, there was no statistically significant difference between post exposure and follow-up average effect size for distress in the uninstructed-focus pair, Q (1) = .167, p =.683.

Moreover, subsequent analyses revealed no significant difference between the average effect size for distraction-focus, uninstructed-distraction, uninstructed-focus pairs with respect to distress at post exposure, Q(2) = 1.942, p = .379, or follow-up, Q(2) = 2.440, p = .295.

3.2 Between-group analysis for behavioral outcomes

With respect to behavior, we initially computed an average effect size for the distraction-focus pair at post exposure (k = 5, N = 143) and follow-up (k = 3, N = 57). There was no study outlying from the average effect size. At post exposure (g = .672, p = .080, 95% CI = [-.080; 1.425]) the average effect size was near significance and in favor of distraction, where participants in the distraction group tended to display better behavioral outcomes (i.e., less avoidance and more approach behavior) than 76% of those in the focus group. At follow-up (g = 1.490, p = .008, 95% CI = [.394; 2.586]), the average effect size was significant and in favor of distraction, where participants in the distraction group demonstrated better behavioral outcomes relative to 92% of those in the focus group. There was evidence of heterogeneity in post exposure, Q (4) = 17.678, p = .001, I^2 = 77.373, and follow-up behavioral results, Q (2) = 6.610, p = .037, I^2 = 69.742. No statistically significant difference between these time points was revealed in the distraction-focus pair, Q (1) = 2.054, p = .152.

Next, we computed the post exposure average effect size in the uninstructed-distraction pair on data extracted from 2 studies (N = 54). We could not compute an average effect size at follow-up on account of a lack of studies and data for this contrast pair. At post exposure, in the absence of outliers, the resulting medium effect size indicated a significant difference between uninstructed exposure and distraction in favor of uninstructed exposure, g = .664, p = .017, 95% CI = [.120; 1.206], meaning that participants in the uninstructed group had better behavioural outcomes than 73% of those in the distraction group. There was no evidence of heterogeneity in results, Q (1) = .001, p = .970, I^2 = 0.000

Further on, we computed an average effect size for the uninstructed-focus pair at post exposure (k = 2, N = 67). We could not compute an average effect size at follow-up because of lack of studies and data for this contrast pair. The resulting small effect size (g = .289, p = .231, 95% CI = [-.184; 0.761]) was not significant and had no evidence of heterogeneity within results, Q (2) = .967, p =.326, I^2 = .000.

Moreover, subsequent analyses revealed no significant difference between average effect sizes for distraction-focus, uninstructed-distraction, uninstructed-focus pairs with respect to behavior at post exposure, Q(2) = 1.316, p = .518.

3.3 Between-group analysis for physiological outcomes

First, we computed average post exposure and follow-up effect sizes for physiology in the distraction-focus pair considering data reported in 7 (N = 237) and 6 studies (N = 177). At both intervals, there was no outlying study to be excluded from further analysis. At both post (g=-.276, p = .282, 95% CI = [-0.781; 0.228]) and follow-up (g = -.520, p = .168, 95% CI = [-1.259; 0.219]) pooled effect sizes for physiology indicated no differences between conditions. There was evidence of heterogeneity in results, at post exposure, Q (6) = 20.509, p = .002, I^2 = 70.745, and follow-up, Q (5) = 25.993, p =. 000, I^2 = 80.764. Results indicated no statistically significant difference between post exposure and follow-up in terms of average physiology effect sizes in the distraction-focus pair, Q (1) = .129, p = .720.

Second, since the majority of studies investigated physiological outcomes following distraction-focus comparison, we could contrast uninstructed-distraction pair at post exposure considering data reported in only 2 studies (N = 58). Results showed no significant difference in terms of physiology between distraction and uninstructed exposure, g = .074, p = .772, 95% CI = [-0.428; 0.577]. There was no evidence of heterogeneity, Q (1) = .906, p = .341, I^2 = .000.).

We could not compute an average effect size for the uninstructed-focus pair at post exposure or follow-up on account of lack of physiological measurements for this constrast (see Table A2.1). Subsequent analyses revealed no significant difference between average effect sizes computed for distraction-focus and uninstructed-distraction pairs with respect to physiology at post exposure, Q(1) = .932, p = .334.

3.4 Moderators of distress outcome

We performed separate moderation analyses for post exposure and follow-up between-group effect sizes for distress, behavior and physiology in the distraction-focus pair, as this was the key comparison in the current study. In addition, there were too few studies per moderator category to contrast uninstructed exposure to distracted or focused exposure (see Table A2.1). Results from analyses with categorical moderators are displayed in Table A2.3 and 4.

The first moderator we took into account was the clinical status of the sample (analogue vs. clinical sample). In the distraction-focus pair, the clinical status did not moderate the effect size for distress in either dataset, post exposure or follow-up (see Table A2.3).

A second moderator was the number of exposure sessions (single vs. multiple sessions), which significantly moderated post exposure and follow up effect size for distress in the distraction-focus pair (see Table A2.3). At post exposure, in the multiple sessions condition, participants in the distraction group had lower levels of distress than 92% of those in the

focus group. In the single session, distraction and focused exposure did not differ significantly (see Table A2.3). At follow-up, in the multiple sessions condition, participants in the distraction group reported lower levels of distress relative to 92% of those in the focus group. This was not the case for the single session condition, where there was no significant difference between both groups (see Table A2.3).

A third moderator was the level of interaction within distraction tasks. This variable significantly moderated post exposure effect size for distress. Distraction was significantly superior to focus in terms of distress in the interactive condition, while in the non-interactive condition, there were no significant differences between both conditions (see Table A2.3). In the interactive condition, participants had lower distress levels than 84% of the individuals in the focus group.

Fourth, we tested follow-up interval length (i.e, less than one month and one month) as a moderator of distress. Follow-up length did not moderate effect sizes for distress in the distraction-focus pair (see Table A2.3).

Table A2.3. Moderation analysis with categorical variables for distress at post exposure and follow-up (FU)

Outcome	Time of measurement	Moderator	Condition	N	g	p	Q w	p	CI	Q b	p
Distress	Post	Analogue/ Clinical Sample	D-F	4	0.434	0.322	12.127	0.007	[-0.426;1.294]	0.001	0.989
				6	0.427	0.170	23.881	0.000	[-0.183;1.037]		
	FU		D-F	3	0.342	0.637	14.479	0.001	[-1.081;1.756]	0.000	0.991
				5	0.351	0.402	23.373	0.000	[-0.471;1.173]		
	Post	Single/ Multiple Sessions	D-F	7	0.057	0.684	6.869	0.333	[-0.218;0.333]	8.099	0.004
				3	1.527	0.002	7.594	0.022	[0.553;2.501]		
	FU		D-F	5	-0.237	0.175	4.367	0.359	[-0.579;0.105]	15.124	0.000
				3	1.519	0.000	5.395	0.067	[0.703;2.335]		
	Post	Interactive/ Non-Interactive	D-F	5	1.010	0.010	21.524	0.000	[0.242;1.778]	6.147	0.013
				5	-0.062	0.736	4.741	0.315	[-0.420;0.297]		
	FU		D-F[a]	3	0.647	0.205	12.301	0.002	[-0.349;1.624]	2.688	0.101
				4	-0.296	0.266	4.316	0.229	[-0.817;0.225]		
	FU	Less than one month/One Month F.U.	D-F[a]	2	-0.665	0.259	3.397	0.065	[-1.820;0.490]	2.528	0.112
				5	0.394	0.205	11.624	0.020	[-0.215;1.003]		

Notes. D-F = distraction-focus; a One outlier (Johnstone and Page, 2004) was excluded from the analyses presented here.

Table A2.4. Moderation analysis with categorical variables for behavior and physiology at post exposure and follow-up (FU)

Outcome	Time of measurement	Moderator	Condition	N	g	p	Q w	p	CI	Q b	p
Behavior	Post	Analogue/ Clinical Sample	D-F	3	0.647	0.135	4.876	0.087	[-0.201;1.495]	0.011	0.916
				2	0.750	0.396	12.202	0.000	[-0.981;2.481]		
	Post	One session/ Multiple sessions	D-F	3	0.032	0.873	0.716	0.699	[-0.359; 0.423]	16.913	0.000
				2	1.606	0.000	0.048	0.826	[0.965; 2.246]		
	Post	Interactive/ Non Interactive	D-F	3	1.128	0.016	6.995	0.030	[0.208;2.049]	5.142	0.023
				2	-0.061	0.792	0.130	0.718	[-0.520;0.397]		
Physiology	Post	Interactive/ Non Interactive	D-F	2	-0.759	0.315	8.057	0.005	[-2.240;0.722]	0.677	0.411
				5	-0.094	0.741	10.659	0.031	[0.653;0.465]		
	FU		D-F	2	-0.703	0.366	9.548	0.002	[-2.227;0.299]	0.322	0.570
				4	-0.233	0.408	5.028	0.170	[-0.554;0.821]		
	FU	Less than one month/ One Month F.U.	D-F	2	0.072	0.750	0.130	0.719	[-0.785; 0.319]	2.478	0.115
				4	-0.877	0.117	19.219	0.000	[-1.973; 0.219]		

Notes. D-F = distraction-focus.

3.5 Moderators of behavioral outcome

In terms of behavior, the first moderator we took into account was the clinical status of the sample. The clinical status did not moderate the effect size for behavior in either dataset, post exposure or follow-up (see Table A2.4).

A second moderator was the number of exposure sessions that significantly moderated post exposure effect size for behavioral outcome (see Table A2.4). Distraction significantly outperformed focused exposure in the multiple sessions condition, where individuals from the distraction group had better behavioral outcomes (i.e., less avoidance and more approach behavior) than 95% of the individuals in the focus group. In the single session condition, the difference between distracted versus focused exposure did not reach significance (see Table A2.4). The analysis could not be extended to follow-up on account of lack of diversity between studies with respect to number of exposure sessions, meaning that the majority of studies had multiple exposure sessions (see Table A2.1).

A third moderator was the level of interaction within the distracting task. This variable significantly moderated post exposure effect size for behavioral outcome. That is, distraction was significantly superior to focus in terms of behavior for interactive tasks, while for non-interactive tasks there was no difference between distraction and focus (see Table A2.4). Furthermore, with interactive tasks, distracted exposure had better behavioral outcomes than 84% of the individuals in the focused exposure group. The analysis could not be extended to follow-up time interval or follow-up length moderator since there were too few studies (see Table A2.1).

3.6 Moderators of physiological outcome

Regarding the physiological outcome, on account of few studies and lack of variability among papers in terms of the investigated moderators (see Table A2.1), it was possible to perform moderation analysis only for level of interaction within distraction and follow-up length.

Irrespective of the time of measurement, post exposure or follow-up, none of the investigated variables was a significant moderator of the physiological outcome (see Table A2.4).

3.7 Publication bias

To investigate the presence of publication bias we generated funnel plots, and computed Duval and Tweedie's (2000) trim-and-fill procedure using a random effects model. Publication bias analyses were carried out for distress, behavior, and physiology effect sizes at post exposure and follow-up in all the three investigated exposure contrasts.

For distress, in the distraction-focus pair, trim-and-fill procedure estimated no study with effects higher or lower than the mean which could modify the results at post-exposure. At follow-up, trim and fill estimated one study with an effect size higher than the mean which

did not change significantly the results, g = .280, 95% CI = [-.313; .874], Q = 30.419. In line with this result, the funnel plot showed asymmetry, suggesting the presence of missing studies with effect sizes above the mean and the possibility of obtaining under-inflated estimates of the true differences (see Figure A2.2.A).

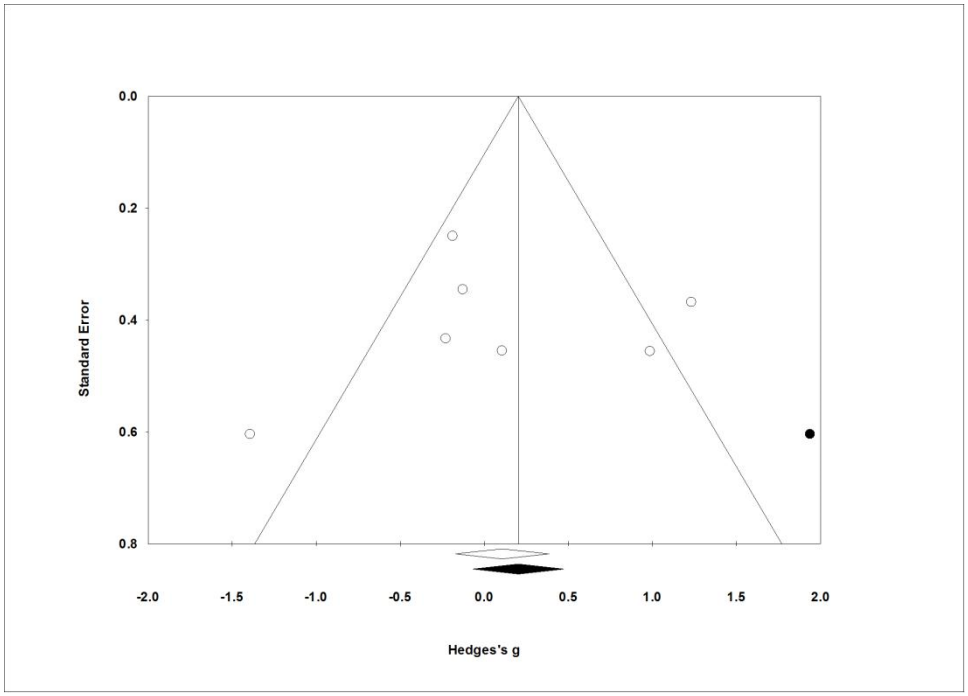

Figure A2.2.A. Funnel plot of publication bias. Funnel plot of publication bias for distress follow-up effect size in the distraction-focus contrast.

For behavior, in the distraction-focus contrast, trim-and-fill procedure estimated one study, at post exposure, with an effect size lower than the mean which did not change significantly the results, g = .443 95% CI = [-.326; 1.213], Q = 25.502. In line with this result, the funnel plot showed asymmetry, suggesting the presence of missing studies with effect sizes below the mean and the possibility of obtaining slightly inflated behavioral estimates for the distraction-focus pair (see Figure A2.3.A). For the remaining contrasts, the presence of only two studies per condition implied that publication bias could not be investigated.

For physiology, at post exposure, the trim and fill procedure estimated one study with effect sizes above the mean, which did not change significantly the results, g = -.096, 95% CI = [-.645; .452], Q = 30.902. In line with this result, the funnel plot showed some asymmetry, suggesting the possibility of obtaining slightly under-inflated estimates of the true differences in physiology (see Figure A2.4.A). At follow-up, two studies with effect sizes below the mean were estimated to reduce the effect size, g = -.925, 95% CI = [-1.693; -.157], Q = 48.677. The resulting funnel plot depicts some asymmetry suggesting the possibility of obtaining slightly inflated estimates of physiology in the distraction-focus pair

(see Figure A2.5.A). As was the case for behavior, the other two exposure contrasts cannot be investigated for publication bias because of lack of studies.

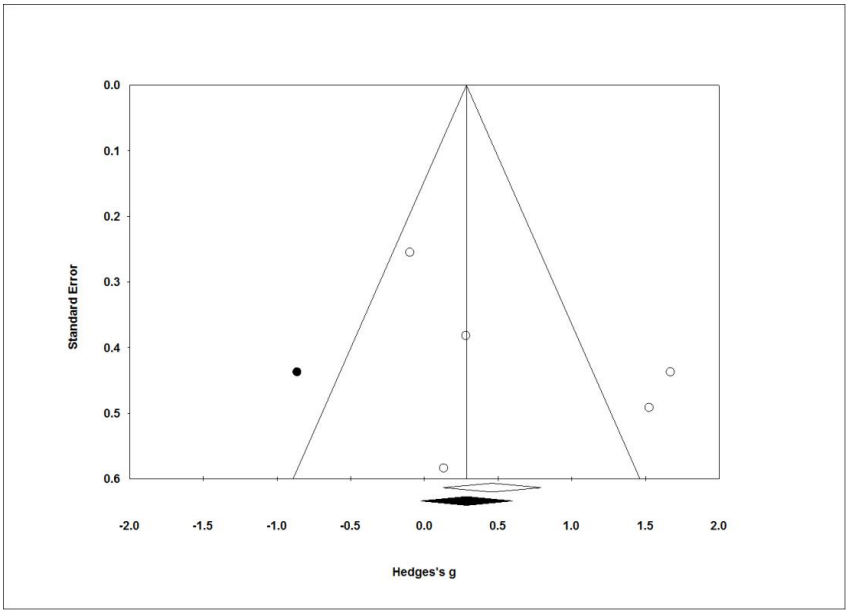

Figure A2.3.A. Funnel plot of publication bias. Funnel plot of publication bias for behavioral post exposure effect size in the distraction-focus contrast.

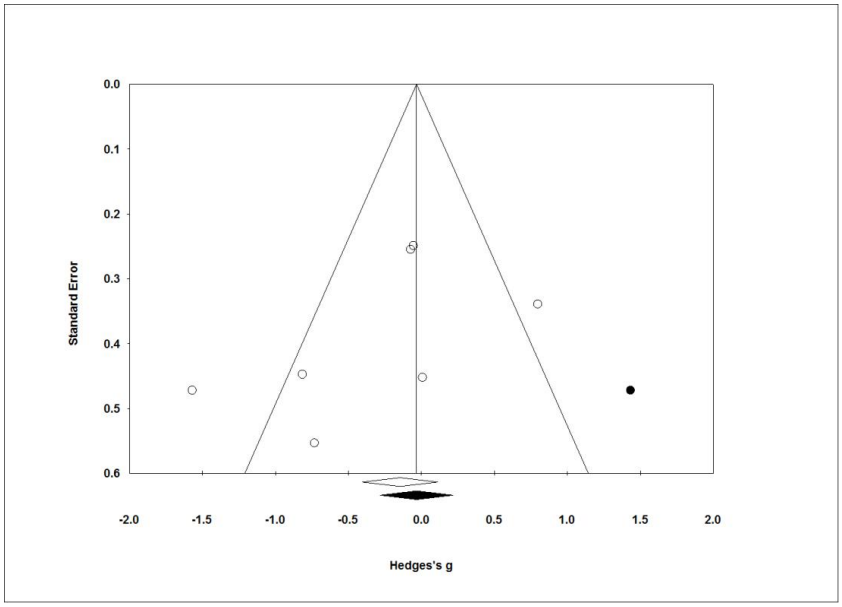

Figure A2.4.A. Funnel plot of publication bias. Funnel plot of publication bias for physiology post exposure effect size in the distraction-focus contrast.

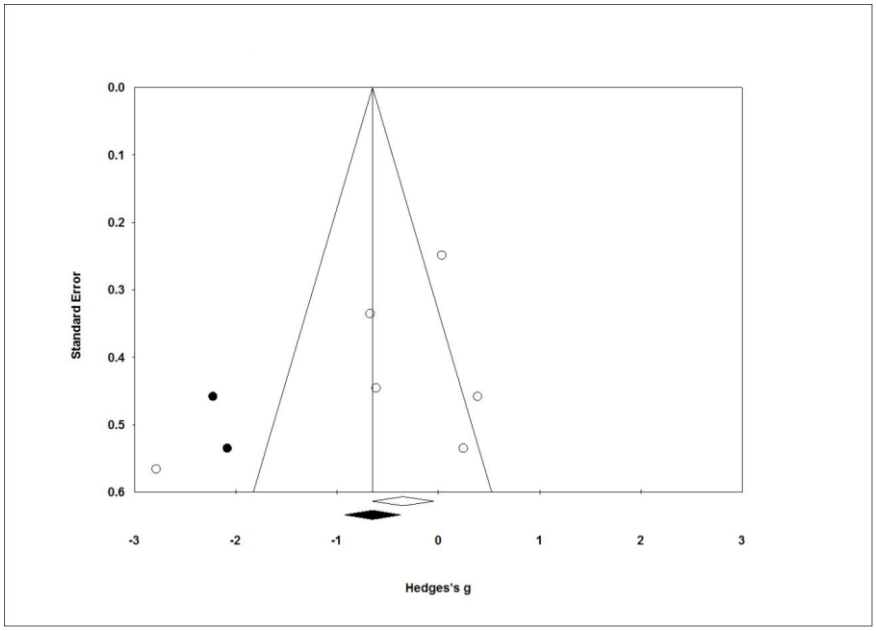

Figure A2.5.A. Funnel plot of publication bias. Funnel plot of publication bias for physiology follow-up effect size in the distraction-focus contrast.

4. Discussion

The current meta-analysis aimed at investigating the efficacy of focused vs. distracted and uninstructed exposure on distress, behavioral, and physiological outcomes. We performed a quantitative review of 15 randomized studies that included post exposure and follow-up measurements. We made specific two by two comparisons between distracted, focused, and uninstructed exposure. Moreover, we examined potential moderators of differences in response to interventions (i.e., clinical status, number of sessions, level of interaction within distraction, and follow-up length).

4.1 Main effects

First, there were no differences in efficacy between focused and distracted exposure regarding distress and physiology at post-exposure or follow-up. The lack of significant differences between interventions indicates that distracted exposure is comparable to focused and uninstructed exposure in terms of distress and physiology. Thus, distraction may not be as detrimental to exposure as it has been suggested (Foa & Kozak, 1986; Foa et al., 2006). In addition, the lack of significant outcome differences (i.e., distress and physiology) between post exposure and follow-up stands contrary to views on distraction as a risk factor for symptom return (Foa & Kozak, 1986; Foa et al., 2006).

Second, there were significant and marginally significant differences between exposure pairs regarding behavioral outcomes. At post-exposure, results were marginally significant

in favor of distracted as opposed to focused exposure, while at follow-up results significantly favored distraction. An explanation for these results might have to do with perceived control during exposure. This seems plausible as there are studies associating opportunities for behavioral approach and avoidance to perceived control (Schmid-Leuz et al., 2007; Oliver & Page, 2008). Therefore, distracted exposure might enhance perceived control and thus the approach towards threat. Noteworthy, in the uninstructed-distraction pair, results for behavioral outcomes were in favor of the uninstructed group at post-exposure. Perhaps, in terms of approach behavior, it is important for the patients to be able to choose how to direct their attention. In the uninstructed exposure patients are free to select the attentional strategy which they find more helpful to approach a feared stimulus.

There was significant heterogeneity in several comparisons, which signals potential important moderators. Therefore, we specifically tested whether there were moderators of the efficacy of exposure under distraction or focusing instructions. These effects are discussed below.

4.2 Moderator effects

First, the number of exposure sessions was a significant moderator of distress and behavioral outcomes. For distress, in the multiple sessions' condition, distracted exposure significantly outperformed focused exposure at both time intervals. For behavior, in the multiple sessions' condition, exposure with distraction was superior to exposure with focus, directly after the intervention. The results are in line with previous meta-analyses (e.g., Cuijpers et al., 2010), a dose-response relationship, and early research in psychotherapy indicating that a larger number of sessions is related to larger symptom improvement (Howard, Kopta, Krause, & Orlinsky, 1986; Kopta, Howard, Lowry, & Beutler, 1994).

Second, with reference to the level of interaction within distraction, our results indicate that this variable was a significant moderator of the efficacy of distress and behavioral outcomes. Distracted exposure significantly outperformed focused exposure, in terms of behavior and distress, directly after treatment in the interactive condition. It may be that interactive distraction, which is a communication experience between patient and therapist, triggered pleasant emotions. In turn, the positive emotions, experienced during stressful conditions, might have created the premises for counterconditioning. Alternatively, it may have to do with the nature of the task, meaning that interactive distracters (e.g., threat unrelated conversations) might have been more engaging and less stressful than the non-interactive distracters, which may have mirrored evaluation contexts (e.g., summarizing a documentary at the end of exposure).

Some of the expected moderators were not significantly associated with the efficacy of exposure under various attentional focus conditions. First, neither one of the outcomes was significantly moderated by clinical status and follow-up duration. One reason that these moderation models were not supported could be inadequate power due to the relatively small samples per condition. Second, none of the moderation analyses employed were significant for physiology. Again, this may have to do with the limited number of studies and the small

diversity among studies in terms of the investigated moderators (see Table A2.1). As such, only two moderation analyses could be performed for this outcome. Alternatively, it may have to do with the nature of the outcome. Previous reports indicate that physiological measures do not always follow trends in other anxiety related outcomes (Alpers & Sell, 2008). Therefore, moderators for distress and behavior are not necessarily the same as the moderators for physiology.

4.3 Theoretical and clinical implications

From a *theoretical point of view*, our results may pose a challenge to current views on exposure where it is thought that distraction during exposure may prevent fear reduction. One surprising result is that distracted exposure was comparable to focused and uninstructed exposure in terms of distress and physiology (i.e., irrespective of the time of measurement). A second unexpected result is that distraction outperformed focus in terms of behavioral approach immediately after the intervention (i.e., via a marginally significant result) and at follow-up. Furthermore, moderation results were interestingly in favor of distraction. Distraction outperformed focused exposure in the multiple sessions' condition (i.e., at both time intervals for distress and directly after exposure for behavior) and in the interactive distraction condition (i.e., at post-exposure for distress and behavioral outcomes). These results, along with the lack of theoretical explanations regarding the beneficial effects of distraction (Foa et al., 2006), might urge reconsideration of distraction's role in the efficacy of exposure, at least in comparison to focused exposure. Yet, results should be interpreted with caution when it comes to uninstructed exposure, as behavioral indexes seem to suggest that uninstructed exposure is the most effective.

There are two approaches that might help to reconsider the role of distraction during exposure. First, there is one critical issue that has been largely overlooked in the literature, which is how distraction is perceived by the patients. Depending on whether symptom reduction is attributed to distraction or not, distraction strategies may be harmful or beneficial. This issue has been raised in several previous studies (Parrish et al., 2008; Powers, Smits, Whitley, Bystritsky, Telch, 2008) but has barely been investigated. Second, distraction's beneficial effect during exposure may have to do with reduced tendency to catastrophise about feared outcomes, which in turn may prevent maladaptive thinking. Although it may have slightly negative effects on threat processing, distraction could provide anxiety patients with an opportunity to stay in a feared situation without being overwhelmed by fear. More experimental studies are needed to test such hypotheses directly.

From a *clinical point of view*, our results indicate that as long as the exposure sessions are extended over multiple sessions and the distracter is interactive, distraction does not impede symptom reduction. In fact, there are indications that distraction could be useful, during the early stages of treatment, to facilitate engagement in sessions and long-term exposure exercises (for review see Ellis, 2012; Rachman, Radomsky, & Shafran, 2008). Therefore, distraction research could change its current approach. Instead of comparing exposure with focus and distraction instructions, it would be interesting to examine to what extent and under what circumstances distraction is helpful in exposure. Also, to shed light on this matter, it

might help for future studies to be more oriented on uninstructed-distraction comparisons. The present study provided indications that there were no differences between these conditions, in terms of physiology and distress. Yet, the uninstructed condition was superior to distraction in terms of behavior, directly after exposure, suggesting that attentionally unguided patients might find it more helpful to choose their attentional strategy when it comes to approaching threat.

4.4 Limitations and Future Directions

The present meta-analysis has several limitations related to the current state-of-affairs in this literature. First of all, there were a limited number of studies contrasting attentionally instructed exposure against uninstructed exposure with quite a lot of variety in methodology and results, which limited the conclusions that can be drawn from these contrasts. Second, we had no objective information regarding the amount of load imposed by the distracter on cognitive resources. This is an important drawback of the published research, to date, as less demanding distracters might allow for threat to be processed; while more demanding distracters could impede threat processing (e.g., Telch et al., 2004; Rodriguez & Craske, 1995). Third, cognitive outcomes could broaden the perspective on the efficacy of exposure in anxiety related symptoms. However, the lack of cognitive assessments within studies limits our meta-analysis to emotional, physiological and behavioral findings. Fourth, because the manipulation check for compliance with instructions is missing in most studies, the degree of attention allocation to and from threat couldn't be controlled for. This is similar to clinical practice, to which this article is addressed to, where the client may or may not comply with the instructions provided by the clinician. Fifth, lack of manipulation check reflects also on the uninstructed exposure condition. Participants in an uninstructed group may still use focus/distraction strategies to manage their anxiety.

Furthermore, the current evidence are generalizable to specific phobias only. Previous studies indicate that specific phobia is not always representative for other anxiety disorders (Cuthbert et al., 2003). This disorder is supposed to have fear networks tightly associated to specific fear cues which might allow for a better fear activation and subsequent changes in the pathological components of the fear structure (Foa et al., 2006). Future studies, expanding attentional focus during exposure to other anxiety disorders, could shed light in this matter.

In addition to extending research to other anxiety disorders, future studies could: (a) endeavor to further refine distraction tasks to assess the amount of distraction that takes place during exposure; (b) investigate to what extent different types of distraction, like visual or cognitive, impede or not exposure mechanisms; (c) investigate whether distraction is present in some tasks of focused exposure, like patient-therapist conversation on threat related topics; (d) measure symptom reduction from a multilevel perspective; (e) examine whether distraction per se or attribution of recovery to distraction instead of exposure is counterproductive to therapy; (f) extend research to cognitive outcomes, like negative evaluation of the CS, a risk factor for return of fear (Dirikx, Hermans, Vansteenwegen, Baeyens, & Eelen, 2004); (g) include, during exposure, measurements of safety processing as potential mechanisms behind distraction efficacy. That is, if one is not that focused on

one's feelings of anxiety, being in a fear-relevant situation might become associated with control (distraction can be seen as a form of mental control) and lower the expected levels of fear.

On the basis of these findings, the present meta-analysis suggests that distraction in contrast to focused exposure could be less counterproductive and even useful to exposure when distraction task is interactive and exposure is spread over the course of multiple sessions. From an empirical perspective, based on the current evidence, there are no indications that distraction would predispose to symptom return, challenging models of exposure. From a clinical perspective, the current results could lead to a reexamination of the role played by distraction in exposure therapy for specific phobia.

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Note: References marked with an asterix (*) mark articles included in the meta-analysis. In -text citations to studies selected for meta-analysis are not preceded by asterisks.

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Annex 3

Table A3.1. Mean (*M*) and standard deviation (*SD*) for each time measure in the first session across conditions.

Variable	Schematic imagery (n=22)					Non-schematic imagery (n=22)					Exposure alone (n=22)				
	Pre-exposure	ME 1	ME 2	ME 3	Post-exposure	Pre-exposure	ME 1	ME 2	ME 3	Post-exposure	Pre-exposure	ME 1	ME 2	ME 3	Post-exposure
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*
FSQ															
Emotional and avoidance responses	83.86 (10.30)	-	-	-	75.27 (14.70)	82.59 (8.38)	-	-	-	72.14 (12.84)	86.23 (9.26)	-	-	-	72.41 (16.56)
Anxious anticipation of spiders	17.73 (4.75)	-	-	-	18.14 (5.65)	15.77 (5.44)	-	-	-	15.73 (5.52)	17.14 (4.12)	-	-	-	16.32 (4.65)
SUDs	55.45 (21.04)	49.77 (22.17)	46.14 (23.60)	49.55 (25.77)	44.09 (22.61)	44.32 (22.85)	41.82 (25.71)	41.14 (25.72)	39.68 (27.87)	34.86 (21.13)	53.64 (24.21)	46.59 (20.55)	41.86 (21.05)	41.41 (22.24)	36.18 (21.99)
SCRs	.404 (.210)	.218 (.121)	.240 (.151)	.253 (152)	.230 (.155)	.315 (.141)	.257 (.167)	.258 (.122)	.283 (.121)	.258 (.132)	.347 (.128)	.247 (.142)	.231 (.170)	.219 (.200)	.178 (.121)
HRV: LF/HF ratio[#]	.110 (.386)	.281 (.475)	.203 (.548)	.217 (.465)	.223 (.484)	.036 (.499)	-.079 (.642)	-.098 (385)	-.100 (.406)	-.076 (393)	.168 (.482)	-.098 (.385)	.084 (.533)	.057 (.439)	.041 (.544)
BAT	6.59 (3.98)	-	-	-	8.36 (4.08)	7.50 (3.33)	-	-	-	9.14 (3.33)	7.09 (3.78)	-	-	-	8.82 (3.33)

Note. [#]For this variable, the number of participants in each group used to calculate the statistics were as follows: $n_{schematic\ imagery} = 21$; $n_{non\text{-}schematic\ imagery} = 21$; $n_{exposure\ alone} = 20$. FSQ = Fear of Spiders Questionnaire; SUDs = Subjective Units of Distress; SCRs = skin conductance responses (square root transformed); HRV = heart rate variability; LF/HF ratio = low frequency/ high frequency ratio (logarithmic transformation); BAT = Behavioral Avoidance Test.

Table A3.2. Mean (*M*) and standard deviation (*SD*) for time measures between sessions across conditions.

Variable	Schematic imagery (n=19)		Non-schematic imagery (n=19)		Exposure alone (n=20)	
	Post-exposure	Follow-up	Post-exposure	Follow-up	Post-exposure	Follow-up
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*
FSQ						
Emotional and avoidance responses	73.58 (14.44)	66.21 (20.12)	70.90 (12.82)	72.05 (13.19)	72.95 (17.23)	71.30 (22.01)
Anxious anticipation of spiders	17.32 (5.54)	15.16 (4.88)	16.10 (5.63)	15.50 (5.82)	16.50 (4.83)	15.00 (6.87)
SUDs	42.37 (22.32)	38.42 (24.16)	33.85 (20.39)	45.25 (25.98)	36.05 (22.41)	43.25 (26.22)
SCRs	.214 (.155)	.226 (.142)	.262 (.134)	.230 (.182)	.167 (.109)	.279 (.200)
HRV: LF/HF ratio[#]	.198 (.496)	.016 (.577)	-.073 (.414)	-.207 (.441)	.019 (.549)	.117 (.429)
BAT	9.53 (2.99)	9.84 (3.20)	9.10 (3.49)	9.60 (2.80)	8.90 (3.48)	9.05 (3.62)

Note. Pre-exposure measure was used as a covariate. [#]For this variable, the number of participants in each group used to calculate the statistics were as follows: $n_{\text{schematic imagery}} = 18$; $n_{\text{non-schematic imagery}} = 19$; $n_{\text{exposure alone}} = 19$. FSQ = Fear of Spiders Questionnaire; SUDs = Subjective Units of Distress; SCRs = skin conductance responses (square root transformed); HRV = heart rate variability; LF/HF ratio = low frequency/ high frequency ratio (logarithmic transformation); BAT = Behavioral Avoidance Test.

Annex 4

Appendix 4.A

Table A4.A.1. Mean (M) and standard deviation (SD) from pre-exposure to post-exposure across conditions

Variable	Schematic Negative			Non-schematic Negative			Non-schematic Positive		
	n	Pre-exposure	Post-exposure	n	Pre-exposure	Post-exposure	n	Pre-exposure	Post-exposure
Habituation during exposure trials (SUD)	48	62.542 (21.623)	45.479 (24.843)	46	58.565 (21.807)	41.674 (23.905)	47	60.894 (16.048)	35.894 (21.252)
Generalizability (pre-exposure and post-exposure)									
SUD	48	60.833 (21.888)	43.354 (24.991)	46	62.022 (24.423)	43.217 (25.659)	47	61.851 (19.698)	40.021 (20.286)
SCRs	46	.4689 (.1578)	.2574 (.1651)	46	.4960 (.1768)	.2681 (.1641)	47	.4619 (.1312)	.3125 (.1602)
HR	44	85.016 (12.275)	73.903 (9.479)	45	86.236 (12.967)	74.312 (8.517)	45	85.820 (14.060)	75.016 (11.178)
Reported symptoms									
Emotional and avoidance responses	48	83.333 (12.398)	69.500 (18.004)	46	84.087 (10.758)	73.804 (15.79)	47	84.830 (9.783)	78.447 (13.382)
Anxious anticipation of spiders	48	15.563 (6.212)	15.792 (5.779)	46	15.239 (5.751)	16.609 (5.226)	47	17.043 (4.709)	17.043 (5.767)
Self-efficacy	48	21.451 (13.608)	33.516 (18.864)	46	24.840 (16.433)	32.211 (17.265)	47	25.198 (18.336)	31.039 (19.108)

Note. SUD = subjective units of distress; SCRs = skin conductance responses (square root transformed); HR = heart rate.

Table A4.A.2. Mean (M) and standard deviation (SD) for time measures between sessions across conditions

Variable	Schematic Negative			Non-schematic Negative			Non-schematic Positive		
	n	Pre-exposure	Post-exposure	n	Pre-exposure	Post-exposure	n	Pre-exposure	Post-exposure
Reactivity measures									
SUD	45	43.244 (24.539)	54.667 (22.115)	43	43.674 (26.288)	51.628 (23.061)	43	41.419 (20.408)	48.721 (25.011)
SCRs	43	.2547 (.1705)	.3811 (.1541)	42	.2699 (.1663)	.3611 (.1665)	43	.3093 (.1547)	.362 (.1846)
HR	40	73.563 (8.996)	78.337 (9.510)	42	75.101 (8.023)	78.764 (10.253)	41	75.228 (11.253)	79.072 (12.327)
Reported symptoms									
Emotional and avoidance responses	45	68.800 (18.107)	70.689 (16.802)	43	72.884 (15.885)	74.419 (15.290)	43	78.186 (13.707)	76.209 (15.248)
Anxious anticipation of spiders	45	15.667 (5.889)	14.533 (5.405)	43	16.581 (5.174)	15.047 (6.470)	43	17.256 (5.782)	15.535 (5.492)
Self-efficacy	45	34.365 (19.151)	34.732 (18.495)	43	32.833 (17.698)	33.111 (17.532)	43	29.747 (18.659)	32.679 (17.305)

Note. SUD = subjective units of distress; SCRs = skin conductance responses (square root transformed); HR = heart rate.

Appendix 4.B

Table A4.B.1. Two-way repeated measures analyses of variance with Time as a within-subject factor and Stimuli identification and Condition as between-subjects factors

Variable	Time effect					Time × Stimuli identification					Time × Condition (type of words used in imagery)					Time × Stimuli identification × Condition (type of words used in imagery)				
	df_n	df_d	F	p	η^2	df_n	df_d	F	p	η^2	df_n	df_d	F	p	η^2	df_n	df_d	F	p	η^2
Habituation during exposure trials (SUD; first and last trial)	1	135	163.506	<.001	.548	1	135	.037	.848	<.001	2	135	3.121	.047	.044	2	135	.280	.756	.004
Generalizability (pre-exposure and post-exposure)																				
SUD	1	135	100.072	<.001	.426	1	135	.048	.827	<.001	2	135	.420	.658	.006	2	135	.665	.516	.010
SCRs	1	133	151.551	<.001	.533	1	133	.347	.557	.033	2	133	2.422	.093	.035	2	133	.604	.548	.099
HR	1	128	278.492	<.001	.685	1	128	.285	.594	.002	2	128	.192	.826	.003	2	128	4.388	.014[a]	.064
Reported symptoms (pre-exposure and post-exposure)																				
Emotional and avoidance responses	1	135	70.102	<.001	.342	1	135	.145	.704	.001	2	135	3.169	.045	.045	2	135	.175	.840	.003
Anxious anticipation of spiders	1	135	2.158	.144	.016	1	135	2.090	.151	.015	2	135	1.170	.314	.017	2	135	.850	.430	.012
Self-efficacy (pre-exposure and post-exposure)	1	135	37.840	<.001	.219	1	135	1.126	.291	.008	2	135	1.796	.170	.026	2	135	1.515	.244	.022

Note. SUD = subjective units of distress; SCRs = skin conductance responses (square root transformed); HR = heart rate.

[a]In order to decompose the observed triple Time × Stimuli identification × Condition (type of words used in imagery) interaction for HR, we tested the simple Time × Condition interaction in the constrained and free attentional focus groups separately by using LMATRIX and MMATRIX subcommands of SPSS, as suggested by Howell and Lacroix (2012). The results demonstrated that the Time × Condition interaction was not significant in the free attentional focus groups, $F(2,128) = 1.701$, $p = .187$, $\eta^2 = .026$, while this same interaction was marginally significant in the constrained attentional focus groups, $F(2,128) = 2.943$, $p = .056$, $\eta^2 = .044$. Therefore, we performed specific schematicity and valence contrasts (as described in the Efficacy Analyses section) in the constrained attentional focus groups. The results supported

the valence model but not the schematicity model. Participants in the negative conditions (schematic and non-schematic) did not differ in the decrease in HR from pre- to post-exposure, $F(1,43) = .002$, $p = .964$, $\eta^2 < .001$. In contrast, participants in the positive condition (non-schematic) showed a significantly smaller decrease in HR from pre- to post-exposure than in the negative conditions, $F(1,65) = 6.825$, $p = .011$, $\eta^2 = .095$. Conversely, participants in the non-schematic conditions (positive and negative) displayed dissimilar decreases in HR from pre- to post-exposure (with a smaller decrease for the positive group than for the negative group), $F(1,45) = 4.896$, $p = .032$, $\eta^2 = .098$, which questions the schematicity model.

Table A4.B.2. Two-way repeated measures analyses of variance with Time (post-exposure and follow-up) as a within-subject factor and Stimuli identification and Condition as between-subjects factors

Variable	Time effect					Time × Stimuli identification					Time × Condition (type of words used in imagery)				
	df_n	df_d	F	p	η^2	df_n	df_d	F	p	η^2	df_n	df_d	F	p	η^2
Reactivity measures															
SUD	1	125	22.649	<.001	.153	1	125	1.941	.166	.015	2	125	.426	.654	.007
SCRs	1	122	18.434	<.001	.131	1	122	.119	.731	.001	2	122	.981	.378	.016
HR	1	117	32.601	<.001	.215	1	117	.060	.807	.001	2	117	.267	.766	.005
Reported symptoms															
Emotional and avoidance responses	1	125	.096	.757	<.001	1	125	1.765	.186	.014	2	125	1.413	.247	.022
Anxious anticipation of spiders	1	125	10.857	.001	.080	1	125	.498	.482	.004	2	125	.177	.838	.003
Self-efficacy	1	125	.878	.351	.007	1	125	2.175	.143	.017	2	125	.594	.554	.009

Variable	Time × Stimuli identification × Condition (type of words used in imagery)					Stimuli identification					Condition (type of words used in imagery)				
	df_n	df_d	F	p	η^2	df_n	df_d	F	p	η^2	df_n	df_d	F	p	η^2
Reactivity measures															
SUD	2	125	.583	.560	.009	1	125	.024	.876	<.001	2	125	.434	.649	.007
SCRs	2	122	.143	.867	.002	1	122	.994	.321	.008	2	122	.513	.600	.008
HR	1	117	1.356	.262	.023	1	117	.530	.468	.005	2	117	.205	.815	.003
Reported symptoms															
Emotional and avoidance responses	2	125	3.085	.049[a]	.047	1	125	.003	.953	<.001	2	125	2.802	.065	.043
Anxious anticipation of spiders	2	125	3.176	.045[b]	.048	1	125	2.030	.157	.016	2	125	.760	.470	.012
Self-efficacy	2	125	2.266	.108	.035	2	125	3.387	.068	.026	2	125	.370	.691	.006

Note. SUD = subjective units of distress; SCRs = skin conductance responses (square root transformed); HR = heart rate.

[a]In order to decompose the observed triple Time × Stimuli identification × Condition (type of words used in imagery) interaction for emotional and avoidance responses, we tested the simple Time × Condition interaction in the constrained and free attentional focus groups separately by using LMATRIX and MMATRIX subcommands of SPSS, as suggested by Howell and Lacroix (2012). The results demonstrated that the Time × Condition interaction was significant in the free attentional focus groups, $F(2,125) = 4.152$, $p = .018$, $\eta^2 = .062$, while this same interaction was not significant in the constrained attentional focus groups, $F(2,125) = .190$, $p = .827$, $\eta^2 = .003$. Therefore, we performed specific schematicity and valence contrasts (as described in the Efficacy Analyses section) in the free attentional focus groups. The results

supported the valence model but not the schematicity model. Participants in the negative conditions (schematic and non-schematic) did not differ in the change in emotional and avoidance responses from post-exposure to follow-up, $F(1,43) = .003$, $p = .954$, $\eta^2 < 001$. In contrast, participants in the positive condition (non-schematic) showed a significantly larger change in emotional and avoidance responses from post-exposure to follow-up than they did in the negative conditions, $F(1,62) = 8.814$, $p = .004$, $\eta^2 = .124$. Conversely, participants in the non-schematic conditions (positive and negative) displayed dissimilar changes in emotional and avoidance responses from pre- to post-exposure, $F(1,39) = 5.028$, $p = .031$, $\eta^2 = .114$, which questions the schematicity model. Note that there is no difference at follow-up between the three conditions, $F(2,125) = 1.696$, $p = .188$. [b]In order to decompose the observed triple Time × Stimuli identification × Condition (type of words used in imagery) interaction for emotional and avoidance responses, we tested the simple Time × Condition interaction in the constrained and free attentional focus groups separately by using LMATRIX and MMATRIX subcommands of SPSS, as suggested by Howell and Lacroix (2012). The results demonstrated that the Time × Condition interaction was not significant in the free attentional focus groups, $F(2,125) = 2.335$, $p = .101$, $\eta^2 = .036$, or in the constrained attentional focus groups, $F(2,125) = 1.004$, $p = .369$, $\eta^2 = .016$.

Table A4.B.3. One-way analysis of variance on Behavioural Avoidance Task

	df_n	df_d	F	p	η^2
Stimuli identification	1	125	3.329	.070	.026
Condition (type of words used in imagery)	2	125	5.850	.004	.086
Stimuli identification × Condition (type of words used in imagery)	2	125	.410	.665	

Appendix 4.C. Within-session effects during the second session

A two-way repeated measure ANOVA with Time (first and second trial of exposure) as a within-subject factor and Condition as a between-subjects factor was computed on the SUD reported during exposure trials. The analyses showed a significant effect of Time (with a decrease from the first to the last trial), no significant Time × Condition interaction effect, and a marginal effect of Condition. Schematicity and valence contrasts performed on the SUD measured both during the first and second trial of the second session indicated that both schematicity and valence models were marginally valid. Participants in the negative conditions (schematic and non-schematic) did not differ in the reported SUD, $F(1,86) = 1.322$, $p = .253$, $\eta^2 = .015$. Participants in the positive condition (non-schematic) displayed marginally weaker SUD than did those in the negative conditions (schematic and non-schematic), $F(1,128) = 3.599$, $p = .060$, $\eta^2 = .027$. Reciprocally, participants in the non-schematic conditions (positive and negative) did not differ in the reported SUD, $F(1,84) = 1.127$, $p = .292$, $\eta^2 = .013$. Participants in the non-schematic conditions (positive and negative) displayed marginally weaker SUD than did those in the schematic condition (negative), $F(1,128) = 3.811$, $p = .053$, $\eta^2 = .029$.

Two-way repeated measure ANOVAs with Time (follow-up and post-reexposure) as a within-subject factor and Condition as a between-subjects factor were computed on the outcome variables. The results are presented in Table A4.C. The analyses of the variables measured in response to novel sets of pictures, namely SUD, SCRs and HR, showed significant Time effects but no significant Time × Condition interactions or Condition effects. Similarly, the analyses of emotional and avoidance responses showed a significant Time effect but no significant Time × Condition interactions or Condition effects. Each of these variables decreased from post-exposure to follow-up regardless of conditions. No significant effect was observed for the anxious anticipation of spiders and self-efficacy.

Table A4.C. Two-way repeated measures analyses of variance with Time as a within-subject factor and Condition as a between-subjects factor

Variable	Time effect					Time × Condition effect					Condition effect				
	df_n	df_d	F	p	η^2	df_n	df_d	F	p	η^2	df_n	df_d	F	p	η^2
Habituation during exposure trials (SUD; first and second trial)	1	128	58.251	<.001	.313	2	128	.208	.812	.003	2	128	2.480	.088	.037
Reactivity measures (follow-up and post-reexposure)															
SUD	1	128	19.550	<.001	.132	2	128	.291	.748	.005	2	128	1.247	.291	.019
SCRs	1	127	10.948	.001	.079	2	127	.192	.825	.003	2	127	.423	.656	.007
HR	1	124	33.010	<.001	.210	2	124	.172	.842	.003	2	124	.107	.899	.002
Reported symptoms (follow-up and post-reexposure)															
Emotional and avoidance responses	1	128	27.440	<.001	.177	2	128	.321	.726	.005	2	128	1.229	.296	.019
Anxious anticipation of spiders	1	128	.709	.401	.006	2	128	.108	.898	.002	2	128	.374	.374	.688
Self-efficacy (follow-up and post-reexposure)	1	128	14.423	<.001	.101	2	128	1.180	.311	.018	2	128	1.180	.311	.018

Note. SUD = subjective units of distress; SCRs = skin conductance responses (square root transformed); HR = heart rate.

Annex 5

Appendix 5.A. Concerns about exposure

Merci d'indiquer votre degré d'accord avec chacune des affirmations suivantes

1	2	3	4	5	6
Tout à fait en désaccord	Moyennement en désaccord	Légèrement en désaccord	Légèrement d'accord	Moyennement d'accord	Tout à fait d'accord

« Lorsque je propose de l'exposition à un patient…

1…j'ai l'impression de manquer d'empathie	**1**	**2**	**3**	**4**	**5**	**6**
2…je crains d'être perçu comme un thérapeute froid/distant	**1**	**2**	**3**	**4**	**5**	**6**
3…je crains que cela ne nuise à la relation thérapeutique	**1**	**2**	**3**	**4**	**5**	**6**
4…j'ai peur d'un abandon du patient	**1**	**2**	**3**	**4**	**5**	**6**
5…je me sens en difficulté par rapport à la détresse de patients	**1**	**2**	**3**	**4**	**5**	**6**
6…j'ai peur de confronter les patients à une détresse trop importante	**1**	**2**	**3**	**4**	**5**	**6**
7…je crains que l'exposition mène à une substitution de symptômes	**1**	**2**	**3**	**4**	**5**	**6**
8…j'ai peur d'un risque de retraumatisation	**1**	**2**	**3**	**4**	**5**	**6**
9…j'ai peur que le patient perde conscience	**1**	**2**	**3**	**4**	**5**	**6**
10…j'ai peur que le patient décompense	**1**	**2**	**3**	**4**	**5**	**6**
11…j'ai peur d'une détérioration des symptômes	**1**	**2**	**3**	**4**	**5**	**6**

Appendix 5.B. Modified Practices Attitudes Scale (MPAS)

(Chorpita, Weisz, Higa, et al., unpublished measure, 2004)

Les questions suivantes concernent votre disposition à utiliser de nouveaux types de thérapie ou traitements. Les termes de « Traitement basé sur les preuves » se réfèrent à toute intervention qui possède des guidelines spécifiques et/ou des composants qui viennent d'un manuel et/ou qui suivent une structure prédéterminée.

0	1	2	3	4
Pas du tout	*Dans une faible mesure*	*Dans une mesure modérée*	*Dans une grande mesure*	*Dans une très grande mesure*

1. Je suis disposé à utiliser de nouveaux traitements s'il y a des preuves de leur efficacité	0	1	2	3	4
2. Les traitements basés sur les preuves ne me permettent pas d'adapter la thérapie aux besoins particuliers de chaque patient (R)	0	1	2	3	4
3. L'expérience clinique et le jugement sont plus importants que le fait de se baser sur les traitements empiriquement validés (R)	0	1	2	3	4
4. J'aime utiliser les traitements basés sur les preuves à cause de la structure qu'ils fournissent	0	1	2	3	4
5. Un problème des traitements basés sur les preuves est qu'on doit apprendre un programme différent pour chaque diagnostic ou type de problème. (R)	0	1	2	3	4
6. Les traitements basés sur les preuves permettent aux cliniciens de répondre à d'importants événements quand ils surviennent en cours de thérapie	0	1	2	3	4
7. Je n'aime pas les traitements basés sur les preuves parce qu'ils sont trop rigides (R)	0	1	2	3	4
8. Les traitements basés sur les preuves ne sont pas conçus pour prendre en charge des patients avec plus qu'un diagnostic ou d'autres défis qui sont fréquents en thérapie dans le monde réel (R)	0	1	2	3	4

Annex 5.C. Indices of multicollinearity

Tolerance scores	Support toward the procedure	Ignorance of literature recommendations	Concerns about exposure	Positive appraisal of exposure	Confidence in exposure abilities	Past difficulties with exposure	Positive attitude towards EBP	Empathic concern	Years of practice
Graduality	.860	.820	.699	.502	.492	.831	.810	.888	.852
Variability	.888	.824	.712	.501	.488	.873	.775	.897	.856
Expectancy salience	.608	.642	.737	.494	.489	.855	.801	.896	.858
Acceptance	.821	.795	.738	.509	.497	.873	.821	.892	.853
Distress relief	.846	.867	.732	.473	.496	.836	.758	.934	.845
Removal of safety signals	.787	.793	.722	.510	.498	.885	.817	.933	.854
Stimulus Attention									
I make sure that what triggers distress and discomfort is salient for the patient (consciously perceived and identified as such) during exposure	.462	.473	.721	.507	.479	.883	.823	.910	.856
I ask the patient to distract from what frightens him/her during exposure[r]	.675	.703	.681	.506	.489	.867	.820	.832	.814
Cognitive restructuring									
I realize cognitive restructuring before exposure	.920	.909	.735	.501	.499	.869	.806	.906	.813
Relaxation									
I make sure that the patient uses relaxation techniques during exposure	.933	.921	.710	.506	.500	.882	.810	.892	.814

Variance Inflation Factor	Support toward the procedure	Ignorance of literature recommendations	Concerns about exposure	Positive appraisal of exposure	Confidence in exposure abilities	Past difficulties with exposure	Positive attitude towards EBP	Empathic concern	Years of practice
Graduality	1.163	1.219	1.431	1.992	2.034	1.204	1.234	1.126	1.174
Variability	1.126	1.214	1.404	1.997	2.049	1.145	1.291	1.115	1.169
Expectancy salience	1.646	1.557	1.357	2.023	2.045	1.170	1.249	1.116	1.165
Acceptance	1.219	1.258	1.355	1.963	2.011	1.145	1.218	1.121	1.172
Distress relief	1.183	1.154	1.367	2.114	2.015	1.197	1.318	1.070	1.184
Removal of safety signals	1.271	1.261	1.384	1.961	2.009	1.130	1.223	1.072	1.172
Stimulus Attention									
I make sure that what triggers distress and discomfort is salient for the patient (consciously perceived and identified as such) during exposure	2.165	2.116	1.387	1.974	2.090	1.132	1.215	1.099	1.168
I ask the patient to distract from what frightens him/her during exposure[r]	1.480	1.422	1.469	1.975	2.045	1.154	1.220	1.202	1.228
Cognitive restructuring									
I realize cognitive restructuring before exposure	1.087	1.101	1.360	1.996	2.006	1.150	1.240	1.104	1.230
Relaxation									
I make sure that the patient uses relaxation techniques during exposure	1.072	1.086	1.409	1.975	1.998	1.134	1.234	1.121	1.229