The Role of Simulation in Imagery Rescripting for Posttraumatic Stress

Disorder: A Single Case Series

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June, 2016

Research submitted in partial fulfilment of the requirements for the degree of Doctor in

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Acknowledgements

Abstract

Little is known about the mechanisms for change involved in Imagery Rescripting (ImRs), an image-based therapy technique used to target intrusive imagery in post-traumatic stress disorder (PTSD) by imaging alternative endings to traumatic events (Arntz, 2012). The aim of this study was to explore the role of simulation as a mechanism for change in ImRs through the use of a single-case experimental design (SCED) and coding. Both ImRs and simulation involve the mental construction of a hypothetical event that has not actually happened. Seven individual cases were followed for the duration of rescripting of one image. It was hypothesised that those with well-simulated rescripts would experience greater reductions in image intrusiveness than those with less well-simulated rescripts. Effective ImRs was also hypothesised to link with greater reductions in counterfactual thinking (and associated frequency/distress) and an increase in global meaning, with high levels of simulation expected to play a role in both of these links. Sessions were also coded for other potential mechanisms such as activation of thoughts/emotions and level of belief in the rescript. Coding results from session recordings and patterns of outcome measures from the seven cases were explored at group and individual levels. Due to the small sample size and the observational nature of much of the analyses, results were tentative in nature. However, group and individual analyses offered initial support for the idea that higher levels of simulation were followed by greater reductions in symptoms. Additional factors, especially intensity of thoughts/emotions related to original and new imagery elements, level of cognitive and emotional shift and belief in the resultant rescript, were also identified. Potential mechanisms of action between these factors are discussed. Offering initial support for the second hypothesis, participants who

experienced the greatest change in symptom severity also experienced the greatest changes in counterfactual thinking, and very tentative support suggests that this was linked to simulation levels. No support was found for the third hypothesis, as symptom severity reduction was not linked to increases in global meaning. Potential implications of these findings and suggestions for future research are discussed.

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Post-traumatic stress disorder (PTSD) arises from exposure to severe, life-threatening events and involves attempts to emotionally process both what has happened and the various ways in which the trauma might have been avoided or turned out differently (Ehlers & Clark, 2000). Recovery is also concerned with re-establishing a sense of personal meaning (Horowitz, 1986). Imagery Rescripting (ImRs), a treatment approach that involves imagining alternative endings to traumatic events, has received much attention over the past few decades. There is a growing body of evidence suggesting that ImRs is effective in reducing PTSD symptomology (e.g., Arntz, Tiesema & Kindt, 2007; Ehlers, Clark, Hackmann, McManus & Fennell, 2005; Grunert, Weis, Smucker & Christianson, 2007).

However, due to its complex nature, there is little systematic research into the underlying mechanisms of ImRs (Arntz, 2012). One recent study developed a coding scheme in order to start making sense of the myriad of factors that might be related to change in ImRs (Salter, 2014). While this study represents an important step within ImRs literature, the coding scheme failed to capture (1) the detailed imaginal nature of scenarios constructed in ImRs, and (2) that these involve counterfactual events that have not actually occurred. The simulation heuristic (SH), which stipulates that the properties of imagined scenarios that lend them believability relate to the ease with which a mental model of a hypothetical situation can be created (Kahneman & Tversky, 1982; Tversky & Kahneman, 1973), encompasses both of these key aspects. The SH has not yet been considered as a mechanism for change in ImRs.

The idea that ImRs efficacy may rely in part on its level of simulation leads to the consideration of two further factors: counterfactual thinking and global meaning.

Heightened counterfactual thinking (Davis et al., 1995), a reduction in one's sense of global meaning (Park, 2010) and the associated distress have been implicated in PTSD. Similar to ImRs, both of these phenomena involve the mental construction of a coherent narrative, either about what could have happened or about one's sense of self and the world.

The aim of this study was to explore (1) the mechanisms through which ImRs produces change for people with PTSD, (2) whether the tendency to continuously generate distressing counterfactuals about potential alternative outcomes is in some way interrupted and reduced by the ImRs process and (3) whether effective ImRs relates to an increase in one's sense of personal meaning. The study had a particular focus on simulation and how it may provide a common thread throughout these potential changes.

PTSD and Intrusive Images

PTSD is triggered by exposure to actual or threatened death, serious injury or sexual violation. Symptoms include re-experiencing, avoidance, negative cognitions, low mood and hyper-arousal (American Psychiatric Association, 2013). Re-experiencing involves spontaneous memories, dreams, flashbacks and prolonged psychological distress. Avoidance of distressing thoughts, feelings, memories and external reminders of the traumatic event are common. People also often experience a distorted sense of blame of self/others and an inability to remember key aspects of the event.

'Flashbacks', often considered the hallmark of PTSD, are recurrent sensory images of past trauma (Brewin & Holmes, 2003; Ehlers & Clark, 2000). They include sounds,

smells, tastes and/or bodily sensations (Hackmann, Ehlers, Speckens & Clark, 2004), although visual imagery tends to be the most common. Flashbacks can recur against a person's will, with intense emotion and a sense that they are happening in the here-and-now. They often consist of patients' subjective worst trauma moments ('hot spots') (Holmes, Grey & Young, 2005). Intrusion triggers are not always in conscious awareness and can consist of reminders in the external or internal psychological environment (Hirsch & Holmes, 2007). Due to the aversive nature of intrusive images and resultant negative emotions and physiological arousal, triggers are typically avoided. Given the range of potential triggers, and the fact that people cannot always identify triggers, the level of avoidance is often extensive, with a severe impact on daily functioning.

Summary. Intrusions have a significant impact on daily life. In addition to the distress associated with the inherent uncontrollable and 'here-and-now' nature of intrusions, they also drive hyperarousal and avoidance of triggers in PTSD. Due to their far-reaching effects, reducing intrusions is a key target for treatment. Thus, an understanding of how they are developed and maintained is important. In turn, this can shed light on appropriate treatment options as well how best to carry out these treatment techniques in clinical practice.

Development and Maintenance of Intrusive Imagery

Various models of development and maintenance of PTSD exist. The three main theories are outlined below. They are presented in chronological order. Each theory builds, to an extent, on that which came before. Thus, while there are differences in the rationale that each presents, there are also commonalities throughout.

Emotional Processing Theory. Foa and colleagues (Foa, Steketee & Rothbaum, 1989; Foa & Rothbaum, 1998) developed the 'Emotional Processing Theory' suggesting that traumatic events violate one's basic concept of safety and are represented in memory in a way which differs from other experiences. They are represented by a fear network that consists of interconnections of different 'nodes' including event stimulus information (e.g., sights, sounds), information about one's emotional and physiological response, and information about the event meaning.

Node interconnections are very strong and over-inclusive such that encountering a stimulus represented in one node (e.g., visual reminder of the traumatic event) will activate the entire fear network, which is accompanied by intense hyperarousal. Thus, people try to avoid potential triggers, preventing adequate processing of trauma material and network modification. When network-activation occurs, people engage in behaviours designed to keep themselves safe, further preventing the network from being updated.

The Emotional Processing Theory also highlights the importance of pre-trauma knowledge about the self, others and the world, suggesting that those with more rigid pre-trauma views (either positive or negative) will be particularly susceptible to PTSD. This is because the experienced trauma will either completely contradict rigid positive beliefs or further reinforce rigid negative beliefs. Negative appraisals of responses and behaviours during and after the trauma are also thought to play a role in PTSD maintenance (Brewin & Holmes, 2003).

Dual-Representation Theory. Brewin and colleagues (Brewin, Dalgleish & Joseph, 1996; Brewin, Gregory, Lipton & Burgess, 2010) put forward a 'Dual-Representation Theory' of PTSD, based on the idea of two memory systems that operate in parallel. In an early version of this theory (Brewin et al., 1996), a distinction was made between the Verbally Accessible Memory (VAM) system, which contains memory representations that are embedded in their context in time and under conscious control, and the Situationally Accessible Memory (SAM) system, which contains lower-level representations that are tightly bound to their basic sensory and affective qualities.

In a later revision of this theory, these memory systems were re-named and the underlying processes further elaborated. According to these revisions, contextual memory (C-memory) contains contextually-bound representations (C-reps) of episodic events that become integrated into personal, semantic memory over time. C-reps can be recalled at will and used to consider the memory from different viewpoints, and to generate meaningful interpretations of an event as well as an abstracted 'gist' sense of the event.

During encoding, a second, low-level sensation-based (e.g., sights/sounds that may receive little conscious attention) memory system (S-memory) is also temporarily activated. These sensation-based representations (S-reps) are driven by perception and contribute to the initial formation of their corresponding C-rep before decaying and becoming relatively inaccessible. Communication between these two systems allows (1) events to be appropriately integrated within their autobiographical context (thus

preventing the memory being re-experienced in the present) and (2) increased top-down control via the C-rep such that memories may be deliberately recalled or suppressed.

During a traumatic event, high levels of arousal have a deleterious effect on the C-memory system and one's attention is largely directed towards the source of threat, such that very little information is processed in enough detail to enable encoding in the C-memory system (Brewin et al., 2010). This results in a weak, impoverished C-rep and a relatively strong and enduring S-rep, consisting largely of perceptual details.

Furthermore, none of the usual connections between the two representations are formed. S-reps can be triggered involuntarily in a bottom-up fashion by situational reminders of the event. Uninfluenced by their corresponding C-rep, S-reps lack temporal contextualisation and association with autobiographical knowledge, giving them their here-and-now nature. Behavioural and cognitive avoidance of flashback triggers further prevents the formation of links between C-reps and S-reps and maintains the weak and incomplete nature of the C-rep.

Cognitive Model. A third, cognitive model (Ehlers & Clark, 2000) suggests that pathological trauma responses arise when people process trauma-related information in a way that produces a sense of current threat. A number of processes are thought to contribute to this sense of current threat, but two major mechanisms are suggested. Firstly, negative appraisals of the trauma and aftermath (e.g., overgeneralising from the event to perceive many normal activities as dangerous), as well as associated safety behaviours, are thought to play a role. Secondly, the nature of the trauma memory itself is thought to be important.

Ehlers and Clark (2000) suggest an 'autobiographical memory base' that is organised by themes and personal time periods. The way in which most memories are stored in this base enhances a higher-order, meaning-based and intentional retrieval route. Trauma memories are poorly elaborated in the autobiographical memory base and are inaccessible via the intentional retrieval route. Rather, they are accessed via a second route which involves direct, involuntary triggering of memories by stimuli associated with the traumatic event. This retrieval route is involuntary and the memories are inadequately integrated into their context in time. This explains the uncontrollable and 'here-and-now' sense of flashbacks that gives them their sense of current threat.

The cognitive model also draws on learning theory, suggesting that stimulus-stimulus and stimulus-response associations are particularly strong for traumatic material. Thus, cues present at the time of the trauma come to act as predictors of imminent danger in everyday life, regardless of actual presence of threat. Such mechanisms are intended to help organisms predict future danger but, in PTSD, can lead to a sense of current threat and retrieval from associative memory that is cue-driven and unintentional.

Treatment implications. All three theories have similar implications for treatment, namely, to experience some form of exposure to the trauma memory. Thus, 're-living' became the treatment of choice. While variations exist, re-living tends to involve imaginal exposure (IE) to the traumatic event by closing one's eyes and reliving the trauma, in the mind's eye as vividly and realistically as possible, including all thoughts, feelings and sensations (Ehlers & Clark, 2000; Foa & Rothbaum, 1998). More time can be spent on hot spots. Problematic thoughts/beliefs associated with key

moments are often subjected to cognitive restructuring techniques, with the alternative perspectives then being incorporated into re-living (Ehlers & Clark, 2000).

However, the underlying proposed mechanisms for change differ from theory to theory. Proposed mechanisms include activating the fear network in the presence of corrective information in order to decrease the association of fear with other elements of the trauma memory (Foa & Rothbaum, 1998), and elaborating and integrating the trauma memory in context and time to create a coherent account of the trauma (Brewin et al., 1996; Ehlers & Clark, 2000), either to create a new competing representation to block the original memory representation (Brewin & Holmes., 2003), or to update and elaborate the original memory (Ehlers & Clark, 2000).

Thus, one of the key differences between theories is whether treatment involves altering or elaborating the original memory representation in some way (Emotional Processing and Cognitive Models), or whether it involves the creation of a new representation that is somehow preferentially retrieved over the original (Dual-Representation Theory). All theories suggest that treatment should aim to reduce avoidance in order to learn that trauma memories and associated cues are not dangerous in spite of the symptoms that they elicit.

Emergence of ImRs

While the efficacy of IE is well documented (Powers, Halpern, Ferenschak, Gillihan & Foa, 2010; Seidler & Wagner, 2006), it is not effective in all cases, for example, when clients experience emotions such as shame and guilt, or experience dissociation (Grunert et al., 2007; Jaycox & Foa, 1996). As a result, an alternative technique, ImRs,

has seen an increase in popularity. Broadly speaking, ImRs is a technique designed to target intrusive images (Smucker, 2004) that involves imagining an image as vividly as possible, in the here-and-now, and imagining that the sequence of events is changed in a way desired by the client (Arntz, 2012). There is considerable variation in how this is carried out.

Some approaches offer manualised, structured approaches (e.g., Arntz & Weertman, 1999; Wild & Clark, 2011) and start by reliving the memory in full before going back and making changes. However, Arntz (2011) found that some could not tolerate full exposure and thus started to introduce change earlier on in the memory. Some involve going back to the time of the trauma as the current adult self (e.g., in cases of child abuse) and offering support/assistance (Arntz & Weertman, 1999). Other approaches reduce the sense of threat in the image (e.g., by reducing the size of the perpetrator or moving them further away), involve conversations with dead people or bring in other people and creatures (real or imaginary) to support them in their time of need (Hackmann, 2011). Rescripts vary in the amount of time they take and in the amount of therapist input.

Efficacy. An emerging body of research shows promising results for ImRs as an effective treatment for intrusive images across a range of disorders. In PTSD, ImRs has been linked to symptom reduction and greater reduction in anger, shame, guilt and dropout rates compared to exposure (Arntz et al., 2007; Grunert et al., 2007; Kindt, Buck Arntz, & Soeter, 2007). In social phobia, ImRs is associated with reductions in negative social beliefs, vividness and distress of the intrusion and associated early memories (Wild, Hackmann & Clark, 2007, 2008). For people who experienced

intrusive images as part of depression, ImRs was linked to a decrease in distress caused by intrusions (Wheatley, et al., 2007).

How does ImRs Work?

While there is a growing body of evidence for ImRs efficacy, there is very little research on the *mechanisms* through which ImRs exerts change (Arntz, 2012) and on what constitutes a 'good' rescripting session (i.e., what are the necessary components needed for effective rescripting?). ImRs lacks a comprehensive underlying theoretical framework.

This is particularly important given (a) the variation in ImRs approaches and (b) that the theories described above suggest that symptom reduction requires repeated exposure to the original memory. How, then, can an alternative, imaginary ending reduce symptoms? There has been much debate as to how ImRs may be understood in relation to existing PTSD theories. While there is no established, comprehensive theory of ImRs, a number of potential mechanisms for change have been suggested in the absence of an overarching framework. Research is also hindered due to the fact that ImRs is rarely carried out in the absence of initial exposure work, making it difficult to isolate and evaluate treatment components.

Thus, there are two main questions to consider: (1) *what* factors are necessary during therapy for ImRs to produce clinical change and (2) *how* is it that these factors bring about this change in the underlying memory structures. Both of these questions, starting with the latter, will now be discussed with reference to the existing literature.

ImRs and its impact on underlying memory representations. There are two competing theories as to how ImRs produces change in underlying memory representation.

Retrieval competition. Expanding on the Dual-Representation Theory, Brewin and colleagues (2006, 2010) developed the Retrieval Competition hypothesis. They suggest that ImRs creates a competing, less toxic representation of the traumatic event. During rescripting, the existing C-rep is retrieved and held in mind while the client reports on the content of the associated S-rep thereby allowing material from the S-rep to be fully contextualised within the new C-rep. This new and more elaborated C-rep, blends the original negative material with new positive elements. Thus, a new representation is created that shares sensory features with the original image but that also combines these features with new positive thoughts, emotions and sensations.

If ImRs is successful, this new C-rep will be more accessible than the original in response to retrieval cues and will be preferentially retrieved, inhibiting the old image (Brewin et al., 2009). Thus, two competing C-reps exist. Brewin argued that retrieval of the rescripted image is assisted by retrieval practice, memorability of the new representation and general positivity bias (Brewin, 2006).

Change in image meaning. Others have argued that ImRs produces change in the underlying meaning or 'encapsulated belief' of the existing intrusive image (e.g., Hackmann, 2011; Wild & Clark, 2011). They argue that intrusions carry a similar underlying negative meaning to the original trauma memory. ImRs may challenge this encapsulated belief, creating an image that encapsulates a more realistic and/or less

toxic appraisal of the significance of the original event. Some research indicates that, when trauma memories are reactivated in imagination, they go into a labile state and can then be altered in various ways (e.g., Dudai, 2006). Rather than replacing or inhibiting the original representation with a new one, ImRs may prompt meaning change while the image is in this malleable state.

Re-evaluation of the US. Some (Arntz, 2015; Arntz & Weertman, 2011) have used learning theory principles to explain how this change in meaning might take place. They argue that a re-evaluation of the unconditioned stimulus (US), rather than a process of habituation or extinction, takes place. Thus, new, helpful information is fed into the memory representation of the US (i.e., the trauma itself), thereby reducing the dysfunctional meaning of the memory. Subsequently, when triggers are encountered, it is the changed memory representation that is recalled and, due to the change in meaning, this no longer leads to dysfunctional responses. This occurs independent of context. Thus, the fear memory has been reconsolidated with a different meaning, no longer giving rise to a fear response (Arntz, 2011; Arntz & Weertman, 1999).

This could be considered partially in-line with the Emotional Processing Theory (Foa et al., 1989, 1998), which suggests that activating the fear network in the presence of new information serves to decrease the association of fear with other elements of the trauma memory. ImRs may serve to alter the fear network through changes to the 'meaning' node. However, the Emotional Processing Theory does suggest that change occurs through habituation, rather than US re-evaluation.

Shift in processing style. Similar to US re-evaluation, Kindt et al. (2007) also argue for a re-conceptualisation of the idea that extensive exposure to perceptual elements of the trauma memory in IE and ImRs promotes fear activation and habituation (e.g., Foa & Kozak, 1986). They suggest that the meaning of a memory is transformed (i.e., a shift in conceptual processing takes place) due to prolonged focus on sensory, perceptual details of the trauma memory during treatment. Thus, rather than habituating to various cues, perceptual processing during treatment may lead to a more realistic database such that functional conceptual processing may follow.

Results showed that, while effects of perceptual processing during treatment on outcome levels were subsumed by the beneficial effects of conceptual processing after treatment, the two processing styles were correlated. Kindt et al. (2007) suggest that perceptual processing may promote a transfer to subsequent increases in conceptual processing which has beneficial effects on outcome. Thus, perceptual processing during treatment may allow for, and promote, a subsequent shift in meaning (conceptual processing). While this work is promising in terms of uncovering mechanisms and processes at work during treatment, both IE and ImRs were used, making it difficult to disentangle exactly which treatment components were responsible for the identified processes.

ImRs factors necessary to produce clinical change. This section summarises the multitude of factors that may be necessary to the therapeutic process in order to produce clinical change. Whether these factors are thought to contribute to a new, competing memory, or a change in the meaning of the original is often unspecified/unclear in the literature. This is highlighted in the following subsections.

Vividness. Vividness, a complex concept, describes the luminosity and clarity of an image, and the extent to which one's experience of an image is in line with the actual perceptual experience (Pearson, Deeprose, Wallace-Hadrill, Heyes & Holmes, 2011). Trauma memories have been found to be more vivid in those with PTSD, relative to those without (Bernsten, Willert & Rubin, 2004), and there is some evidence that IE (Hackmann et al., 2004) and ImRs (Wild et al., 2007) decreases the vividness of intrusions. However, some work also suggests that self-reported vividness has poor test-retest reliability (Wild et a., 2008). Within ImRs literature, it may also be unclear to participants whether they are rating the vividness of the original image, the rescript or a combination.

Other than the work of Salter (2014), discussed later, there is no work directly assessing the role of vividness within the rescripting process itself. However, findings from the general vividness literature provide a compelling rationale for the idea that creating a highly vivid, less distressing, alternative image during ImRs may make it easier to access it and bring it to mind. Evidence suggests that, the more vivid an image is, the more likely it is to be recalled (regardless of image accuracy), and the more an image is brought to mind, the easier image access becomes (Tversky & Kahneman, 1973).

Thus, in line with the Retrieval Competition Hypothesis, it has been suggested that increasing image vividness may be one way of enhancing accessibility of the new image such that it is preferentially retrieved over the original image. However, it could also be argued that a highly vivid rescript may enhance the process of meaning change or the belief in the new meaning associated with the original image.

Change in cognitions/beliefs and emotions. Long and Quevillon (2009) argue that, if negative imagery triggers negative thoughts, positive imagery may facilitate positive cognitions, suggesting that ImRs creates a shift in negative appraisals regarding the original event/intrusions. Rusch, Grunert, Mendelsohn and Smucker (2000) linked ImRs to reduced feelings of helplessness and more attributions of self-efficacy. Wheatley and Hackmann (2011) suggest that, in order to be effective, rescripting must have a link to the key cognitions associated with the original event. It has also been suggested that ImRs may lead to spontaneous cognitive restructuring, for example, re-appraisal of the behaviour of self or others based on availability of a wider range of information, or the realisation that avoidance is not as important as originally assumed (Hackmann, 2011).

In the context of traumatic stimuli, emotional memory tends to be imagery-based in nature (Arntz, de Groot & Kindt 2005). Conversely, mental imagery is more emotional than verbal processing of the same material (Holmes & Matthews, 2005). Thus, Holmes, Arntz and Smucker (2007) suggest a bi-directional relationship whereby emotional memory is perceptual and perceptual imagery is emotional. Thus, it is possible that ImRs brings about change through the creation of accessible, emotionally relevant images, thereby reducing emotional avoidance and facilitating contextualisation. ImRs also often introduces new emotions into images. People often choose to rescript images in positive and even humorous ways, perhaps making it safer to approach aspects of the original memory, thus enhancing processing (Salter, 2014).

While emotional and cognitive change is likely to be important for effective ImRs, whether this process allows new emotions/cognitions into the fear network (e.g., Foa et

al., 1989), weakens learned associations between the stimulus and conditioned response (e.g., Ehlers & Clarke, 2000), changes the emotional/cognitive meaning of the US (e.g., Arntz, 2015) or enhances recall of the new image due to positivity bias (e.g., Brewin, 2006) is unclear.

Mastery and compassion. Many have argued that it is specifically through the promotion of mastery and/or compassion that ImRs exerts therapeutic change. Mastery-imagery, which involves the client taking control of the traumatic situation in some way, may reduce feelings of helplessness and increase ability to take more active control over one's present life (Wheatley et al., 2007). Compassionate-imagery, which involves visualising a figure that nurtures or soothes clients during the distressing event, may decrease negative appraisals (e.g., self-blame, shame) (Wheatley et al., 2007).

Thus, mastery- and/or compassion-imagery may be a mechanism through which ImRs produces strong cognitive and emotional change. Again, it is difficult to know whether such changes serve to change the meaning of the original image or to enhance the recall of a competing image.

Summary. A range of isolated, potential mechanisms for change in ImRs and their hypothetical impact on underlying memory structures have been suggested. However, there is little concrete research within this area. One recent study has tried to explore how these factors may relate to outcome. Tentative findings from Salter (2014) suggest that activation of thoughts, feelings and emotions was important for change in rescripting. However, if processes associated with original imagery elements were too strong, people were less likely to experience symptom change. A similar pattern for

vividness was found in that, while creation of highly vivid new imagery was effective, overly vivid original imagery made it difficult for people to remain engaged with the ImRs process, leading to poorer outcomes. The extent to which people found the rescript believable also seemed to link to the amount of cognitive and emotional change experienced which, in turn, linked to outcome.

While this study represents a promising first step, there were a number of methodological issues, and findings remain extremely tentative. In the following section, an alternative mechanism, which helps draw together a number of the ideas presented so far, is suggested. The specific ways in which this may produce therapeutic change is also explored.

The Simulation Heuristic

Another avenue for exploration, the simulation heuristic (SH), extends some of the mechanisms (e.g., vividness and accessibility) discussed above. While not a new concept, the SH has not yet been considered within the ImRs framework. The SH describes the process of constructing a mental model of reality in which a hypothetical event takes place (Kahneman & Tversky, 1982; Tversky & Kahneman, 1973) and encapsulates factors such as logical/temporal sequencing, level of detail and ease of imagining. Ease of construction of the mental scenario determines one's subjective probability judgement for the event.

Coding schemes for 'goodness of simulation' (GOS; how well one can simulate a hypothetical event in imagination) have been developed and used to explore underlying mechanisms in various disorders. GOS was associated with higher subjective

probability ratings for hypothetical, negative events as well as increased access to these simulations in anxious patients (Raune, MacLeod & Holmes, 2005). Less coherent simulations for hypothetical *positive* events have also been associated with lower subjective probabilities and higher levels of worry (Brown, MacLeod, Tata & Goddard, 2002). Patients with obsessive-compulsive disorder (OCD) showed higher GOS ratings when simulating a scenario relevant to their core OCD fear than for other OCD and non-OCD fears (Keen, Brown & Wheatley, 2008).

While the SH has not been applied within PTSD treatment literature, some have considered the disorder itself from a simulation perspective. It has been suggested that PTSD, and anxiety disorders in general, may represent extremes on a continuum of the human ability to mentally simulate past and potential future events (Miloyan, Bulley & Suddendorf, 2015). Episodic foresight (the ability to simulate hypothetical future events) and the fact that people experience the event-related emotions in the present, allows humans to guide behaviour in a manner that both reduces possible future threats to fitness and/or reduce the impact of these events if they do occur. PTSD has been associated with a tendency to generate highly generalised simulations of past and future events (Brown et al., 2013), leading some to suggest that it is an extreme manifestation of this biological response that puts people in an extended state of preparedness for subsequent catastrophe (Cantor, 2009).

This is at odds with the general belief that trauma memories in people with PTSD are inherently incoherent and fragmented. However, a recent study found no significant differences in coherence of trauma memories relative to non-trauma memories in those with PTSD. Nor did they find differences in coherence of a range of memory types in

those with PTSD relative to those without PTSD (Rubin et al., 2016). This evidence is particularly compelling as coherence was measured via three methods: subjective participant ratings, objectively by blind raters and through a computer program.

Thus, the SH seems like an intuitively useful framework in which to consider how ImRs might work. Both ImRs and the SH are based on the mental construction of an imaginary event that did not or could not happen. Perhaps, the better the simulation involved in the rescript, the more accessible or memorable it is. According to Tversky and Kahneman (1973, 1982), ease of simulation also predicts subjective probability ratings. While ImRs obviously involves past events, perhaps well-simulated rescripts increase some sort of felt sense that it is realistic, which then might have an impact on emotional and cognitive change and ease of retrieval.

Thus, the SH is a framework that may serve to link together some of the mechanisms already discussed in previous sections. Level of detail and vividness, for example, is encompassed within the SH coding framework. Because vividness promotes recall and, subsequently, access to an image (Tversky & Khaneman, 1973), a well-simulated rescript may be more likely to inhibit the old image, in accordance with Brewin's (2006) Retrieval Competition hypothesis. Indeed, Raune et al., (2005) found that anxious patients had increased access to their simulations for negative events relative to control participants. Alternatively, high levels of simulation may promote a shift in conceptual meaning that leads to meaning change in the original image.

Furthermore, Taylor and Schneider (1989) suggest that simulation allows people to interpret past events and alter their emotional states. Perhaps a rescript with greater

coherence makes it easier for people to connect with new appraisals or emotional content included within the rescript. A well-simulated rescript that 'feels' realistic may also enhance one's connection with the sense of mastery/compassion and new meanings incorporated within a rescript. Of course, there is currently a lack of evidence to back up any of these hypotheses.

Summary. GOS may represent a mechanism for change in ImRs and may provide a conceptual framework in which to consider how ImRs produces symptom change more generally. A focus on coherence of simulation leads to the consideration of two more potential avenues for change in PTSD: counterfactual thinking and global meaning. Both concepts are relevant to the process of recovery in PTSD and constructs of coherence and simulation are also relevant to both.

Traumatic Events and Counterfactual Thinking

Counterfactual thinking refers to the process of creating and imagining alternative realities in reference to past events (i.e., imagining ways that things could have turned out differently), and often comes in the form 'if only…' or 'what if…' (Byrne, 2016). Counterfactual thoughts can focus on imagining how an event could have been better (upward) or worse (downward), and can be self-, other- or non-referent (focusing on how factors/behaviours relating to oneself, other people or the world in general could have been different). Counterfactual thinking is more likely to occur after bad events than good (Sanna & Turley, 1996), and these counterfactuals tend to be upward in nature (de Brigard, Addis, Ford, Schacter & Giovanello, 2013). Upward counterfactual thinking, when self-referent, can lead to feelings of guilt, shame, self-blame and regret

(Mandel & Dhami, 2005; Niedenthal, Tangney & Gavanski, 1994; Zeelenberg & Pieters, 2007).

A functional theory of counterfactual thinking (Epstude & Roese, 2008) proposes that, despite its emotional cost, counterfactual thinking plays an important role in behaviour regulation and performance improvement. Thus, within the non-clinical population, following a negative event, the emotional cost of upward counterfactual thinking is balanced by adaptive outcomes, such as learning from the past in order to better prepare for the future and consequent decreases in counterfactual thinking. However, within the clinical population, this is not always the case and counterfactual thinking can become dysfunctional and sustained (Byrne, 2016). An excess in counterfactual thinking has been implicated in a range of mental health disorders (Epstude & Roese, 2008) where heightened counterfactualising leads to an excess of both problem-focused cognitions and negative emotion.

Within the trauma literature, frequency of counterfactual thinking in PTSD has been associated with continuing levels of posttraumatic distress (El-Leithy, Brown & Robbins, 2006). High levels of upward, self-referent counterfactual thinking in relation to the traumatic event have been found (Davis, et al., 1995), with higher levels of counterfactual thought being linked to increased distress. Branscombe, Wohl, Owen Allison and N'gbala (2003) found a similar link between upward counterfactual thinking and decreased well-being, with this link being mediated by self-blame. They also found a relationship between non-referent counterfactual thinking and decreased well-being, although this was not mediated by self-blame. One study that looked at early predictors of treatment response to trauma-focused cognitive behavioural therapy

(TF-CBT) found significantly higher levels of perseverative thinking in non-responders compared to responders (Brady, Warnock-Parkes, Barker & Ehlers, 2015). Authors suggest that perseverative thinking styles need to be identified and addressed early in trauma treatment.

Some have suggested that improved preparation for the future, which usually results from counterfactual thinking, is likely to take place only when it is combined with the expectation that (a) the event is highly likely to recur and (b) the improved outcome is attainable (Branscombe et al., 2003; Sanna, 1997). Thus, repeatedly mentally undoing the trauma in combination with the realisation that this outcome is unattainable (i.e., the trauma cannot be reversed) may lead to poor-trauma adjustment without any future benefits (Branscombe et al., 2003). When counterfactual thinking is not provided with its usual outlet and reduced through the formation of a future plan, it may persist, thus perpetuating the negative effects on well-being.

Counterfactual thinking and ImRs. Like ImRs, counterfactual thinking can be conceptualised as the simulation of hypothetical events, but in a way that is unhelpful. Because counterfactual thought and ImRs share this link, it is possible that effective ImRs represents a therapeutic means for channelling hypothetical thinking in such a way that persistent counterfactual thinking subsides. Thus, ImRs may effect change in PTSD through a reduction in counterfactual thought and associated distress. Furthermore, due to the nature of both phenomena and their reliance on mental simulation, it is possible that, the higher the GOS rating of a given rescript, the greater the reduction in counterfactual frequency and distress.

De Brigard, Szpunar and Schacter (2013) explored the effects of repeated simulation on counterfactuals in relation to past events in the non-clinical population. While repeated simulation of counterfactuals increased the level of detail and ease of imagining of the imagined scenarios, this was associated with a decrease in perceived plausibility. The authors argue that a clear simulation of the alternatives represented in the counterfactuals helped to bring the divergent details of the real and imagined events into sharper focus. This may be adaptive as it leads to the perception that a high level of change would have been necessary to impact on the actual outcome, thus reducing the need for further counterfactual thinking.

Taken at face value, this seems to be at odds with the ideas discussed earlier, which suggest that ease of simulation predicts higher subjective probability ratings (Tversky & Kahneman, 1973, 1982). However, it is possible that two levels of plausibility are at work here. On the one hand, perhaps a well-simulated rescript increases a sort of felt (rather than logical) sense that it is realistic. However, perhaps on a more logical level, a highly coherent rescript also facilitates an understanding of the amount of change required for the content of their counterfactuals to have been possible at the time, thus facilitating a sense of acceptance in relation to the event and in relation to one's own ability to have effected change.

Further support for the potential utility of ImRs in reducing counterfactual thought comes from a study that compared the content of intrusive memories and thoughts in PTSD. A distinction has traditionally been made between intrusive memories, which are considered to consist largely of sensory experiences, and intrusive thoughts, which consist of cognitive evaluations and contain little or no sensory material (Ehlers,

Hackman & Michael, 2004). However, one study found that, while intrusive memories and thoughts (including counterfactual thoughts) were phenomenologically distinct, almost half of their sample reported that their predominant ruminative and counterfactual thoughts were perceived as sensory experiences as well (Speckens, Ehlers, Hackmann, Ruths & Clark, 2007). The idea that counterfactual thought may involve sensory elements would strengthen the hypothesis that ImRs, an image based intervention, may provide an accessible means to modify the impact of sensation-based thought processes.

Traumatic Events and Global Meaning

Current theories of psychological disorders have tended to focus on factors that distinguish one disorder from another. The theories described previously tended to focus on PTSD-specific tasks of integrating the event within memory and re-appraising specific beliefs relating to the event. While these theories are of obvious use, they overlook broader transdiagnostic constructs that may play an important role, such as one's overall sense of personal or global meaning (which is conceptually distinct from meaning assigned to the traumatic event discussed previously). Such constructs played a more central role in earlier PTSD theories. Baumeister (1991) described this sense of global meaning as 'mental representations of possible relationships among things, events and relationships. Thus meaning *connects* things'. McAdams (1993) suggested that people are motivated to both make a coherent, continuous and meaningful life story, and to construct stories that make sense of life events. Antonovsky (1979) further suggested that people who possess a strong sense of coherence to this story are more likely to cope with adverse life events. Global meaning is thought to be particularly

important when people are confronted with highly stressful life experiences (Park, 2010).

Numerous theories have attempted to explain the relationship between PTSD and global meaning. While there are discrepancies between them, all converge on a set of principles about which there is a high degree of consensus. These have been amalgamated into one theory by Park and Folkman (1997, 2010). They suggest that people's sense of global meaning acts as a set of orienting systems that helps them to interpret experiences. This consists of beliefs, life-goals and a subjective sense of purpose in life. Global meaning also encompasses beliefs that the world is benevolent, predictable and meaningful and that the self is worthy. Traumatic events pose a challenge to one's sense of global meaning and necessitates that some sort of appraisal, or situation-specific meaning, is given to the event. The extent of the discrepancy between the assigned event-meaning and one's global meaning will determine the level of distress experienced. The distress caused by this discrepancy initiates a process of 'meaning making' where one attempts to restore a sense of the world as meaningful and their life as worthwhile. This is thought to lead to better adjustment to the stressful event. Thus, this process will involve an initial loss of meaning below a previous level of functioning, a recovery of meaning and an element of growth beyond this level in order to encompass the traumatic event (Brown, Roach, Irving & Joseph, 2008).

Unlike ImRs, literature on meaning has focused on building up rich and complex theories. However, empirical work is lacking. Some aspects of the model, for example, that most individuals report meaning making attempts, the identification of new meaning following stressful events and that appraised meanings of events that violate

global meaning are linked to distress, are well supported (Park, 2010). Research on other aspects of this model, such as whether distress is the driving force behind the search for meaning, is lacking. Empirical work on many elements of the model, such as whether meaning-making attempts actually lead to a change in meaning and subsequent adjustment, is inconsistent. For example, one longitudinal study found that higher levels of personal growth reported by soldiers five months post-deployment predicted more PTSD symptoms at 15-month follow-up (Engelhard, Lommen & Sijbrandij, 2014). However, the measure of personal growth used was subjective and unrelated to actual growth (Frazier et al., 2009). Updegraff, Cohen-Silver and Holman (2008) found that, following the 9/11 attacks in America, people who reported engaging in a search for meaning in the early aftermath, and were unable to find meaning, were more likely to report posttraumatic symptoms over the following two years than those who did not search for meaning. However, those who were able to find an explanation following a search for meaning reported a decrease in feelings of vulnerability and fewer symptoms. Thus, while there is still debate over many of the finer points of meaning, there is general consensus that people construct coherent life narratives in order to derive meaning from events and that this is in some way disrupted by traumatic events, leading to a search for new meanings.

Global meaning and ImRs. Again, like ImRs, global meaning can be considered, to an extent, within the context of the SH. Coherence has been described as a central aspect to theories of meaning and life-narrative (Brown et al., 2008; Heintzelman & King, 2014). Furthermore, there is evidence that a sense-of-self is dependent on the coherence and continuity of one's narrative structure (Baumeister & Wilson, 1996). Mental simulation and its associations with enhanced meaning has been

studied within the non-clinical population in relation to non-traumatic life events. One series of studies found that one's sense of meaning in life could be enhanced by both temporal and spatial simulation (Waytz, Hershfield & Tamir, 2015). They also found that meaning increased as a function of level of detail, one of the features of GOS. However, these studies were carried out within the normal population and authors do question whether constant and unintentional simulation, as opposed to occasional simulation, may operate differently.

Summary. Of interest to the current discussion is the thread of coherent simulation that is potentially common to both ImRs and global meaning. If a high level of coherence and simulation is necessary for both ImRs efficacy and a sense of life meaning, this prompts the question of whether enhanced simulation in ImRs might, in part, confer benefits through the process of improving coherence of life meaning more globally, thus increasing one's sense of personal and global meaning. Thus, while ImRs and a well-simulated rescript may confer immediate therapeutic benefits through reducing factors like distress and interference caused by the image, it may also have a more global impact on well-being through its ability to enhance one's overarching sense of meaning in life. Similarly, in relation to the previous discussion on counterfactual thinking, ImRs may reduce specific counterfactual thoughts related to the image in question. However, it may also have an impact on one's general level of counterfactual thinking. Thus, when looking at potential therapeutic gains in ImRs, it is important to focus on both (1) specific, image-related factors and (2) more global, overarching markers of well-being.

Methodology

A central problem for researchers is that the development and maintenance of PTSD, and treatments such as IE and ImRs, are extremely complex processes. Thus, it is difficult to go beyond the level of finding concrete associations through the use of questionnaire and laboratory research methods, which tend to emphasise static constructs. These only allow for tentative suggestions about the *potential* mechanisms or processes underlying such associations. Research directly illuminating the actual mechanisms themselves is scarce. Questionnaire and laboratory-based research is also unlikely to be personally engaging enough to elicit the sustained and elaborate processes at work. This is problematic given that target phenomena in day-to-day clinical practice are, most often, not static constructs. Instead, they are processes such as worry or flashbacks that are dynamic, cyclical and repetitive by nature. Two methodological techniques can be utilised to address such issues; coding frameworks and single-case experimental designs (SCED).

Coding frameworks. An emerging body of research has attempted to directly explore underlying mechanisms in PTSD and treatment by coding clients' accounts of trauma and/or recordings of treatment sessions for specific variables. These can then be tracked across time and related to each other or to specific outcome measures.

For example, in terms of the development and maintenance of PTSD, participants' trauma accounts have been coded for indicators of processes such as perceptual and conceptual processing and peri-traumatic dissociation. Such coding work demonstrates that perceptual (rather than conceptual) representations of the trauma memory and peri-traumatic dissociation both seem to relate independently to PTSD symptomology

(Buck, Kindt, Hout, Steens & Linders, 2006). Halligan, Michael, Clark and Ehlers (2003) found that peri-traumatic dissociation may lead to disorganised trauma memories because it is characterised by superficial processing of the traumatic event. They also found that level of disorganisation of the trauma narrative is higher in those with PTSD and that the degree of disorganisation predicts PTSD symptomology. Thus, coding research has begun to make sense of the finer details of how PTSD develops and is maintained.

Through a similar use of coding recorded treatment sessions, a significant decrease in thought disorganisation has been linked to significant improvement in PTSD symptomology following IE (Minnen, Wessel, Dijkstra & Roelofs, 2002). In the study by Kindt et al. (2007) discussed earlier, it was through the use of coding treatment sessions that they were able to specify links between perceptual and conceptual processing, and outcome. Given that the underlying mechanisms of ImRs are unclear, such a coding approach would be useful and informative in this area.

SCED. SCEDs involve comparing performance under different conditions within an individual, rather than either within or between groups (Kazdin, 1978). A number of single cases can be tracked, allowing for patterns to emerge across a series of individual cases. Rather than using a control group, SCED relies on repeated measurement, following participants for a period of time before, as well as during, treatment (Turpin, 2001). Data during treatment is compared to data prior to treatment in order to determine whether a change can be associated with treatment onset, effectively allowing participants to act as their own control. However, in order for concrete conclusions to be drawn, a stable baseline phase is required. Otherwise, it is

difficult to determine whether changes can be attributed specifically to treatment onset. Rather than detecting robust treatment effects in large samples (e.g., reduction of symptomology), SCEDs allow for a closer look at the nuances of processes that emerge over time within a person and whether similar process patterns can be seen across a series of individuals. Such an approach is readily applicable to an investigation of the processes at work *during* ImRs sessions and how these might relate to change.

SCED and coding in ImRs. One study attempted to make sense of the array of literature on proposed mechanisms in ImRs through the use of these two methodological techniques. Salter (2014) designed a coding scheme to capture relevant aspects of ImRs sessions and then applied this scheme to recordings of ImRs sessions to investigate which ImRs aspects might relate to treatment outcome in a series of six cases. While the preliminary findings from this study, discussed earlier, provide a useful and much needed first step towards uncovering ImRs processes, there were two limitations in particular that the current study intended to address.

Firstly, out of six participants, only four had the minimum number of required baseline points (three) and only one of these was stable. Only two participants had follow-up data. This makes it difficult to associate changes in outcome with identified ImRs components and to determine whether changes are sustained beyond treatment. From an experimental standpoint, there was insufficient evidence to attribute symptom reduction to identified ImRs components. The current study intended to address this limitation by attempting to ensure a stable baseline, or introduce statistical means of correcting for unstable baselines if necessary, and by attempting to ensure that follow-up data was collected.

Secondly, Salter (2014) developed the coding scheme in a bottom-up process, looking out for and coding those qualitative ImRs components that were observable and manifest within sessions. While a number of useful components were identified, other less observable processes that may not be so amenable to detection through this type of coding may have been missed. For example, the scheme does not capture the detailed imaginal nature of ImRs scenarios or the fact that they involve the generation of events that have not actually occurred. Incorporating a more top-down coding process, such as the GOS coding scheme, would allow for these less readily observable characteristics to be identified and coded. Thus, the current study intended to enhance existing coding through the use of GOS coding.

The Current Study

Through the use of SCED and coding, this study aimed to explore processes that take place during ImRs, and how these might produce clinical change. Particular attention was paid to the concept of simulation in terms of how it might serve a common link between various treatment and outcome components. The study was also interested in change at both an immediate, image-specific level (e.g., image distress, controllability, frequency, strength of encapsulated belief) and a more global level of well-being (e.g., personal meaning in life). Two phases were conducted.

A key aim of the first phase, which made use of archival data, was to develop a reliable GOS Coding Framework for use within ImRs. This phase was also used to check the reliability of an abbreviated version of Salter's (2014) coding scheme, the 'Session Content' coding scheme. Thus, by the end of Phase 1, two complementary coding schemes were available – one coding for more general aspects of rescripting, and one

(GOS) coding more specifically for the dynamic nature of the imagined scenarios contained in ImRs.

Phase 2 prospectively followed 7 participants during ImRs treatment for PTSD using a SCED design. Participants completed measures related to Image Intrusiveness (contains key markers of flashbacks – frequency, distress, interference with daily life, controllability and sense of 'nowness' to the image), their encapsulated belief, counterfactual thinking and meaning. Session recordings were retrospectively coded using the two coding schemes. Broadly speaking, the aim of this phase was to explore whether there was a relationship between a reduction in outcome measures and the degree to which elements represented in the two coding schemes were present/absent during rescripting.

Participants were divided into high- and low- treatment responders based on reductions in symptom severity (a combination of frequency and distress of imagery). It was then possible to compare high- and low-responders at a group level in terms of outcome measures and coding. Participants were also explored at an individual level in order to examine nuances within treatment.

Phase 2 thus provided the opportunity to attempt to replicate the initial, tentative findings of Salter (2014). However, this study was particularly interested in the concept of simulation. Thus, of particular interest, was whether changes in symptom severity, at group level, were linked to how well a rescript was simulated. It also aimed to explore whether simulation could be linked to Image Intrusiveness and encapsulated belief measures at an individual level. Furthermore, the study aimed to explore whether ImRs

reduced counterfactual thinking and, if so, whether this was mediated by the GOS rating of the rescripted image. Finally, the present research aimed to investigate whether ImRs related to an increase in one's sense of personal meaning.

A number of hypotheses were made. Firstly, that higher GOS ratings would link to greater reductions in outcome measures at both a group (high-responders vs low-responders) and individual level. Secondly, that high-responders would show greater reductions in counterfactual thinking relative to low-responders, and that this would be linked to GOS ratings. It was also predicted that higher GOS ratings would relate to higher levels of change in frequency and distress of specific counterfactual thoughts at an individual level. Thirdly, it was hypothesised that high-responders would show a greater increase in global meaning, and that this would, again, be linked to GOS ratings.

Method

Two phases were involved. Phase 1 was used to assess the inter-rater reliability of the abbreviated 'Session Content' coding scheme and to adapt the 'Goodness of Simulation' (GOS) coding scheme for use within ImRs and assess inter-rater reliability. Phase 2 prospectively applied the two coding schemes to recordings of participants' therapy sessions in order to explore which elements of the Session Content and GOS coding schemes related to therapeutic change.

Phase 1

    Participants. Phase 1 participants were recruited as part of Salter's (2014) original study. Four men and two women with a mean age of 43 (SD=19, range=20-65) took part in Phase 1. Participants came from a range of different ethnic backgrounds including Asian/Asian British (n=3), White or White British (n=2) and Black African (n=1). All participants had a primary diagnosis of PTSD as well as various co-morbidities including depression (n=3), depersonalisation disorder (n=1), anger (n=1) and complicated grief (n=1). One participant had experienced a once-off trauma, while the others had experienced multiple traumatic events. As this information is taken from Salter's (2014) original study, in which an in-depth discussion of each case was conducted, some demographic information has been altered to preserve anonymity.

Participants who experienced intrusive images as part of their PTSD and who were willing to undergo ImRs as part of their treatment were included in this phase. All were receiving TF-CBT. No modifications were made to usual treatment, which involved at least one ImRs session. Provided that rescripting involved changing the original

distressing image, all types of images were included. Participants were followed for the entire duration of ImRs or until the recruitment deadline for this phase ended. All participants continued to receive treatment when the study concluded.

Recruitment. Participants were recruited through two National Health Services (NHS), one out-patient and one in-patient. Both services saw people with a primary diagnosis of PTSD. Four clinicians took part in this phase; three for the out-patient and one for the in-patient service. All were trained in ImRs and received frequent supervision.

Ethics. The current project extended a previous project through a number of major amendments. Original approval was granted through the North West-Lancaster National Research Ethics Committee on 22 May 2013. Approval was subsequently granted by Royal Holloway University Department Ethics Committee (RHUL-DEC) and relevant local Research and Development (R&D) departments. Phase 1 data collection was carried out by Salter based on this approval. A substantial amendment was made to change the name of the Principal Investigator (approval granted on 28 May 2015), thus providing access to this archived data for further analysis. (See Appendices 1-7 for Approval Letters).

Materials.

Goodness of Simulation (GOS) coding scheme. The GOS coding scheme has already been developed and validated for hypothetical scenarios in worry, OCD and paranoia (Brown, MacLeod, Tata & Goddard, 2002; Huddy, Brown, Boyd & Wykes, 2012; Keen, Brown & Wheatley, 2008). The current version was adapted from that of

Rose, Brown, Ellett and Huddy (2012) and consists of six codes. Each code was rated on a three-point scale (1='Not true or mostly not true', 2='Partially true' & 3='Mostly true/clearly there'). A full description of the scheme can be found in Appendix 9, but Table 1 provides a brief description of each of the six codes.

Table 1.

Summary of GOS Codes.

Logical Sequencing	Extent to which successive elements of a scenario are connected logically, with each step following from the previous one.
Temporal Ordering	Extent to which there is a sense of temporal flow, with the scenario unfolding over time.
Minimisation of Uncertainty	Extent to which the scenario decreases a sense of uncertainty about what is being described.
Good Level of Detail	Extent to which the scenario gives a comprehensive account of all of the basic elements of the situation.
Easy to Imagine	Extent to which the scenario is described and easy to imagine.
Flows Smoothly	A subjective, global judgment of how well the scenario flows.

Session Content Coding Scheme. An abbreviated version of the Session Content coding scheme originally developed by Salter (2014) was used in this study. The scheme involved ten codes which were rated on a scale of 0-3. Each rating was anchored with specific descriptions. The full version of the Session Content coding scheme can be seen in Appendix 10, but Table 2 provides a brief description of each of the ten codes.

Table 2.

Summary of Session Content Codes.

Image Departure	Extent to which the rescript departs from the original imagery in terms of the amount of new material being introduced.
Timing of Change	The point in time when new information is introduced into the imagery.
Staying with Imagery	Participant's ability to continuously activate and stay with the imagery throughout the rescripting process.
Therapist Guidance	Participant's ability to follow the rescripting process and incorporate changes without significant guidance from the therapist.
Original Imagery Activation	Participant's ability to visualise original imagery elements as indicated by vividness of description.
New Imagery Activation	Participant's ability to visualise new imagery elements as indicated by vividness of description.
Original Processes	Level of activation of emotions, cognitions and/or psychical sensations associated with original imagery elements.
New Processes	Level of activation of emotions, cognitions and/or psychical sensations associated with new imagery elements.
Cognitive/Emotional Shift	Extent to which the meaning associated with the original imagery changes during the rescripting process.
Believability of Rescript	Extent to which the rescript feels believable and compelling to the client *regardless of whether it is physically possible.*

Procedure. The abbreviated Session Content scheme was retrospectively applied to recordings of ImRs sessions by two researchers (KL & CS). KL, who then used the scheme in Phase 2, applied the codes to all available sessions (18 sessions) in order to become very familiar and well-practiced with the scheme.

The GOS scheme was adapted for use within ImRs through discussions with one of the original authors of the earliest GOS coding scheme (Brown et al., 2002). Once a scheme had been agreed upon, two researchers (KL & ZC) retrospectively applied the codes to the final ImRs session of three randomly selected participants (50% of the sample). Both researchers first discussed the coding scheme to ensure a shared understanding. They then rated the first tape and subsequently compared codes. Where discrepancies existed, researchers discussed how they had arrived at the given ratings. A consensus was agreed and any necessary clarifications/alterations were made to the GOS coding scheme. The second and third recordings were coded in the same way.

KL, who then used the scheme in Phase 2, applied the codes to the final ImRs session of each participant in order to become familiar and well-practiced before using the coding scheme in the prospective phase.

Phase 2

      Participants. Seven participants (5 female, 2 male) took part in Phase 2. The sample was heterogeneous and all but one had experienced multiple traumatic events in their lives. The mean age was 30.7 years (SD=9; range=20-45). Participants were from a range of ethnic backgrounds including white British/European (n=3), Asian/Asian-British (n=3) and Middle Eastern (n=1). See Table 3 for individual participant details. In order to protect participant anonymity, some details have been changed.

Table 3.

Individual Participant Information.

P	Gender	Age	Ethnicity	Previous Treatment	Medication	Co-morbidities	Time since Trauma	Current Treatment Duration
A	F	35	Indian	Counselling (12 sessions), CBT for anxiety (20 sessions)	None	Depression, additional unexplained somatic/physical complaints	8 years	9 months (24 sessions)
B	F	23	British	Counselling x2, EMDR x2, TF-CBT, Community Mental Health Team	Citalopram, Quetiapine	Depression, anxiety, personality disorder	9 years	9 months (29 sessions)
C	M	25	Indian	Counselling, IAPT	Not Available	Depression	6 years	16 months (29 sessions)
D	F	45	Spanish	EMDR	Citalopram, Mirtazapine, Diazepam	Depression	7 years	Six years four months (189 sessions)
E	F	29	Middle Eastern	IAPT (20 sessions)	None	Depression	3 years	11 months (35 sessions)
F	F	38	Irish	IAPT and unspecified service (30 sessions total)	Not Available	Depression, anxiety	1 year	5 months (31 sessions)
X	M	20	Bangladeshi	None	None	Depression	11 years	6 months (8 sessions)

PTSD diagnosis was determined by the treating therapist through the use of routine measures such as the Posttraumatic Stress Diagnostic Scale (PDS; Foa, 1995), the Beck Depression Inventory-II (BDI-II, Beck, Steer & Brown, 1996) and/or diagnostic interview techniques. The decision not to include a diagnostic tool as part of the study was made for a number of reasons: (i) to minimise time pressure on participants/clinicians, (ii) to allow for a wider range of potential participants (all current clients could potentially be included at study commencement whereas use of a diagnostic tool would have minimised the participant pool to those entering the service after the date of study commencement) and (iii) to mirror, as closely as possible, those seeking treatment for PTSD across services in general.

Participants who experienced intrusive images as part of their PTSD and who were willing to undergo ImRs as part of their treatment were included in the study. In addition to a diagnosis of PTSD, the following co-morbidities were also present in the sample: depression, anxiety, personality disorder and unexplained somatic complaints. While English was not required as a first language, those who required the use of an interpreter were excluded from the study. Further exclusion criteria were presence of a psychotic disorder, brain injury, current substance abuse or those with high risk of self-harm or suicide.

Recruitment. Sample size considerations were based on findings and suggestions from previous literature (Shadish & Sullivan, 2011; Shadish, Hedges & Pustejosky, 2014; Anrtz et al., 2013). The median number of cases used in SCEDs is three (Shadish et al., 2011). However, Shadish et al., (2014) argue that three cases will only yield power of .80, provided there is a minimum of 6 observations per phase and

an anticipated effect size (Cohen's d – 'd') of 0.8. They recommend that, when d=0.5, power is adequate with 7 cases and 3 observations per phase. Arntz and colleagues suggest that ten cases would provide 80% power to detect a change of d=.1 or higher when paired t-tests are used to evaluate treatment effects when p=.05 (two-tailed) (Arntz et al., 2013).

Phase lengths in the current study often consisted of less than six data points and participants were only followed for the duration of one image, making it likely that observed effect sizes would be small-moderate. Thus, the aim was to recruit a minimum of 10 participants.

Recruitment was conducted at two outpatient National Health Services (NHS). The first service (Service 1), was a specialist trauma-focused CBT service. Treatment was carried out by three experienced clinical psychologists, all of whom had been specifically trained in ImRs and received regular supervision. Service 2 was an Increasing Access to Psychological Therapies (IAPT) Service. While not a specialist trauma service, this service treated trauma cases as part of their routine work.

In total, nine participants agreed to take part. Of these, three dropped out before the first rescripting session. Two dropped out of ImRs in general – one because they did not like the sound of the approach and one because of an impending court case (thus delaying treatment onset). Another did not want the researcher to have access to any of their records. The six remaining participants were all from Service 1.

In addition to these six participants, one case (Participant X) from the archival sample, outlined in Phase 1, met the methodological criteria for this study and was also included as part of the current sample. This participant was seen at the first service described above. Thus, the final sample number was seven. Figure 1 depicts participant involvement.
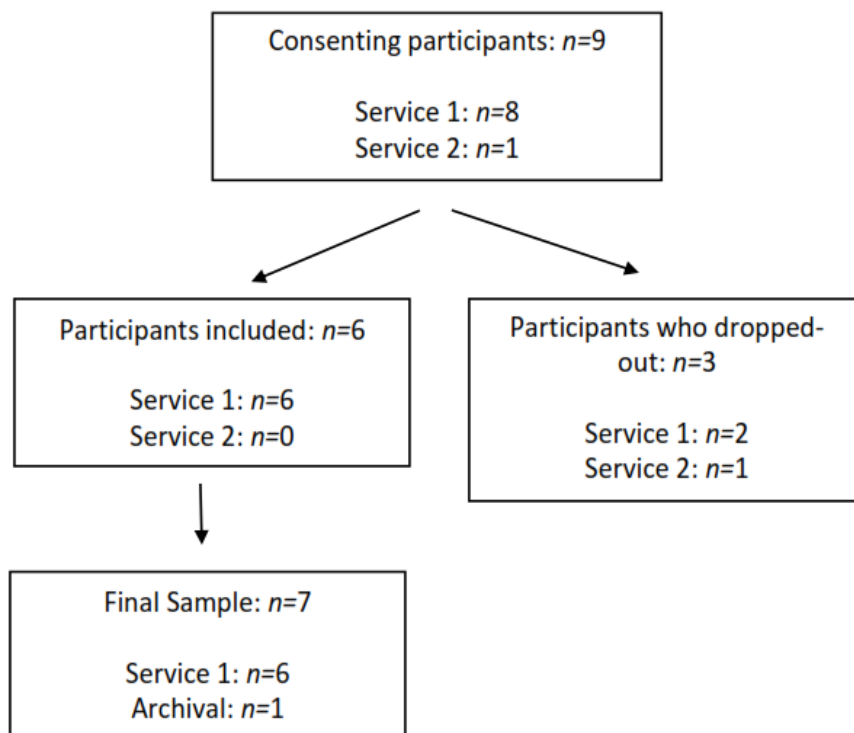
Figure 1. Flow diagram of participant recruitment.

Ethics. Phase 2 involved further extending the ethics procedures outlined in Phase 1. An additional major amendment was made in order to amend the outcome measures used (approval granted on 08 September 2015). Approval was subsequently granted by RHUL-DEC and the relevant local R&D Departments. An additional recruitment site was added as part of Phase 2. Approval letters can be seen in Appendices 1-8.

Materials. Two types of measures were used during Phase 2. 'Frequently Administered Measures' were administered continuously across the course of the study. These consisted of Visual Analogue Scales (VASs) and were used due to their sensitivity to change across short time periods at the level of the individual. This is an essential component of the SCED as multiple baseline measures and continuous measures across the treatment phase is required. A copy of these measures can be seen in Appendices 11-13.

'Pre-/Post- Measures' questionnaires were also administered once before and once after the intervention phase. These measures are less sensitive to small changes and tell us little about causal mechanisms of change, but can be useful in determining which participants have experienced reliable and significant change following an intervention (Morely, 2015b). A copy of these measures can be seen in Appendices 14-15. The two coding schemes from Phase 1 were also used.

Frequently administered measures.

Image Intrusiveness Visual Analogue Scales (IVAS). Image intrusiveness was rated using Brewin et al.'s (2009) self-report visual analogue scales (VASs). These scales ask participants to rate a particular image from 0-100 in relation to four constructs: frequency, level of interference with daily life, controllability and level of distress caused. A fifth scale, asking participants to rate how much it 'feels as if their image is in the here and now' (referred to as 'nowness') was added for the purpose of the current study. While these particular VASs, and the others discussed below, have not been validated, VASs are generally considered one of the simplest and quickest ways of measuring subjective experience (McCormack, de L. Horne, & Sheather,

1988), and have been shown to be both reliable and valid (Ahearn, 1997). They are sensitive to small changes within individuals and can be used to follow therapy processes over time (Morley, 2015a).

Counterfactual Thinking Visual Analogue Scales (CTVAS). This measure was adapted from the interview schedule designed by El-Leithy et al., (2006) to measure counterfactual thinking in trauma victims. This measure consists of two VASs, ranging from 0-100, which measure frequency and level of distress in relation to specific counterfactual thoughts.

Encapsulated Belief Visual Analogue Scale (EBVAS). This scale was adapted from interview methods designed for previous studies (Hackmann, Clark & McManus, 2000; Wild & Clark, 2011). One VAS was used to measure participants' level of belief in the key meaning related to a particular image on a scale of 0-100.

Pre-/post- measures.

Symptom Severity. In order to distinguish high- from low-responders, two of the previously mentioned IVAS subscales were combined and used to form a pre-/post-measure of Symptom Severity. The rationale for choosing these particular scales was due to the importance given to frequency and distress in the Clinician-Administered PTSD Scale (CAPS), which is considered the gold standard in PTSD assessment and has been extensively validated (PTSD: National Centre for PTSD, 2016; Weathers, Keane & Davidson, 2001). The latest version, the CAPS for DSM-5 (CAPS-5), was developed to reflect changes in diagnostic criteria within the DSM-5 and the extensive research supporting these changes.

While the CAPS has always used frequency and distress (referred to as intensity within the measure) to measure severity of symptoms, the CAPS-5 combines these two criteria into a single criterion such that PTSD symptom severity is measured based on a single rating that encompasses both frequency and distress. Thus, a single Frequency/Distress measure, henceforth called Symptom Severity, was thought to be the most salient criterion for use as a primary outcome, to distinguish high- and low-responders.

Measure of Mundane Meaning (MMM) – Integration of Circumstances. The MMM (Brown, et al., 2008) contains 36 items designed to capture loss of personal meaning relative to a previous, higher level of functioning and has three subscales; Sense of Coherence, Integration of Circumstances and Sense of Purpose. Items have good internal consistency (α=.96) and subscales have adequate concurrent validity (r=.4-.64) with subscales of the World Assumptions Scale (WAS; Janoff-Bulman, 1992), another measure of meaning. The Integration of Circumstances (IoC) subscale was used in the current study as a measure of how well participants had integrated the target intrusion into their life narrative. This scale consists of five items rated on a six-point scale. Thus, IoC scores range between 0-30.

Counterfactual Thinking for Negative Events Scale (CTNES) – Self-Referent counterfactual thinking (SRC). The CTNES (Rye, Cahoon, Ali & Daftary, 2008) was designed to measure counterfactual thinking in relation to a specific traumatic event and asks participants to rate 16 items on a likert scale (1-5). The CTNES consists of four subscales; Non-referent Downward, Other-referent Upward, Self-referent Upward and Non-referent Upward. In terms of validity, subscales of the CTNES have been shown to be positively correlated with constructs that are known to relate to

counterfactual thinking such as affect and cognitive style. Subscales are also sensitive to experimental manipulation concerning type of negative event. Because self-referent upward counterfactual thinking is the most common according to the literature (Davis et al., 1995) and is particularly linked to distress, reduced well-being and self-blame (Branscombe et al., 2003; Davis et al., 1995), the Self-Referent Upward counterfactual (SRC) subscale was chosen to determine pre- and post-ImRs rates of counterfactualising. The SRC consists of four items creating a range of scores from 4-20. Each individual's pre and post-score was reduced by 4 in order to create a scale of 0-16.

Coding schemes. The Session Content and GOS coding schemes outlined in Phase 1 were applied to recordings of ImRs sessions in Phase 2.

Design. Treatment took place within the two outpatient services in London described above. This study, using a SCED, aimed to follow participants before, during and after rescripting of one image by using as naturalistic a design as possible, with minimal disruption to routine treatment. However, SCED requires a minimum of three baseline points as well as continuous measures across phases. Thus, some deviation in terms of type and frequency of measures was necessary. The treatment procedures themselves remained unaltered.

Typically, trauma therapy starts with assessment, followed by imaginal exposure/re-living and ending with ImRs. There are two difficulties associated with using SCED within these naturalistic treatment settings; (1) isolating the desired treatment component and (2) acquiring a stable baseline for cases that are already in therapy. In

an attempt to achieve this without disrupting routine treatment, collection of baseline measures was carried out over the period of one week. This allowed the minimum number of three data points to be collected between two sessions.

Therefore, no treatment was administered during the baseline phase, making it more likely that a stable baseline would be achieved. Even though participants may have already benefited from previous treatment, it was hoped that a stable baseline could be achieved from this point on, allowing assessment of further changes brought about specifically by ImRs. This method of baseline collection also avoided interruption of routine treatment. Furthermore, the 'Frequently Administered Measures' all related specifically to the target image, rather than to PTSD symptoms or imagery qualities more generally. This was in an attempt to isolate, very specifically, a target for the SCED that minimised the impact of previous treatment.

Initially, recruitment included only those moving from the imaginal exposures/re-living phase to the ImRs phase. These participants would not therefore have experienced rescripting prior to participation in the study. This was a further attempt to isolate a specific target for the SCED and to minimise the impact of previous treatment. However, due to the limited recruitment timeframe and in the interest of increasing the power of the study, this criterion was broadened to include participants who were already in the rescripting phase of treatment.

Procedure. The study was introduced to potential participants by their treating clinician at any point during treatment up until one week prior to when rescripting commenced on the target image. If interested, they were given information sheets and

consent forms (Appendix 16). For those who consented, data collection began one week prior to rescripting of the target image (i.e., either when participants moved from the reliving to the rescripting phase of treatment, or when participants moved from one image to the next during the rescripting phase of treatment).

'Introduction' session (one week prior to rescripting commencement). During this 'Introduction' session, patient and therapist worked together to identify the target image for rescripting. The elements described in the following sub-sections were then identified and rated in relation to the chosen image. In order to make sure that all measures were administered, participant folders were designed for each case. These folders provided optional scripts for therapists to identify the following elements, followed by the associated VASs. There was a separate section for each session of the study (One of the ImRs Session subsections is shown in Appendix 17 as an example).

Image Intrusiveness. Image intrusiveness relating to the target image was measured using the IVAS (Frequency, Interference, Distress, Uncontrollability and 'Nowness').

Encapsulated Belief. In order to identify the encapsulated belief or 'Key Meaning' associated with the chosen image, participants were asked to close their eyes, get a clear image of the image/hotspot in their mind and describe it. They were encouraged to describe the event in the present tense, as though it was happening again. The therapist then worked with the participant, using Socratic questioning and downward arrow techniques, to determine the key meaning of the image. Examples of questions used to arrive at the encapsulated belief include: *'What is the worst thing*

about this memory?' 'What does it mean about you as a person?' 'What does it say about the world?' 'What is the most distressing/upsetting thing about this image?' Once an appropriate encapsulated belief was agreed upon, it was written down and rated using the EBVAS.

Counterfactual Thoughts. Participants were encouraged to identify up to three of the most common counterfactual thoughts in relation to the identified image. Examples of script prompts used to identify these thoughts include: '*Many people often think about or imagine ways in which things might have turned out differently where the traumatic event is concerned. They may think about other ways that they might have behaved, things that other people might have done or they may imagine ways in which the circumstances of the event might have been different. **These kinds of thoughts might begin with 'what if', 'at least' or 'if only'**.'* Once identified, these were written down and each was rated using the two scales on the CTVAS.

Between sessions. The above ratings of the CTVAS, EBVAS and IVAS represent the first baseline point. Clients were asked to re-rate their image using these scales again during the following week (between sessions). This represents the second baseline point. Participants were also given the IoC and SRC (pre-/post- measures) to fill out between sessions.

Imagery rescripting sessions. The CTVAS, EBVAS and IVAS were re-administered again at the beginning of the following session (first ImRs session), representing the third baseline point. Participants then commenced re-scripting of their first image. All ImRs sessions were recorded for coding purposes.

Due to the naturalistic design, no specifications about particular types of ImRs were imposed on this study. However, the ImRs process used by therapists was generally based on approaches previously used by Arntz and Weertman (1999), Hackmann (1998), Smucker et al. (1995) and Smucker and Dancu (2005). Thus, participants first gave a detailed oral narrative of the chosen intrusive image. They were then asked what it was that they would like to change about the image. Assisted by the therapist, participants then created an alternative, vivid image that served to incorporate these changes. Therapists varied in the extent that they pre-prepared these changes, in the extent of prompting used to create change and in the extent to which the original image was first described. Participants were typically asked to practice bringing this alternative image to mind at home between sessions.

Following rescripting, the IVAS, EBVAS and CTVAS (with the exception of scales relating to 'frequency over the past 3 days' & 'interference with daily life over the past 3 days') were re-administered at the end of the session. Frequency and Interference scales were not re-administered because they relate to 'the last three days' and it would not make sense to rate such scales twice within the space of an hour. Thus, these scales were only administered once, before ImRs. All other VAS scales were administered both before and after ImRs.

This procedure of rating the IVAS, EBVAS and CTVAS, carrying out rescripting and re-rating the measures again was continued across following rescripting sessions. In the interest of consistency across cases, participants were followed for a maximum of three sessions. Thus, each participant was followed for the duration of one image, up to a maximum of three sessions (range of 1-3 sessions).

Thus, for most measures during the treatment phase, there was a minimum of one and a maximum of five data points available. For measures relating to Frequency and Interference, there was a minimum of 0 and a maximum of two data points available for the treatment phase. Prolonging ImRs on the target image in order to obtain the ideal minimum of three data points per phase would not have been in the best interests of the client and, thus, was not imposed.

Follow-up. When rescripting of the target image was complete (or after three ImRs sessions), participants completed the IVAS, EVAS and CTVAS one more time at the beginning of the following session as a follow-up data point. The IoC and SRC (pre-/post- measures) were also administered at this point. Once these measures had been completed, participants were given a Debrief Sheet (Appendix 18). In cases where this follow-up session involved no therapeutic work (e.g., discussions about therapy direction, practical tasks such as assistance with paperwork) a further set of IVAS, EBVAS and CTVAS measures were collected at the start of the following session. Study involvement was then terminated and participants continued treatment as usual.

Participant X. Because Participant X (PX) was taken from the archival sample in Phase 1, there were some differences in Procedure. Firstly, no encapsulated belief or counterfactual thoughts were identified. Thus, PX only completed Image Intrusiveness measures. Pre-/post- measures were not administered as part of Phase 1 either. Furthermore, IVAS measures were collected only once per week at the start of sessions. Thus, the baseline was collected over a period of three weeks. Data was subsequently only collected at the start of each treatment session, before rescripting.

Coding. All session recordings were coded using the Session Content and GOS coding schemes. The Session Content coding scheme produced ten separate codes rated on an anchored scale between 0-3. The GOS coding scheme provided six codes rated between 1-3. Internal consistency of GOS codes has been found to be high ($\alpha > .9$) in previous studies (Huddy et al., 2012; Keen et al., 2008), thus, an overall GOS score for each participant was obtained by summing the six individual scores.

In order to create a GOS scale range of 0-12 (rather than 6-18 which resulted from each item being scored on a scale of 1-3), each total score was reduced by six points. For comparison purposes, resultant rescripts can be considered within different levels that increase in terms of simulation (1-4, 5-8 and 9-12).

Service-user perspective. The research protocol was presented to the service-user group at Service 1 in order to determine its acceptability and to explore possible changes. Overall, the group reported that the protocol did not differ greatly from routine treatment with the exception of the 'Between Sessions' section, which involves bringing the target image to mind independently in order to rate the VAS scales. On the one hand, service-users thought that it might be 'cathartic' to have a written record of this information in order to track it over time. On the other hand, they were concerned that this might be too distressing to complete independently. All group members preferred the option of collecting all baseline measures during therapy sessions, even if this meant delaying ImRs onset by one week.

Unfortunately, the majority of the current participants had already completed baseline measures by the time this meeting took place and there was insufficient time to make

the necessary ethical amendments within the current recruitment timeframe. However, this study is expected to be an ongoing process within Service 1 and ethical permission will be sought to make the necessary amendments for future participants.

Other issues discussed included the point at which it would be most appropriate to partake in the study and whether or not it should be compulsory for the researcher to meet with/talk to participants. Service-users felt that participation in the study would be more acceptable later in the process, rather than at the start of rescripting. This option was already being investigated as an attempt to widen recruitment and was subsequently incorporated into the study. Group members were happy with the current protocol stipulating that the decision of whether participants have direct contact with the research lies with each individual participant.

Results

Phase 1

Phase 1 analysis involved assessing the inter-rater reliability of the two coding schemes. Interclass-correlations were used to assess reliability and, according to convention, an intraclass correlation coefficient of ≥ 0.7 was considered an acceptable level of agreement.

Session Content coding scheme. Six cases (100% of sample), encompassing a total of 18 sessions were coded by two researchers. Discrepancies greater than one point were only seen in 2.1% of the ratings. The inter-class correlation between the two raters was .81, indicating an acceptable level of agreement (>.7).

GOS coding scheme. One session from three cases (50% sample, 17% of sessions) were coded by two researchers. Ratings were never discrepant by more than one point. The inter-class correlation between the two raters was .78, indicating an acceptable level of agreement.

Phase 2

An overview of findings across the entire sample is presented. This is followed by individual analysis of each participant in order to provide a more detailed analysis of links between outcomes and codes.

Table 4.

Symptom Severity, IoC and SRC Scores Before and After ImRs.

P	Symptom Severity Before	Symptom Severity After	SRC Before	SRC After	IoC Before	IoC After
A	91.67	52.5	14	10	8	4
B	46.67	5	7	0	4	14
C	81.67	60	10	10	10	21
D	61.67	17.5	-	-	8	15
E	68.33	35	12	2	17	23
F	65	55	4	6	5	6
X	60	50	-	-	-	-

Note. SRC – Self-Referent Counterfactual Thinking Subscale of the Counterfactual Thinking for Negative Events (CTNES) questionnaire (range: 0-16). IoC – Integration of Circumstances subscale of the Measure of Mundane Meaning (MMM) questionnaire (range: 0-30).

Sample overview. Table 4 above provides a summary of pre- and post- outcome measures for all participants. Analyses were carried out in order to divide participants into high- and low- responders. Following this, high- and low-responders were compared in terms of coding patterns and outcome measures.

Identifying high- and low-responders. The Symptom Severity measure (combination of Frequency & Distress) was used to identify those who experienced statistically reliable and clinically significant changes following rescripting.

Jacobson and Traux (1991) provide the following formula for calculating a reliable change index (RCI): $RCI = M_1 - M_2 / SE_{diff}$. Each subject's post-ImRs score was subtracted from their pre-ImRs score and divided by the Standard Error of Difference. The SE_{diff} was calculated as $\sqrt{(1-r)}$ where r is the test-retest reliability of the measure in question. Using Kendall's r, and based on each participant's first two baseline points, test-retest reliability was calculated as .51, providing a SE_{diff} of 14.65. An RCI above 1.96 can be considered indicative of statistically reliable change (Jacobson & Traux, 1991).

In addition to calculating reliable change, a further calculation for clinically significant change, defined as at least two standard deviations above/below the pre-ImRs sample mean (Jacobson & Traux, 1991; Veale, Page, Woodward & Salkovskis, 2015) was conducted. This formula produced a cut-off point of 38 for Symptom Severity. For all calculations, pre-ImRs data was based on the average of each participant's three baseline scores. For post-ImRs scores, most participants only had one follow-up point. When more than one was available, the average score was obtained.

Comparing high- and low-responders. Four participants (PA, PB, PD and PE) met criteria for reliable change. Of these, three (PB, PD and PE) also met criteria for clinically significant change. Figure 2 shows a scatterplot of participants' pre- and post-Symptom Severity scores and indicates those who met criteria for reliable and/or clinically significant change.
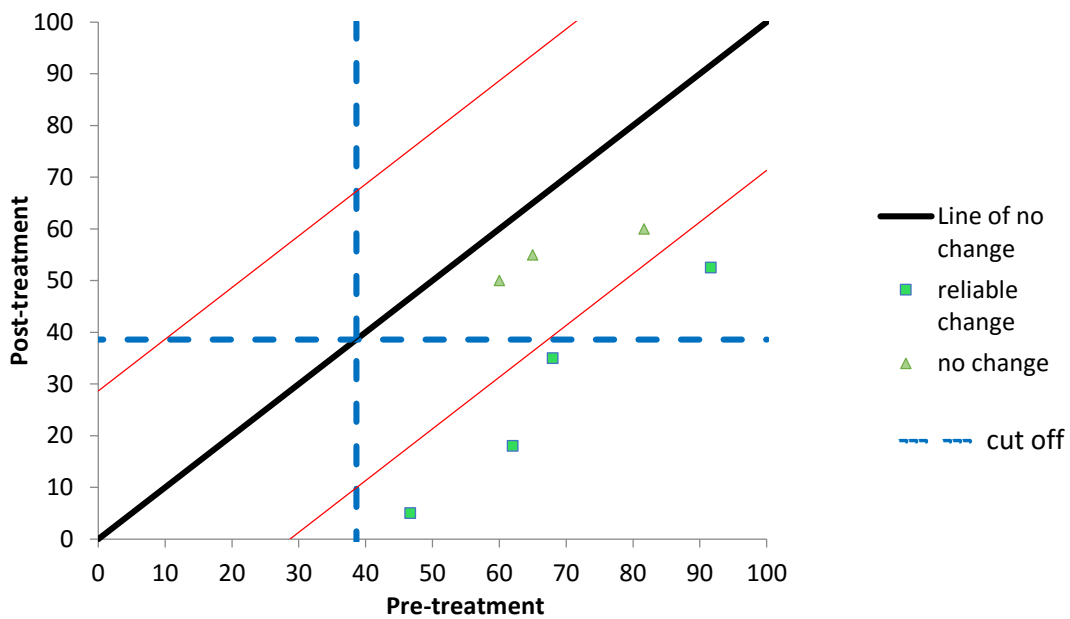
Figure 2. Scatter plot of pre- and post-Symptom Severity scores

Session Content and GOS coding. High- and low-responders were compared in terms of the two coding schemes. For participants who had more than one rescripting session, summary scores were computed by averaging codes across sessions (summarised in Table 5). Darker shading represents a higher rating for a given code. Participants are listed in order of Symptom Severity change. Due to the small sample size, statistical comparison of high- and low-responders was deemed inappropriate. Thus, further analysis is based on descriptive observation only.

All high-responders' rescripts were rated as well-simulated across sessions while low-responders' rescript ratings were in the less coherent range. With the exception of Participant D (PD), an overall trend could also be observed whereby increases in GOS and increases in Symptom Severity change were linked in a roughly linear manner.

In terms of Session Content, the clearest observed difference was for activation of new processes. All high-responders were rated as having incorporated very intense emotions, cognitions and/or physical sensations within the rescripted imagery, while low-responders' new processes were rated as less intense. Apparent differences can also be seen for cognitive/emotional shift, therapist guidance and rescript believability. High-responders were rated as showing evidence of experiencing higher levels of cognitive/emotional shift while low-responders tended to experience lower levels of shift. A similar pattern can be seen for rescript believability with higher belief ratings ascribed to high-responders and lower belief ratings ascribed to low-responders. Low-responders also required more overall therapist guidance than high-responders.

Less pronounced differences were observed for timing of change in ImRs. All high-responders incorporated change during the original imagery while 2/3 low-responders chose to introduce change immediately before the event. Less clear differences were also observable for new imagery activation. High-responders' new imagery elements tended to be rated as a bit more vivid than low-responders'.

There were no pronounced patterns for the remaining codes. Although less clear-cut, original imagery activation ratings showed the opposite pattern to new imagery activation, with original imagery elements rated as marginally less vivid for high-

responders, relative to low-responders. In terms of image departure, all participants but one incorporated some original but mostly new imagery elements. PX, who responded least to ImRs, included some new but mostly original imagery. In terms of processes relating to the original imagery, mean scores for high- and low-responders were similar. However, low-responder's original processes were rated as either very intense or minimally intense, while high-responders' original processes fell more within the middle range of intensity ratings. No differences were observed in ability to stay connected to the imagery during rescripting. All participants were rated as being able to stay with the imagery throughout.

Table 5.

Participant GOS and Session Content Ratings across All ImRs Sessions.

P	Symptom Severity Change	GOS	Image Departure	Timing of Change	Staying with Image	Therapist Guidance	Original Imagery Activation	New Imagery Activation	Original Processes	New Processes	Cognitive/ Emotional Shift	Rescript Believability
D	-44.2	8.7	2	3	3	2.7	1.3	2.7	1.7	2.7	1.7	1.7
B	-41.7	12	2	3	3	3	3	3	1	3	3	3
A	-39.2	9	2	3	3	2.3	2.7	2.3	2.3	3	2.7	2.7
E	-33.3	9	2	3	3	2	1.5	3	1.5	3	3	2.5
C	-21.7	7	2	2	3	2	3	2	1	1	1	1
F	-10	7	2	2	3	1	1	3	0	2	2	2
X	-10	5	1	3	3	2	3	2	3	2	2	2
HR Mean:		9.68	2	3	3	2.5	2.13	2.75	1.63	2.93	2.6	2.48
LR Mean:		6.33	1.67	2.33	3	1.67	2.33	2.33	1.33	1.67	1.67	1.67

Note. High-responders are above the thick horizontal line and low-responders are below. Mean codes for high- and low-responders are represented at the bottom of the table. GOS coding ranges from 0-12 and Session Content codes range from 0-3. Darker shading represents higher levels/categories across codes. For GOS, simulation was divided into three levels, 1-4, 5-8, 9-12.

Counterfactual thinking and global meaning. Cut-off points (rounded to nearest whole number) for clinically significant change (Jacobson & Traux, 1991) were calculated for the SRC and IoC. To meet criteria, post-ImRs scores had to be below 2 on the SRC and above 18 on the IoC. Table 6 shows level of change in SRC and IoC outcome measures for each participant. Scores that met criteria for clinically significant change are highlighted in bold. PX, the archival participant, was omitted from these analyses as they did not complete SRC or IoC measures. PD was omitted from the SRC analyses as she declined to complete this measure. Comparing high- and low-responders statistically was deemed inappropriate due to the small sample size. Thus, subsequent analysis is based on descriptive observation.

Table 6.

Level of Change for SRC and IoC, and Mean GOS Scores for each Participant.

P	Symptom Severity Change	GOS Rating	SRC	IoC
D	-44.2	8.7	-	+7
B	-41.7	12	**-7**	+10
A	-39.2	9	-3	-4
E	-33.3	9	**-10***	**+6**
C	-21.7	7	0	**+11**
F	-10	7	+2	+1

Note. High-responders are above the horizontal line and low-responders are below. Participants are listed in order of Symptom Severity change experienced. Scores highlighted in bold represent those that meet criteria for clinically significant change. An * marks scores that fall on the cut-off point.

As can be seen from Table 6, all high-responders experienced some level of decline in self-referent counterfactualising with two of these meeting criteria for clinically significant change. Low-responders experienced no change or an increase in scores. There was no overlap in scores between high- and low-responders. In terms of GOS, well-simulated rescripting was linked to declines in SRC and less well-simulated rescripting was linked to no change or increasing scores. However, GOS ratings did not seem to link to decreases in SRC scores in a linear fashion, as had been predicted.

IoC scores were less clear. All but one participant experienced some increase in meaning scores. However, there did not seem to be any differences between high- and low-responders. Two participants met criteria for clinically significant change – one was a low-responder while the other fell just above the high-responder cut off. Thus, no obvious relationship between ImRs efficacy and change in meaning can be seen, nor did there appear to be a relationship between GOS and change in IoC scores.

Individual analysis. Demographic information was presented previously in Table 3. For each participant, further background information is presented, followed by graphical analysis of outcome measures and a summary of the Session Content and GOS codes.

Analysis plan. A recent document on SCEDs outlined the steps necessary for effective visual analysis of data (Kratochwill et al., 2010). The first step is to determine whether the baseline is consistent enough to be used to assess intervention effects. The second step is to assess the level, trend and variability of data *within* each phase and to compare these observed patterns across phases in order to consider whether patterns

change across phases. This process can be further supplemented, where necessary, through the use of comparing overlap and immediacy of effect.

There is debate in the literature about whether visual analysis of graphs in SCEDs is sufficient (Barlow, Nock & Herson, 2009; Morely, 2015) or whether statistical analysis is necessary (e.g., Kazdin, 2007; Parker, Vannest, Davis & Sauber 2011; Shadish, 2014), although there is generally consensus that conventional parametric statistics are inappropriate due to the associated threats to validity (Shadish, Rindskopf, Hedges & Sullivan 2013). One instance where statistical analysis of SCED data may be called for beyond visual analysis is in cases where baseline data is unstable (Morley, 2015; Parker et al., 2011), especially when longer phases are available.

Table 7.

Explanation of Key Terms used within Graphical Analysis.

Key Term	Explanation
Median	Number in the middle of the data when data is rank ordered. If there is an even number of data points, then the median is estimated by calculating the average of the middle two data points.
Broadened Median (BMED)	The average of the three middle values when data are rank ordered.
Running Median of 2 (RM2)	Average of successive sets of 2 data points throughout the phase
Trended Range (TR)	Lines connecting the highest and lowest values in each half of the phase – depicts change in variability across time.

Based on the relevant literature, the following plan was established. Definitions of key terms used in this section can be found in Table 7 above. Central tendency, trend and

variability were calculated for all VAS measures. Various methods were used to calculate these parameters depending on phase length (Morley, 2015; Morley & Adams, 1991). Table 8 summarises the calculations used and the manner in which these are presented within the graphs. Phases are separated by vertical solid lines. Graphs depicting central tendency and trend are presented within each participant subsection and graphs showing trended range can be seen in Appendices 19-25.

Table 8.

Calculations used for Central Tendency, Trend and Variability.

Measures of Central Tendency – Dashed Line		
Phase Length	Method Used	Represented Graphically by
1	Data points only (no line)	Round dots
2-4	Median	Dashed line
5+	Broadened Median (BMED)	Dashed line
Trend in Phase Data – Dotted Line		
Phase Length	Method Used	Represented Graphically by
1-2	Data points only (no line)	Round dots
3+	Running Mean of 2 (RM2)	Dotted line
Variability within Phases – Solid Lines		
Phase Length	Method Used	Represented Graphically by
1-2	Data points only (no line)	Diamond shaped dots
3+	Trended Range	Solid black lines

According to Gast and Spriggs (2010), baseline stability can be assumed when 80% of the phase data falls within a 20% range of the median. Due to the small number of data

points available, a conservative approach to baseline stability was used with stability being assumed only when all phase data points fell within a 20% range of the median.

In cases where baseline data was unstable and there was a minimum of three data points in both baseline and treatment phases, Tau-U analysis was carried out. This is a statistical analysis that controls for trend in baseline and assesses level of overlap in data between phases simultaneously (Parker et al., 2011). In cases where less than three data points were available in either phase, statistical analysis was deemed inappropriate. In these cases, the source of variability is discussed in so far as is possible (Kratochwill et al., 2010) and cautious visual analysis is carried out (See Figure 3 for a summary).
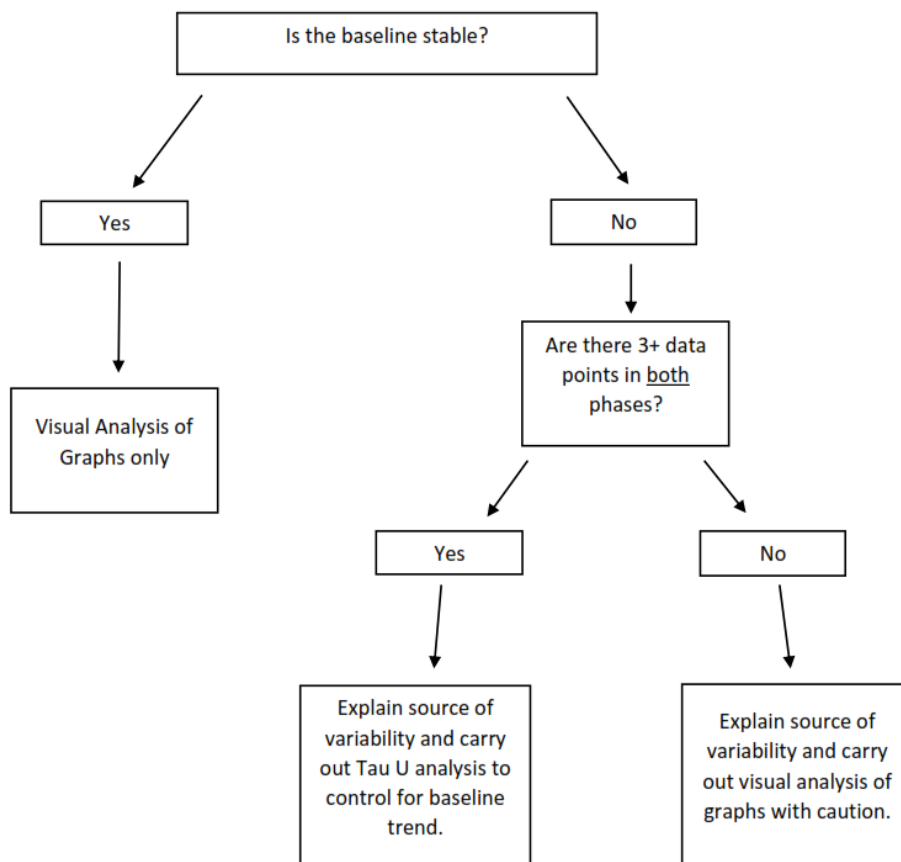

Figure 3. Flow chart for use of statistical means of baseline control.

Participant A. Table PA1 shows PA's rescript details. PA spoke English as a first language, had experienced multiple traumas in life and met criteria for complex PTSD. She was experiencing significant dissociation and ongoing legal difficulties at the time of treatment.

Table PA1.

Target Image, Encapsulated Belief, Counterfactual Thoughts and Chosen Rescript for PA.

Target Image	Encapsulated Belief	Counterfactual Thoughts	Rescript
Held at gun point in domestic violence situation. Perpetrator known to participant.	'I was helpless and defeated and that means I am weak.'	1 'If only I didn't go in there, then this s*** wouldn't have happened.' 2 'If only I had kept my mouth shut about my relation to him, this wouldn't have happened.' 3 'If only there had been a back-up there. The police should have sent someone. If only someone was guiding and supporting me.'	1st session – martial arts used to gain control of gun and physically attack perpetrator. 2nd session – verbally berated perpetrator and forced him to leave. Set scene of trauma alight and teleported police into the fire before zapping them with a magical weapon and going to safe place. 3rd session – used superpowers to transform gun. Cleansed soul of perpetrator with help of magical creature before zapping him away. Sought revenge on police for not aiding her. Verbally berated them, physically assaulted them and squashed them with a magic machine. Went to safe space with magical creature.

Three baseline points were available for PA, followed by three rescripting sessions and two follow-up data points. PA had not completed rescripting of the target image and work continued following study involvement. Baseline data across all measures with the exception of Uncontrollability was either increasing or within a 20% range of the median and thus deemed to be stable. Statistical analyses were used with regard to Uncontrollability baseline instability. Image Intrusiveness, Encapsulated Belief and Counterfactual Thought VAS scales are graphically displayed in Figures PA1-5, Figure PA6 and Figures PA7-12 respectively. GOS and Session Content codes are summarised in Table PA2.
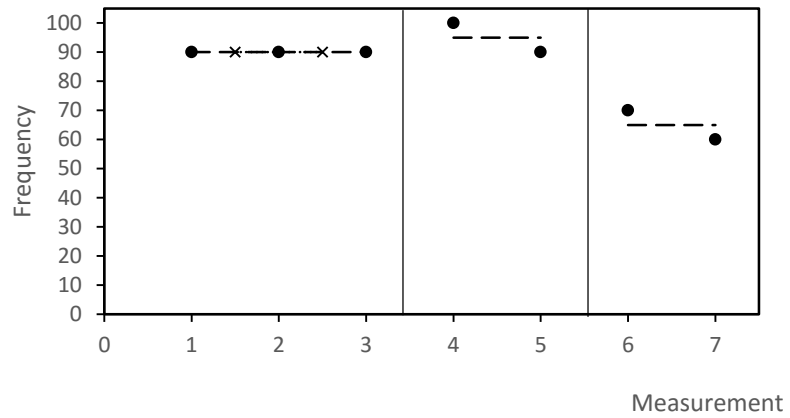
Figure PA1. Frequency VAS: raw data (●), central tendency (------) and trend (··x··).
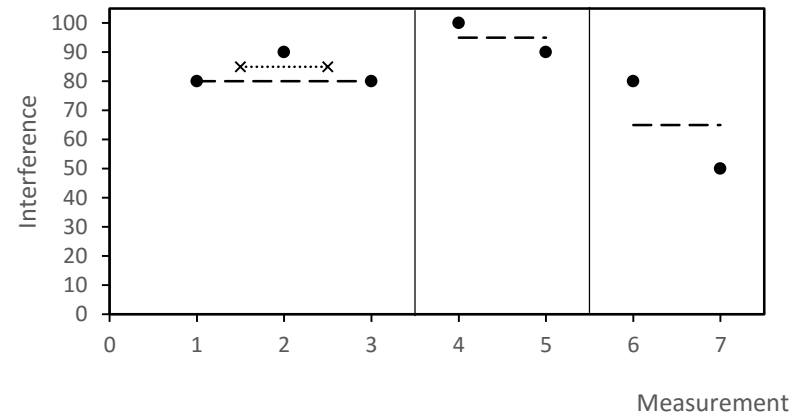

Figure PA2. Interference VAS: raw data (●), central tendency (------) and trend (··x··).
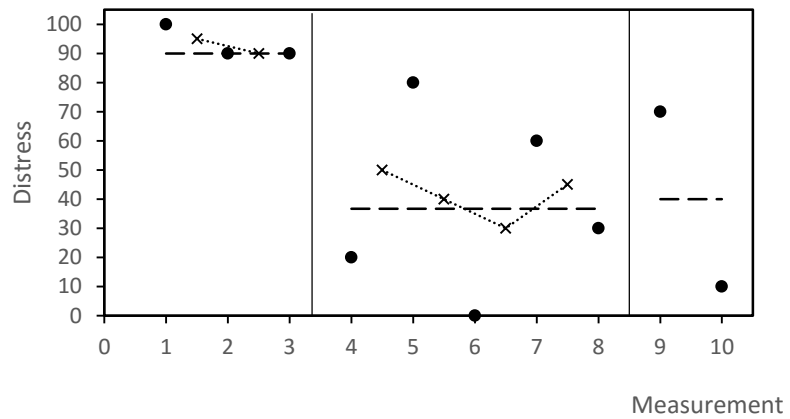

Figure PA3. Distress VAS: raw data (●), central tendency (------) and trend (··x··).
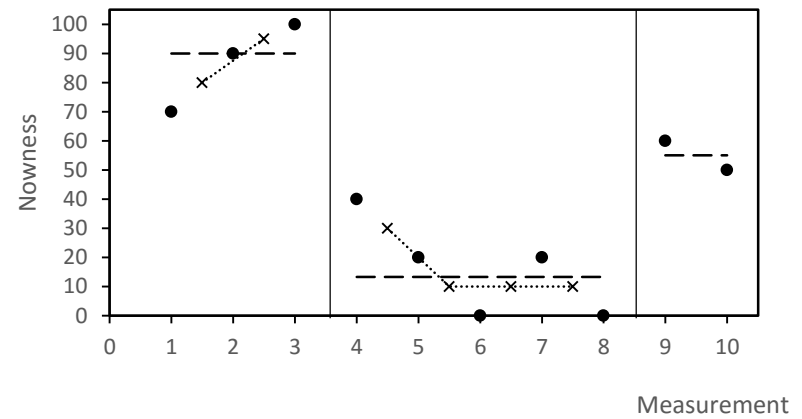

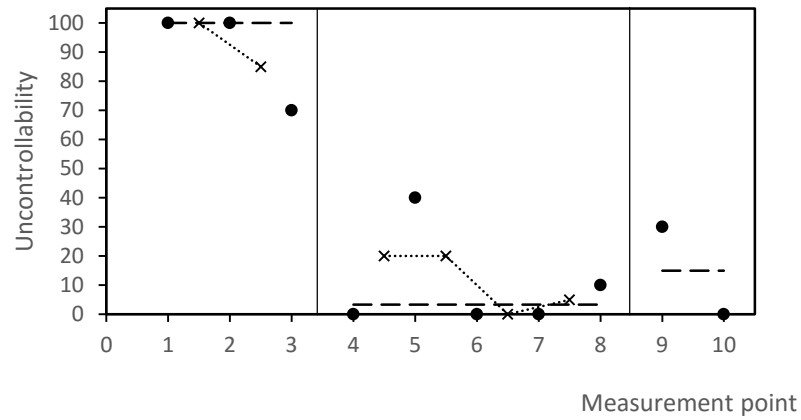*Figure PA4.* Nowness VAS: raw data (●), central tendency (----) and trend (··x··).

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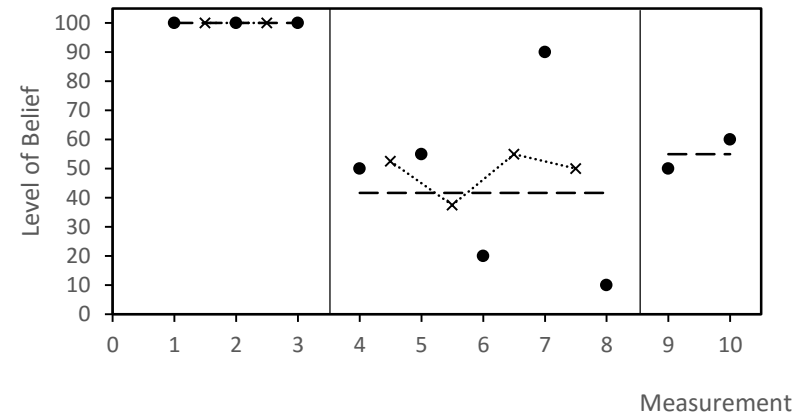*Figure PA5.* Uncontrollability VAS: raw data (●), central tendency (------) and trend (··x··).

Figure PA6. Level of Belief VAS: raw data (●), central tendency (------) and trend (··x··).
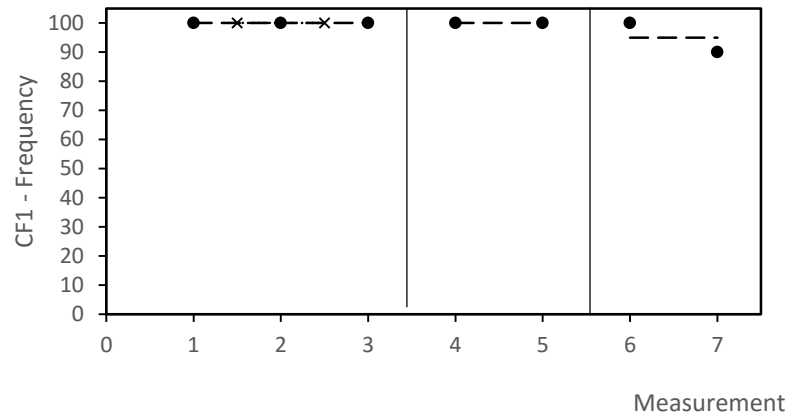
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Figure PA7. CF1-Frequency VAS: raw data (●), central tendency (---) and trend (··x··).

Figure PA8. CF1-Distress VAS: raw data (●), central tendency (------) and trend (··x··).

Figure PA9. CF2-Frequency VAS: raw data (●), central tendency (-----) and trend (··x··).

Figure PA10. CF2-Distress VAS raw data (●), central tendency (------) and trend (··x··).
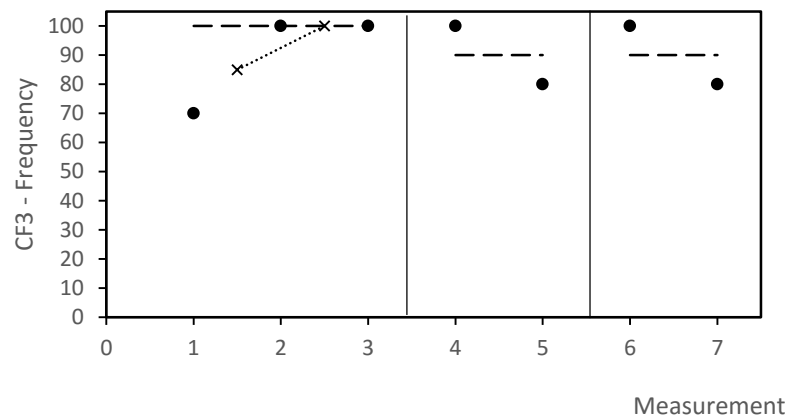
Figure PA11. CF3-Frequency VAS: raw data (●), central tendency (-----) and trend (··x··).
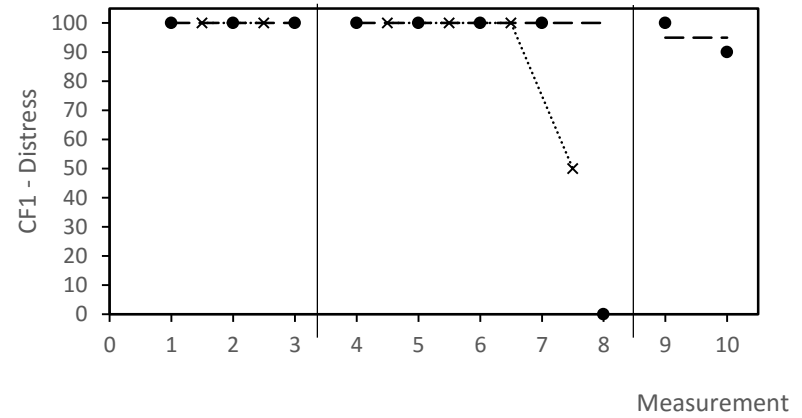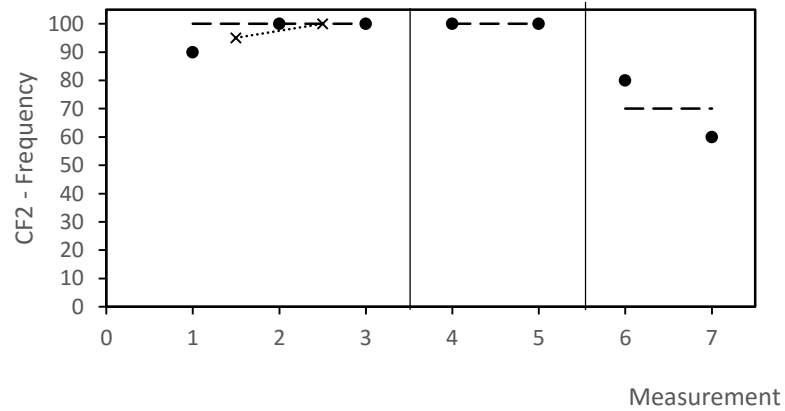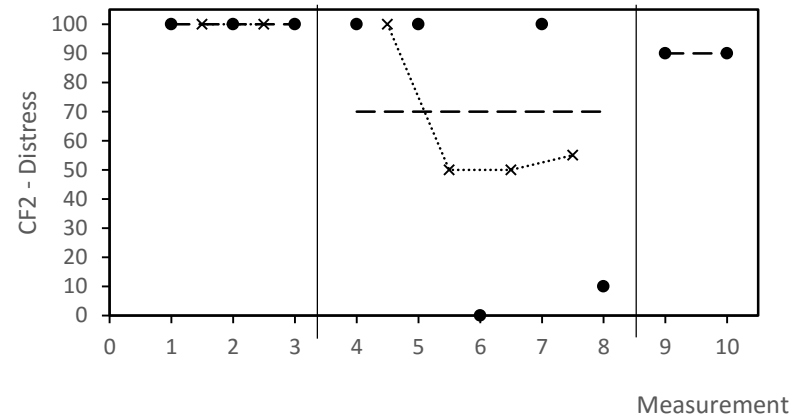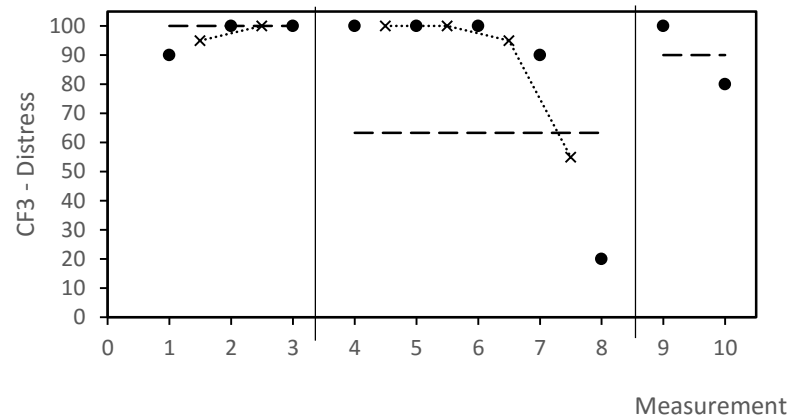

Figure PA12. CF3-Distress VAS: raw data (●), central tendency (------) and trend (··x··)

Table PA2.

Summary of GOS and Session Content Codes for PA.

GOS	Image Departure	Timing of Change	Staying with Image	Therapist Guidance	Original Imagery Activation	New Imagery Activation	Original Processes	New Processes	Cognitive/ Emotional Shift	Rescript Believability
9	2	3	3	3	2	2	2	3	3	3
8	2	3	3	2	3	2	2	3	2	2
10	2	3	3	2	3	3	3	3	3	3

Note: GOS coding ranges from 0-12 and Session Content codes range from 0-3.

Linking GOS and Session Content codes to outcome. Sessions 1 and 3 were well-simulated, while session two fell just below this cut-off and was less well-simulated. As can be seen from the coding summary, all sessions contained some original imagery of the trauma, but mostly new, rescripted imagery. Change was always introduced during the image, including the worst point, and PA did not have any difficulties staying with the imagery. The first session was rated as mostly self-guided but therapist guidance increased thereafter in order to facilitate more vivid and detailed descriptions within the imagery.

For the first session, both original trauma elements and new imagery elements were rated as moderately activated. These ratings increased across sessions such that, by the last session, PA was rated as visualising all imagery very vividly. PA was rated as experiencing high activation of original trauma emotions (fear/anger), thoughts ('How dare you?') and physical sensations (pain, body temperature) for the first two sessions. This intensity increased during the final session. Emotions (reduced fear, relief, pride), thoughts ('He's pathetic', sense of authority and power) and physical sensations (body relaxing) associated with new imagery elements were rated as very highly activated across all sessions. Associated level of cognitive/emotional shift and level of belief in the rescript were both rated as shifting from high to medium and back to high.

In terms of outcome, these factors were followed by a delayed decrease in Frequency and Interference (follow-up). For the remaining Image Intrusiveness measures and Level of Belief, some changes in scores occurred during the treatment phase. However, a stable and continued decrease in scores was not achieved for most measures. Uncontrollability, in particular, also showed significant baseline trend. Non-overlap

analysis showed that differences between baseline and treatment fell short of significance, TAUb = -.87 (p = .05), Confidence Intervals (CI): -1.6<>-.13. Generally speaking, these measures showed a pattern in variability whereby scores decreased notably from the start to end of a session, followed by a subsequent increase by the beginning of the following session. This variability generally decreased across the treatment phase to some extent. However, scores generally increased at follow-up.

In terms of counterfactual thinking, the largest changes in Distress across all counterfactuals were seen in Session 3 which was the only session that was both well-simulated and rescripted fully in-line with one of PA's main counterfactual beliefs. Changes were also seen during Session 2, which was moderately well-simulated and partially in-line with CF3. However, session specific changes were found for CF1 and CF2, even though they were not incorporated into the rescript. Despite large decreases in scores within certain sessions, overall, gains from baseline to follow-up for most counterfactual measures were small. Counterfactual frequency data were less variable. No changes were seen in CF1. CF2 Frequency remained high and stable across the treatment phase but dropped at follow-up with a downward trend. CF3 central tendency decreased from baseline to treatment and was maintained at follow-up.

Participant B Table PB1 shows PB's rescript details. PB spoke English as a first language. She had experienced multiple traumas and suffered from physical disabilities relating to her trauma history. The image in question related to a medical procedure carried out in relation to an intensive care unit (ICU) admission.

Table PB1.

Target Image, Encapsulated Belief, Counterfactual Thoughts and Chosen Rescript for PB.

Target Image	Encapsulated Belief	Counterfactual Thoughts	Rescript
Medical procedure carried out by a nurse without sedation in the context of an ICU admission.	'I am worthless.'	'If only I'd been sedated.' 'If only someone had stepped in.' 'If only she'd talked to me.' (nurse)	PB instigated conversation with nurse that resulted in sedation prior to the procedure. Image also changed such that nurse was more friendly and reassuring and offered an explanation of the procedure as it progressed.

Three baseline data points are available for PB, followed by one session of rescripting and one follow-up session. Rescripting work on the target image was deemed to be complete at this time. Because PB only had one rescripting session, there is no treatment phase data for any of the Frequency or Interference measures. All remaining measures contain one data point during the treatment phase. There was a gap of three weeks between the second and third baseline points. For all measures, there is an obvious increase in variability and downward trend across the baseline phase. Data did not meet criteria for stability for any of the measures. Statistical analysis was not deemed appropriate due to limited treatment phase data.

Interestingly, PB reported that, after completing measures for the second baseline point, she spontaneously started to rescript the image independently. For all measures, the first two baseline points either met stability criteria or increased. This was followed by a significant decrease in scores for baseline point 3, when spontaneous rescripting

occurred. This will be taken into account during the following sections. However, it renders analysis difficult because, if the third baseline point is considered as potentially falling more within the rescripting phase, only two baseline points are then available, making it impossible to assume stability. Thus, the following analysis must be viewed with caution and any findings are tentative. Image Intrusiveness, Encapsulated Belief and Counterfactual Thought VAS scales are graphically displayed in Figures PB1-5, Figure PB6 and Figures PB7-14 respectively. GOS and Session Content codes are summarised in Table PB2.
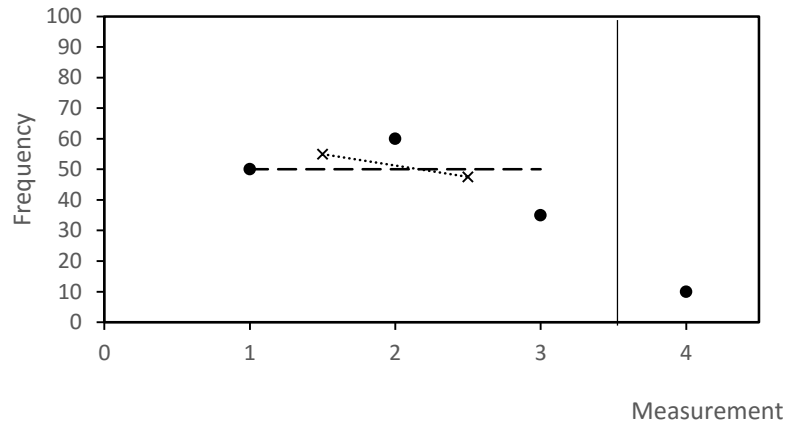
Figure PB1. Frequency VAS: raw data (●), central tendency (---------) and trend (··x··)

Figure PB2. Interference VAS: raw data (●), central tendency (-------) and trend (··x··).

Figure PB3. Distress VAS: raw data (●), central tendency (------) and trend (··x··).
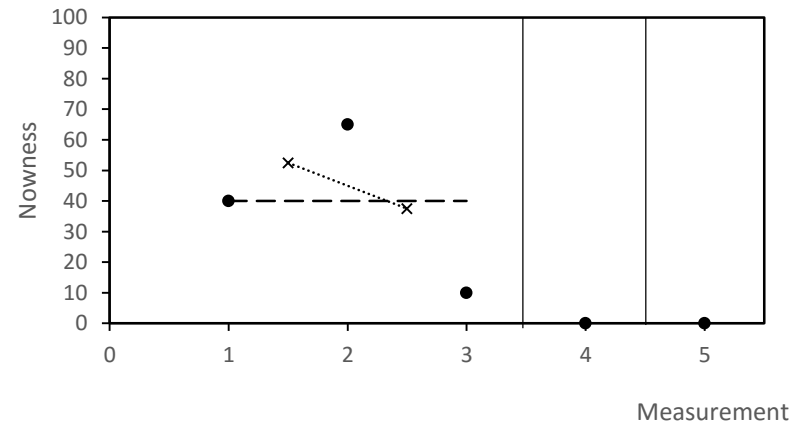
Figure PB4. Nowness VAS: raw data (●), central tendency (------) and trend (··x··).
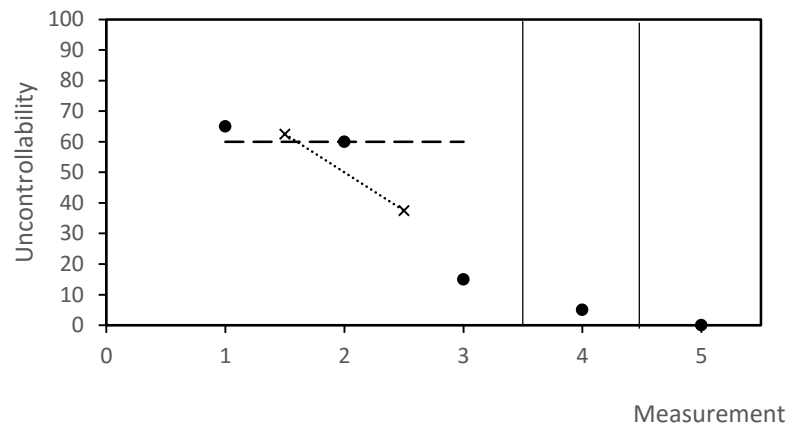
Figure PB5. Uncontrollability VAS: raw data (●), central tendency (------) and trend (··x··).
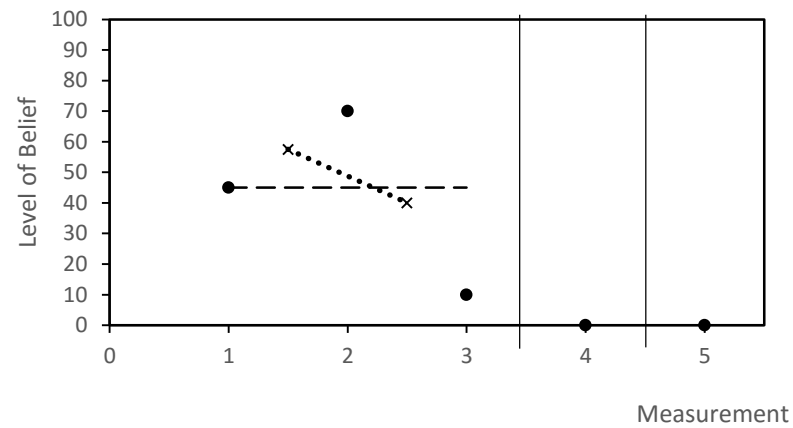
Figure PB6. Level of Belief VAS: raw data (●), central tendency (------) and trend (··x··).
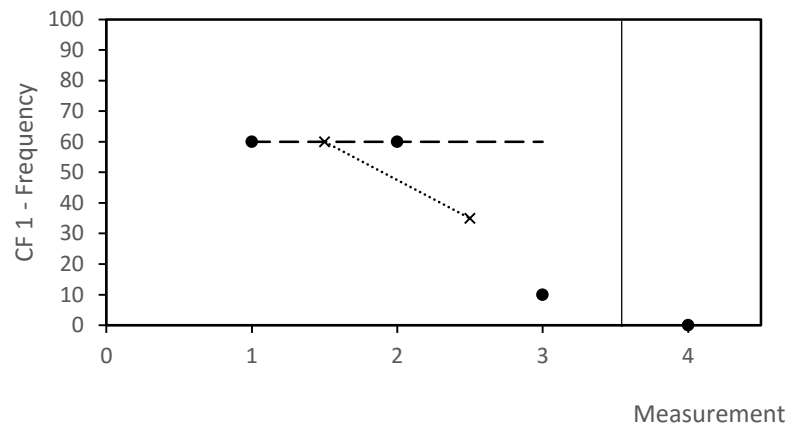
Figure PB7. CF1-Frequency VAS: raw data (●), central tendency (-----) and trend (··x··).
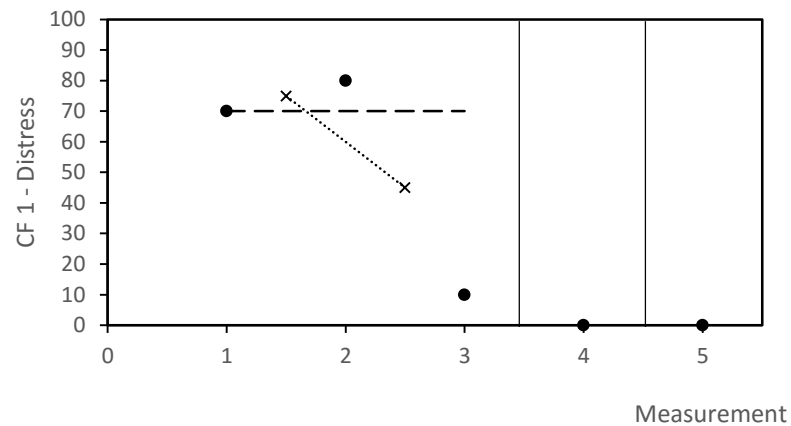
Figure PB8. CF1-Distress VAS: raw data (●), central tendency (------) and trend (··x··).
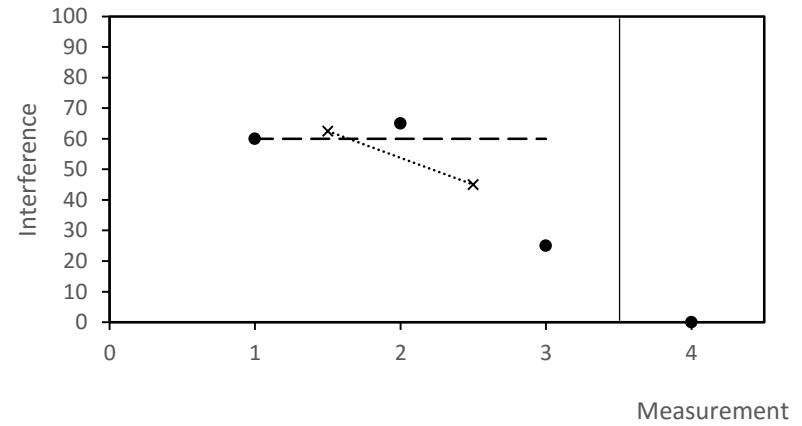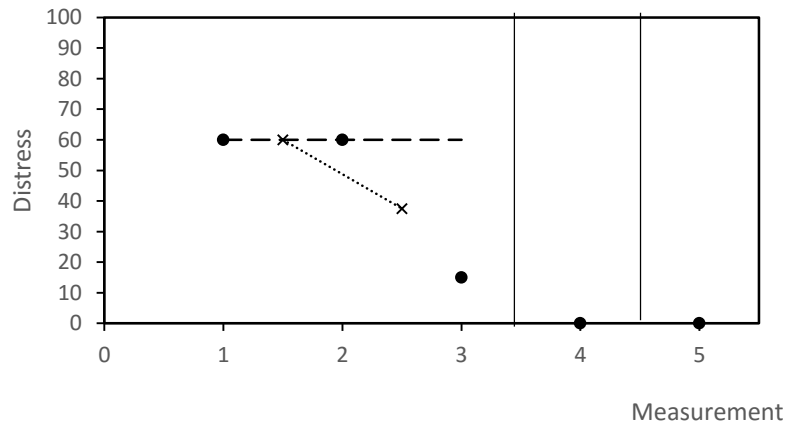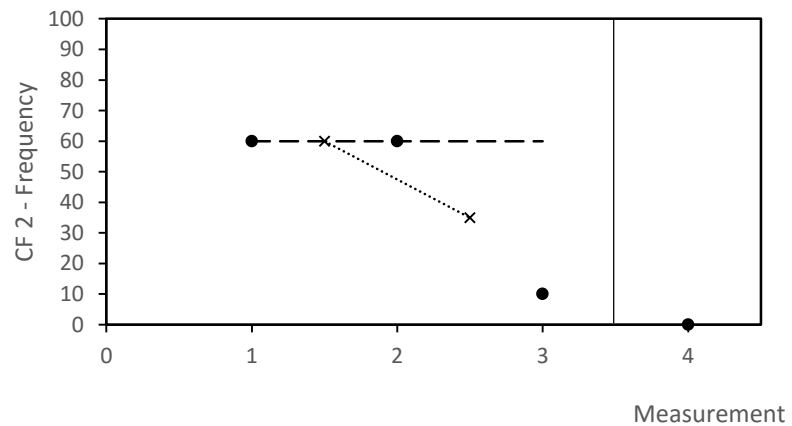

Figure PB9. CF2-Frequency VAS: raw data (●), central tendency (-----) and trend (··x··).
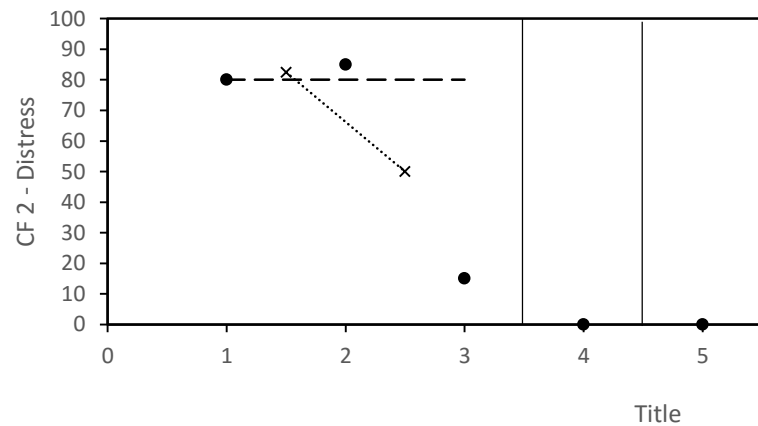
Figure PB10. CF2-Distress VAS: raw data (●), central tendency (------) and trend (··x··).
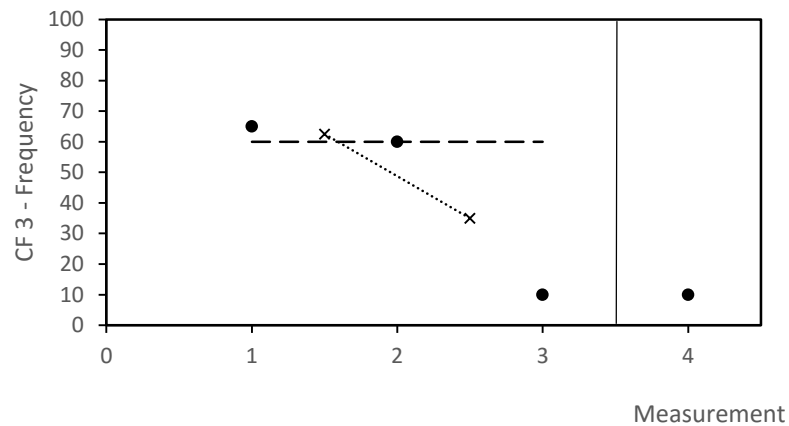
Figure PB11. CF3-Frequency VAS: raw data (●), central tendency (-----) and trend (··x··).
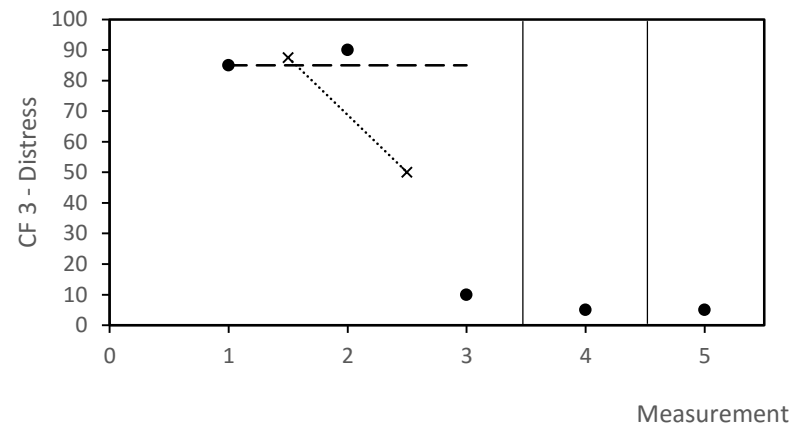
Figure PB12. CF3-Distress VAS: raw data (●), central tendency (------) and trend (··x··).

Table PB2.

Summary of GOS and Session Content Codes for PB.

GOS	Image Departure	Timing of Change	Staying with Image	Therapist Guidance	Original Imagery Activation	New Imagery Activation	Original Processes	New Processes	Cognitive/ Emotional Shift	Rescript Believability
12	2	3	3	3	3	3	1	3	3	3

Note: GOS coding ranges from 0-12 and Session Content codes range from 0-3.

Linking GOS and Session Content codes to outcome. PB received maximum scores across all simulation codes. Rescripting consisted of mostly new, rescripted imagery and some original imagery elements. Change was introduced during the image, although the worst moment was not included. PB was able to stay with the imagery throughout and imagery was mostly self-guided.

Both original and new, rescripted imagery elements were rated as very vivid and intense with many of the senses experienced very clearly. PB appeared to experience low activation of emotions (anxiety), thoughts and physical sensations (tired, cold) associated with the original image. However, new emotions (e.g., relief, happiness, reassured), cognitions ('looking forward to it being over', 'will miss it – it has been a big part of my life') and physical sensations (e.g., relaxed, strange/ticklish-sensation) associated with change in the imagery were rated as very highly activated. Ratings suggest that the resultant rescript was associated with a high level of change in meaning and was experienced as completely believable.

While the largest decrease in scores across measures tended to take place at the end of the Baseline phase (i.e., spontaneous rescripting), a further decrease in scores for all Image Intrusiveness and Encapsulated Belief measures occurred during the following phase. Furthermore, there was no overlap in scores between baseline and treatment phases, and gains were either maintained or showed further improvement at follow-up. PB rescripted in-line with all three of her counterfactuals. Taking spontaneous rescripting into account, ImRs was followed by a sustained decrease in Frequency and Distress of all counterfactuals.

However, caution is required with regard to PB's results due to the substantial variability and downward baseline trend. On the one hand, this trend is likely due to the spontaneous rescripting that occurred at the end of the baseline phase. This is supported by the fact that the first two baseline points across all measures were either stable or increased. On the other hand, there are two remaining reasons for caution. Firstly, two data points is not enough to assume phase stability. Secondly, no coding exists for the rescripting that took place independently, making it harder to draw conclusions about links between the above identified codes and outcome measures.

Participant C. Table PC1 shows PC's rescript details. PC spoke English as a second language without the need for an interpreter. PC had experienced sustained and multiple traumas as an adult and was experiencing asylum issues and significant social isolation at the time of treatment.

Table PC1.

Target Image, Encapsulated Belief, Counterfactual Thoughts and Chosen Rescript for PC.

Target Image	Encapsulated Belief	Counterfactual Thoughts	Rescript
Being forced into oral rape with a prison guard.	'It was unfair.'	'I wish I could have pushed him away or punched his face.' 'If only I'd kept my mouth shut.' 'If only he hadn't come on his own.'	PC sought revenge on perpetrator by physically attacking him. Rescript continued such that PC was able to leave prison via legal proceedings.

Three baseline points are available for PC, followed by one session of rescripting and two follow-up points. PC felt that he had done sufficient work on the image following one session of rescripting and no further image work was planned. Thus, there is no treatment phase data available for any Frequency or Interference measures. All remaining measures contain one data point during treatment. Baseline data for all measures, with the exception of Nowness, either met criteria for stability or showed an increase in trend. Due to the lack of sufficient treatment phase data, Tau-U analysis was not applied to Nowness data. Thus, particular caution is necessary when interpreting Nowness results. Image Intrusiveness, Encapsulated Belief and Counterfactual Thought VAS scales are graphically displayed in Figures PC1-5, Figure PC6 and Figures PC7-12 respectively. GOS and Session Content codes are summarised in Table PC2.

Figure PC1. Frequency VAS: raw data (●), central tendency (-------) and trend (x).
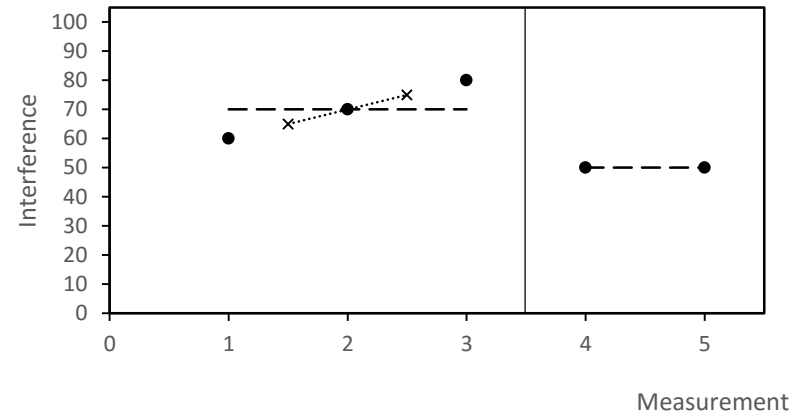
Figure PC2. Interference VAS: raw data (●), central tendency (------) and trend (x).
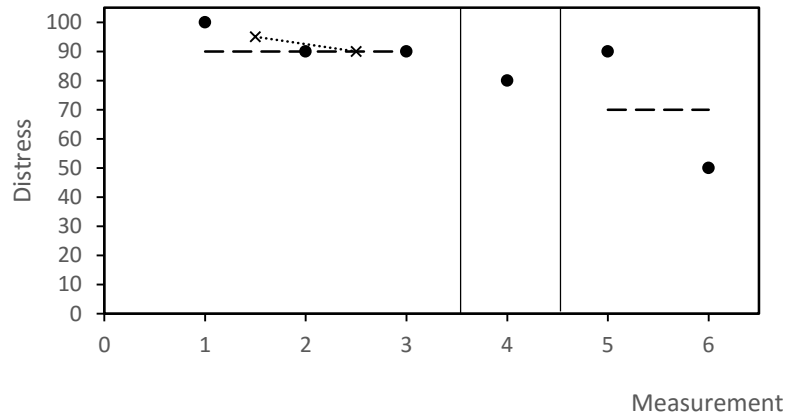
Figure PC3. Distress VAS: raw data (●), central tendency (------) and trend (x).
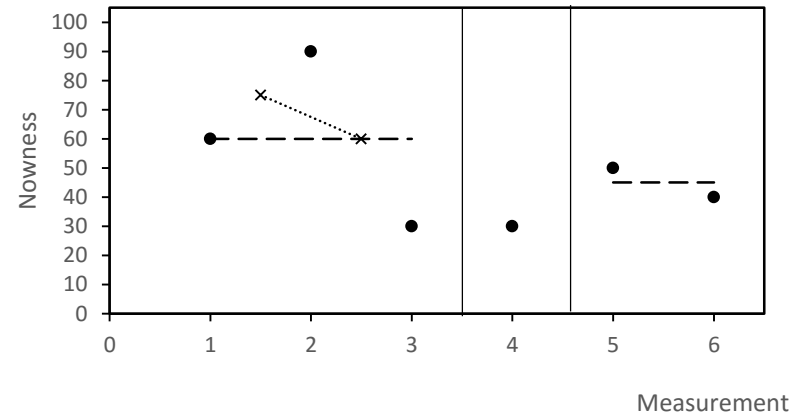
Figure PC4. Nowness VAS: raw data (●), central tendency (---) and trend (x).
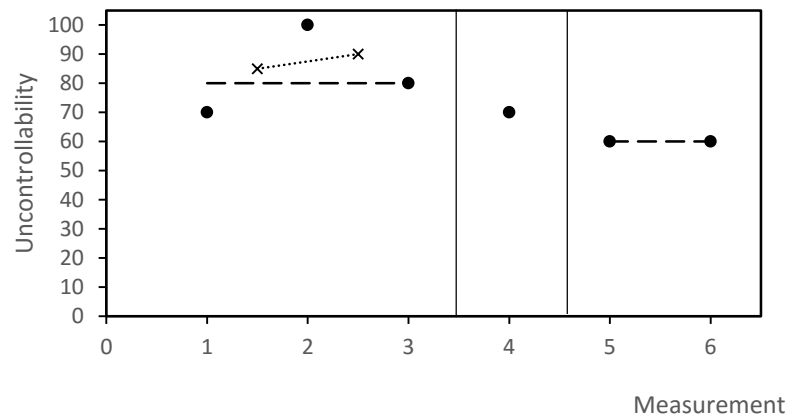
Figure PC5. Uncontrollability VAS: raw data (●), central tendency (------) and trend (··x··).
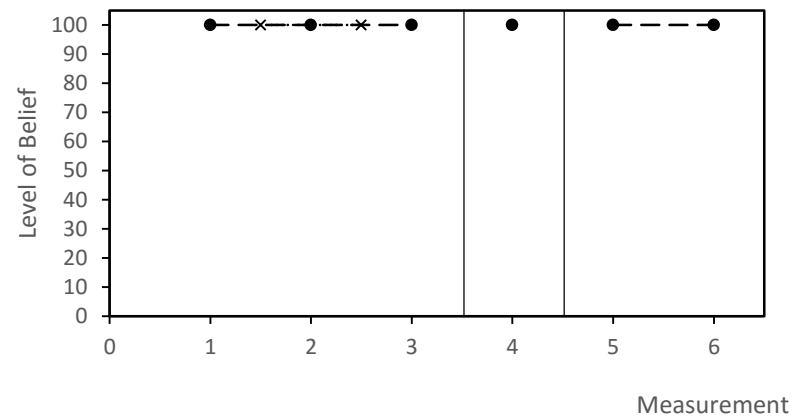
Figure PC6. Level of Belief VAS: raw data (●), central tendency (------) and trend (··x··).
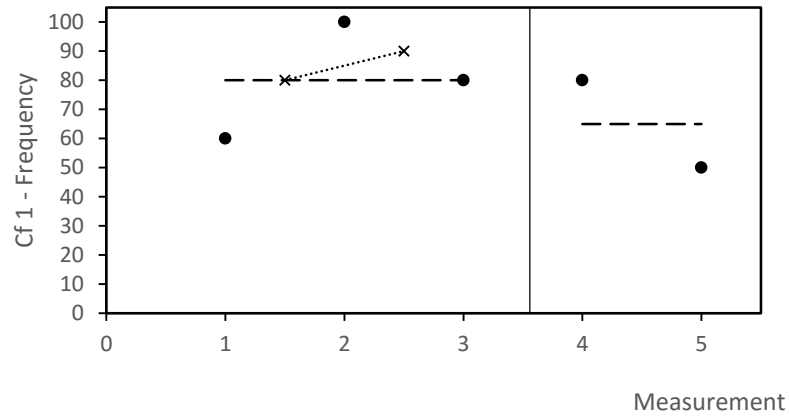
Figure PC7. CF1-Frequency VAS: raw data (●), central tendency (-----) and trend (··x··).
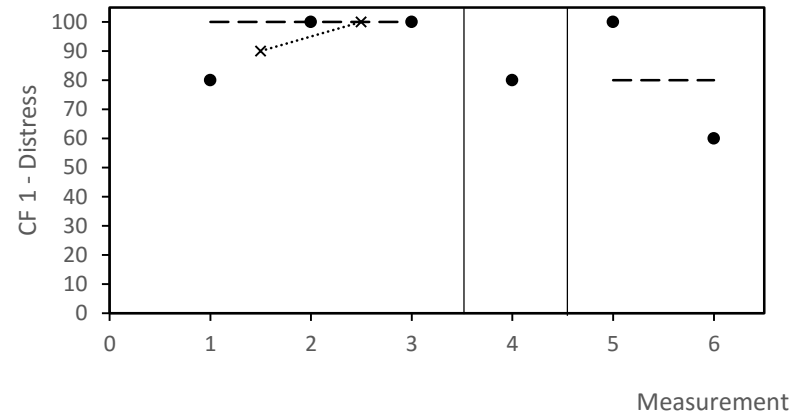
Figure PC8. CF1-Distress VAS: raw data (●), central tendency (------) and trend (··x··).
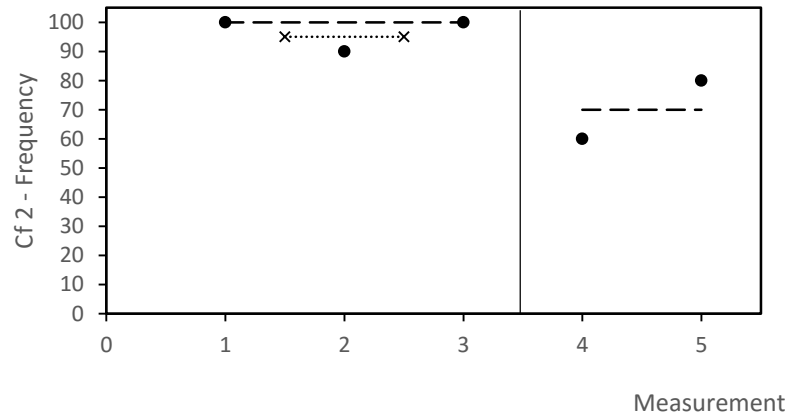
Figure PC9. CF2-Frequency VAS: raw data (●), central tendency (---) and trend (··x··).
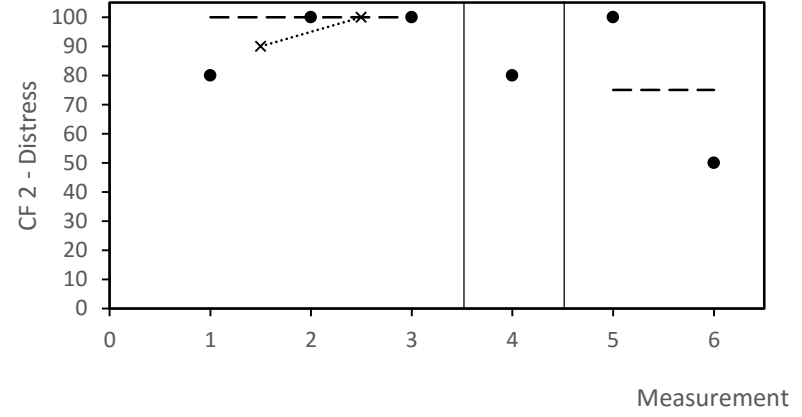
Figure PC10. CF2-Distress VAS: raw data (●), central tendency (------) and trend (··x··).

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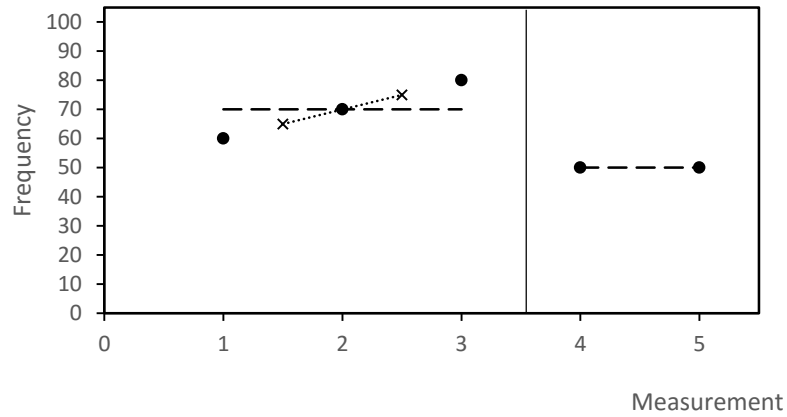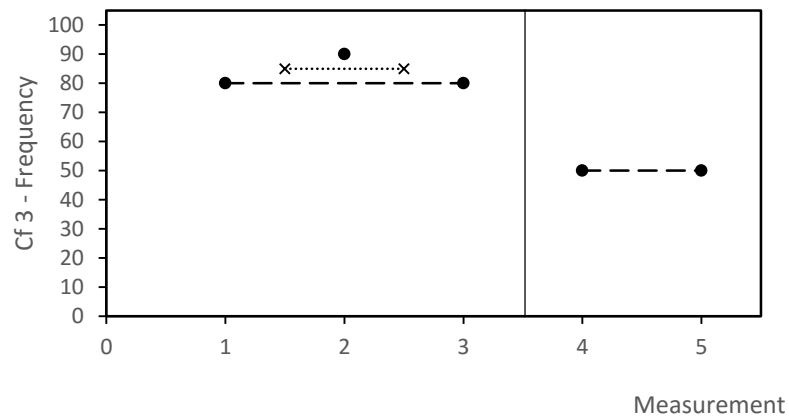*Figure PC11.* CF3-Frequency VAS: raw data (●), central tendency (-----) and trend (··x··).
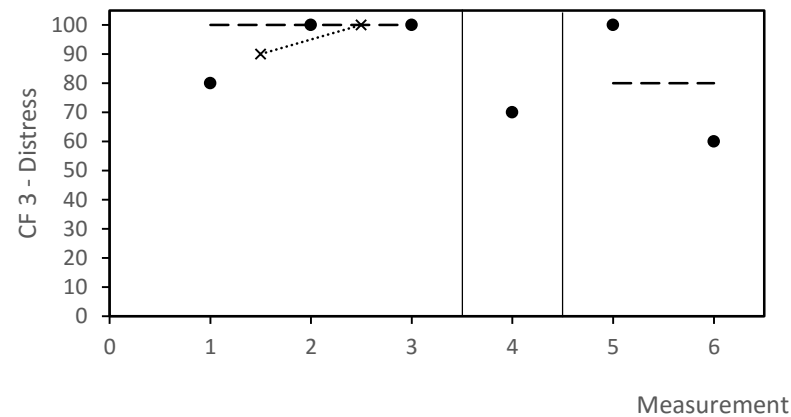
Figure PC12. CF3-Distress VAS: raw data (●), central tendency (------) and trend (··x··).

Table PC2.

Summary of GOS and Session Content Codes for PC.

GOS	Image Departure	Timing of Change	Staying with Image	Therapist Guidance	Original Imagery Activation	New Imagery Activation	Original Processes	New Processes	Cognitive/ Emotional Shift	Rescript Believability
7	2	2	3	2	3	2	1	1	1	1

Note: GOS coding ranges from 0-12 and Session Content codes range from 0-3.

Linking GOS and Session Content codes to outcome. PC's rescript fell within the moderate GOS range. It contained some original, trauma-related elements, but mostly consisted of new imagery. Change was introduced during the original image, although the worst moment was not included. PC was able to stay with the imagery throughout the session although some therapist guidance was necessary to facilitate more vivid and detailed descriptions.

Original trauma-imagery elements were rated as very vivid while new, rescripted elements were rated as moderately vivid. Original and new internal processes were both given low intensity ratings. Processes associated with the trauma included emotions (fear) and thoughts ('might get beaten up'). During rescripted imagery, while PC still experienced some fear, he also experienced relief and happiness. New thoughts ('life is changeable', 'glad that it is being done by the books') were also present. Ratings indicated that PC experienced a low level of cognitive/emotional shift and that the rescript was only somewhat believable.

In terms of Imagery Intrusiveness, the most consistent and stable change were found for Frequency, Interference and Uncontrollability, all of which showed small but clear decreases in central tendency across treatment and follow-up. Data variability and baseline instability for Distress and especially Nowness made it difficult to draw any concrete conclusions about lasting change. No change in Level of Belief in the encapsulated belief occurred.

In terms of counterfactual thinking, moderate simulation levels co-occurred with changes in Frequency for all three counterfactuals. Only CF1, which was incorporated

into the rescript, continued to decrease further across follow-up. However, there were no difference between counterfactuals in terms of Distress, with all three showing some evidence of a decrease in central tendency during treatment followed by subsequent increases and variability at follow-up, making conclusions about stable change difficult. Caution in interpretation is required due to the limited treatment phase data, especially for Frequency and Interference data, for which no treatment phase data was available.

Participant D. Table PD1 shows PD's rescript details. PD could not identify any particularly strong counterfactual beliefs associated with her image. Thus, no counterfactual measures were completed. Although it was not her first language, sessions were conducted in English. PD had experienced an eight-year period of domestic abuse. During Session 3, PD reported awaiting results of a potentially serious health condition.

Table PD1.

Target image, Encapsulated Belief, and Chosen Rescript for PD.

Target Image	Encapsulated Belief	Counterfactual Thoughts	Rescript
Being verbally and physical abused by husband.	'As a human being, I am extinguished and dead'	-	Fictional characters brought into rescript to physically intimidate and verbally berate perpetrator, before comforting PD. Characters and PD then travel to a safe space and engage in pleasant activities.

Three baseline points are available for PD, followed by three rescripting sessions and one follow-up point. Work on the target image was then considered complete. Due to

the fact that PD was approaching the end of her treatment within the service, sessions were conducted every second week. Thus, there was a gap of two weeks between treatment session and before follow-up. Baseline data for all measures, except Interference, met criteria for stability. Due to limited treatment phase data, Tau-U analyses were not conducted in relation to Interference. Image Intrusiveness and Encapsulated Belief VAS scales are graphically displayed in Figures PD1-5 and Figure PD6 respectively. GOS and Session Content codes are summarised in Table PD2.
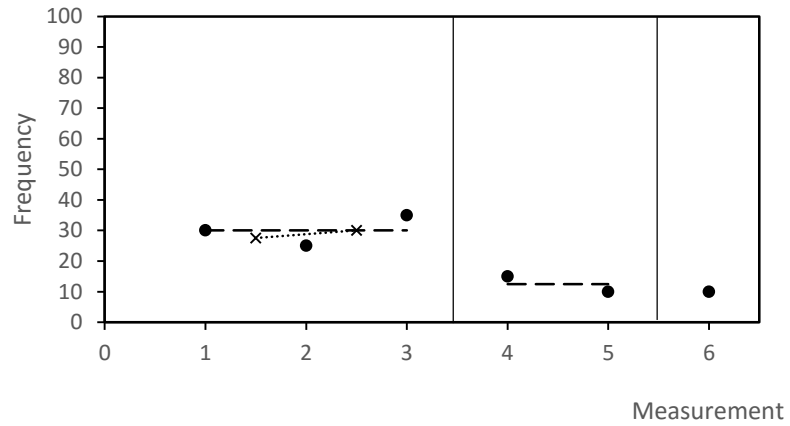
Figure PD1. Frequency VAS: raw data (●), central tendency (------) and trend (x).
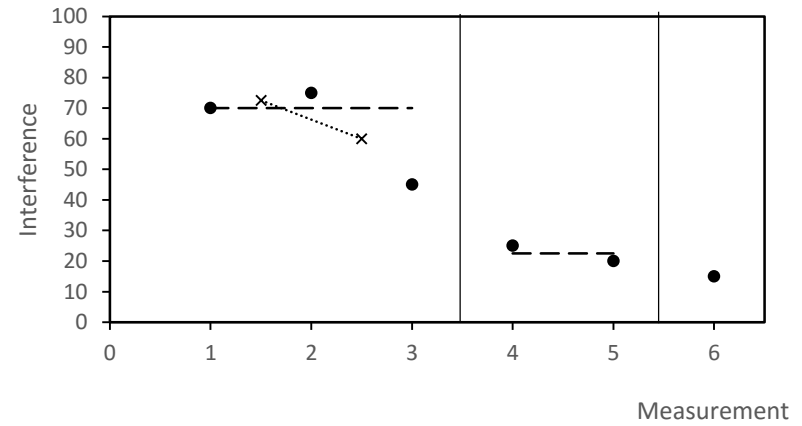
Figure PD2. Interference VAS: raw data (●), central tendency (----) and trend (x).
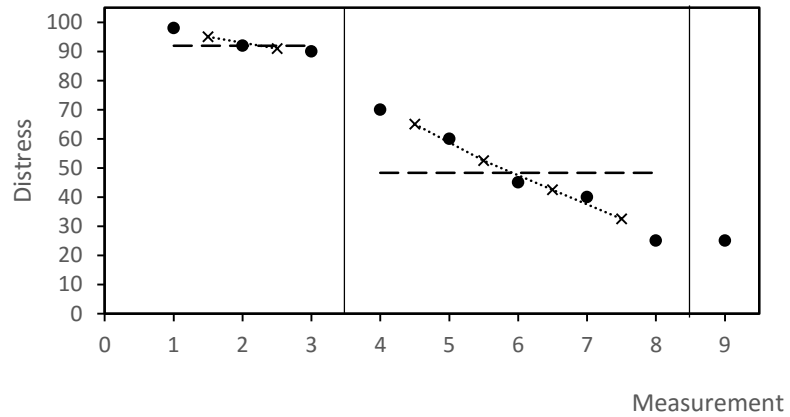
Figure PD3. Distress VAS: raw data (●), central tendency (------) and trend (x).
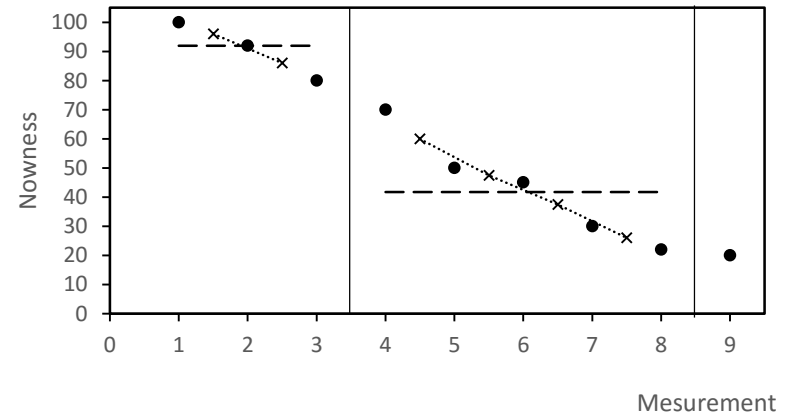
Figure PD4. Nowness VAS: raw data (●), central tendency (------) and trend (x).

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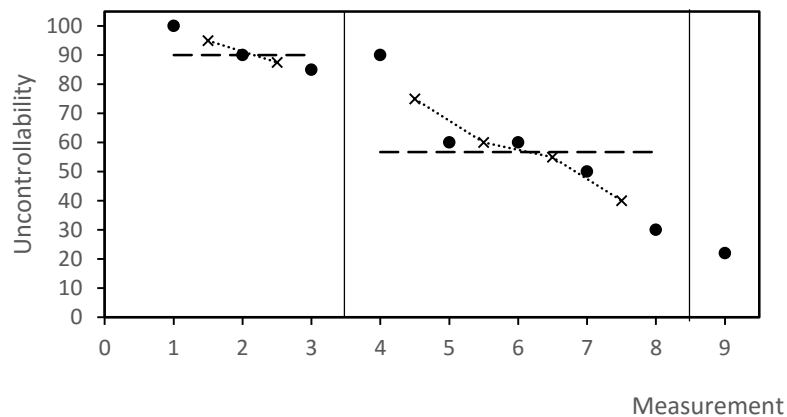
Figure PD5. Uncontrollability VAS: raw data (●), central tendency (------) and trend (··x··).
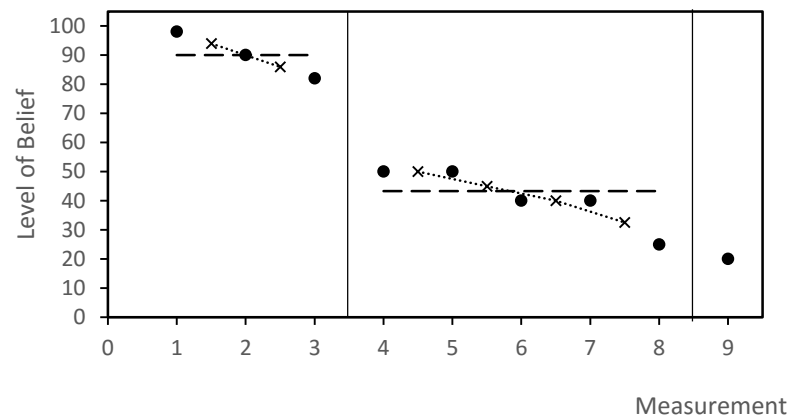
Figure PD6. Level of Belief VAS: raw data (●), central tendency (------) and trend (··x··).

Table PD2.

Summary of GOS and Session Content Codes for PD.

GOS	Image Departure	Timing of Change	Staying with Image	Therapist Guidance	Original Imagery Activation	New Imagery Activation	Original Processes	New Processes	Cognitive/ Emotional Shift	Rescript Believability
7	2	3	3	2	1	3	2	2	1	1
10	2	3	3	3	2	3	2	3	2	2
9	2	3	3	3	1	2	1	3	2	2

Note: GOS coding ranges from 0-12 and Session Content codes range from 0-3.

Linking GOS and Session Content codes to outcome. Session 2 and 3 were well-simulated relative to Session 1 which was less well-simulated. Interestingly, at the end of Session 2, PD spontaneously remarked that she had found the rescripting process easier than she had during the previous week as it 'felt more coherent' this time. Session 1 was described as 'jumping from one bit to the next more', making it more difficult to follow. PD used some original trauma-imagery but mostly new image elements across sessions. Change was introduced during the image, including the worst point. PD did not have any difficulties staying with the imagery and progressed from moderately self-guided to mostly self-guided rescripting.

Original trauma imagery was rated as somewhat to moderately vivid while new imagery was rated more vividly. Ratings of original emotions (fear), thoughts ('I am emotionally non-existent') and physical sensations (paralysed) decreased in intensity across sessions. Ratings of new emotions (feel 'good', laughs during rescript) and thoughts ('My appetite for life hasn't completely died') associated with the rescript, increased from highly to very highly activated by the end of rescripting. Ratings for cognitive/emotional shift and level of belief in the rescript both increased across sessions.

In terms of outcome, graphs show a clear but small decrease in Frequency and more pronounced decreases in Level of Belief in the encapsulated belief. Decreases in Interference cannot be attributed to ImRs onset due to significant baseline variability. Remaining measures showed consistent decreases during treatment but graphical analyses show similar rates of decline to baseline. Despite meeting baseline stability criteria, the Tau-U analysis was carried out (Table PD3). Gains made in treatment for

Distress and Nowness fell just short of significance, which may partially reflect lack of power due to limited number of data points. Distress, in particular, shows the greatest decrease in scores at treatment onset. Uncontrollability changes at treatment were not significant.

Table PD3.

Tau-U analysis for Distress, Nowness and Uncontrollability for PD.

	TAUb	P Value	CI 90%
Distress	-.8	.07	-1.54<>-.06
Nowness	-.8	.07	-1.54<>-.06
Uncontrollability	-.62	.18	-1.54<>-.14

Due to the fact that PD was at the end of over 200 sessions of treatment, it is possible that a certain level of spontaneous rescripting occurred during the baseline due to PD's familiarity with the technique. With this in mind, a sizeable and steady decrease in scores was found. However, due to the absence of coding during the baseline and lack of stability, it is difficult to make concrete links between specific codes and outcome. That said, it is also notable that scores did not increase towards the end of the treatment phase when PD reported experiencing a considerable amount if distress in relation to a potentially serious health scare.

Participant E. Table PE1 shows PE's rescript details. PE's trauma related to the experience of carrying out aid work in a war zone. English was spoken as a first language. PE had experienced one isolated trauma.

Table PE1.

Target Image, Encapsulated Belief, Counterfactual Thoughts and Chosen Rescript for PE.

Target Image	Encapsulated Belief	Counterfactual Thoughts	Rescript
Went back to get forgotten item. In the lift. Soldier trying to get into the lift. Feeling trapped.	'I am helpless and powerless. I can't cope.'	'If only I hadn't left the bag behind, this wouldn't have happened.' 'If only I was able to think and act more quickly.' 'What if they catch me and get me?'	1st Session – PE changed the image such that she used a magical sword of power in order to safely escape the war zone with her team as well as using its power to protect the people living in the area. 2nd Session – As above but this time PE let the soldiers almost catch her before using the sword to stop and disarm them.

Three baseline points were available for PE, followed by two rescripting sessions and one follow-up point. PE did not plan to carry out further rescripting work on this image. Baseline data for Nowness, Level of Belief and all three Counterfactual Distress measures failed to meet stability criteria. Tau-U analysis was carried out for these measures (Table PE3). All other measures met baseline stability criteria. Image Intrusiveness, Encapsulated Belief and Counterfactual Thought VAS scales are graphically displayed in Figures PE1-5, Figure PE6 and Figures PE7-12 respectively. GOS and Session Content codes are summarised in Table PE2.
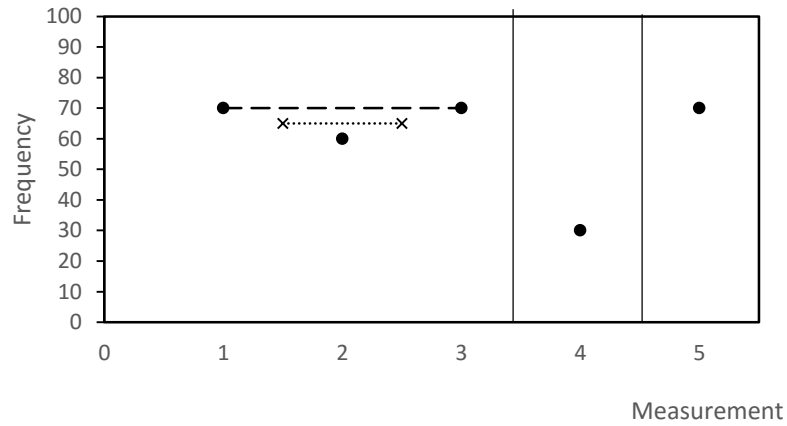
Figure PE1. Frequency VAS: raw data (●), central tendency (------) and trend (··x··x··).
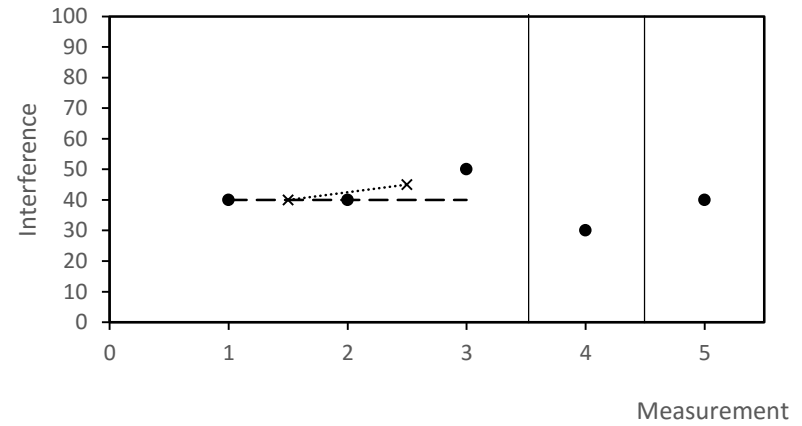
Figure PE2. Interference VAS: raw data (●), central tendency (---) and trend (··x··x··).
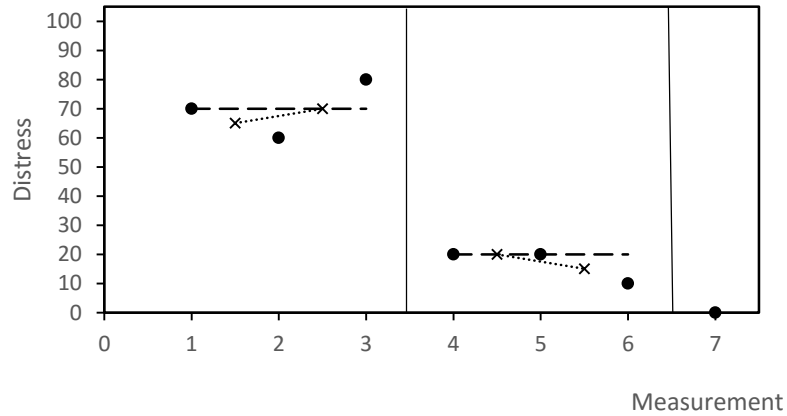
Figure PE3. Distress VAS: raw data (●), central tendency (------) and trend (··x··).
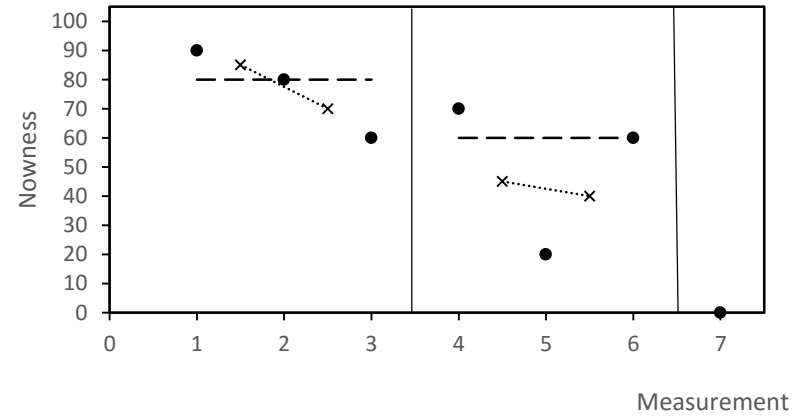
Figure PE4. Nowness VAS: raw data (●), central tendency (----) and trend (··x··).
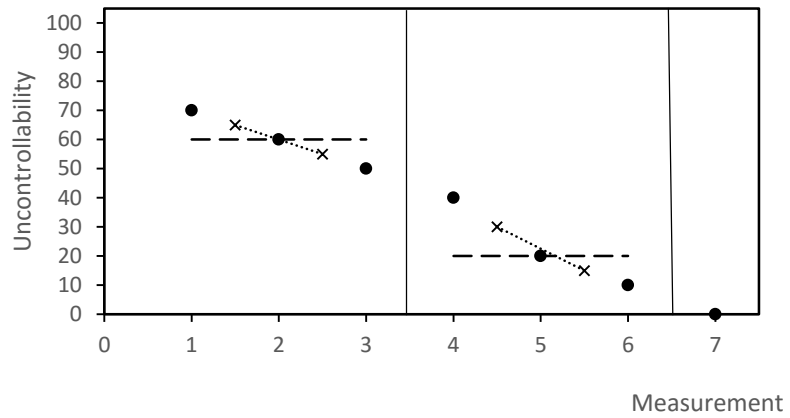
Figure PE5. Uncontrollability VAS: raw data (●), central tendency (------) and trend (··x··).
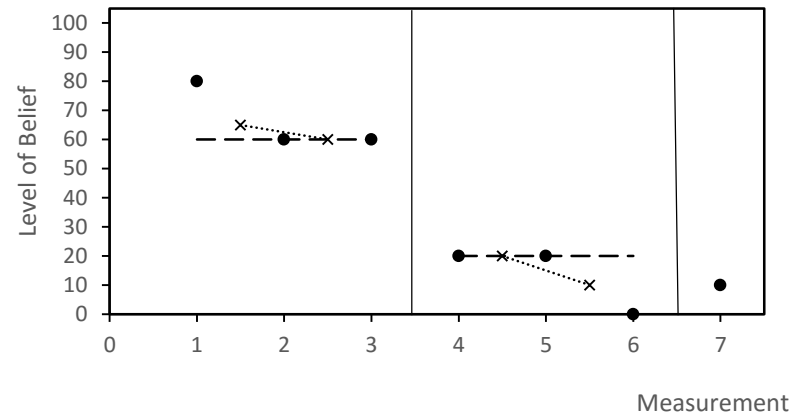
Figure PE6. Level of Belief VAS: raw data (●), central tendency (------) and trend (··x··).
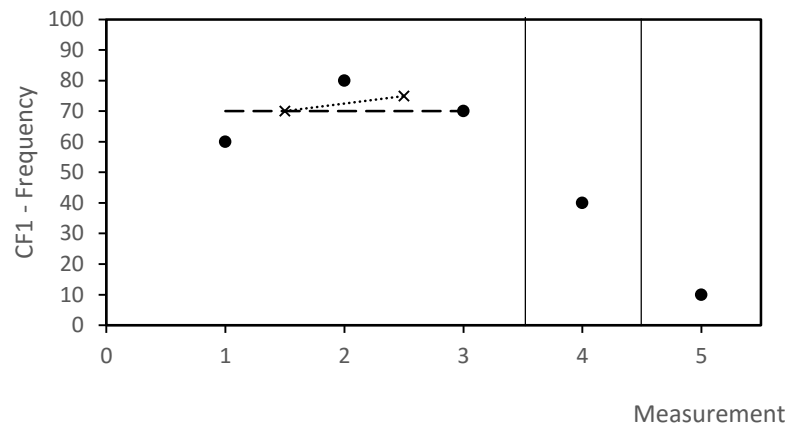
Figure PE7. CF1-Frequency VAS: raw data (●), central tendency (-----) and trend (··x··).
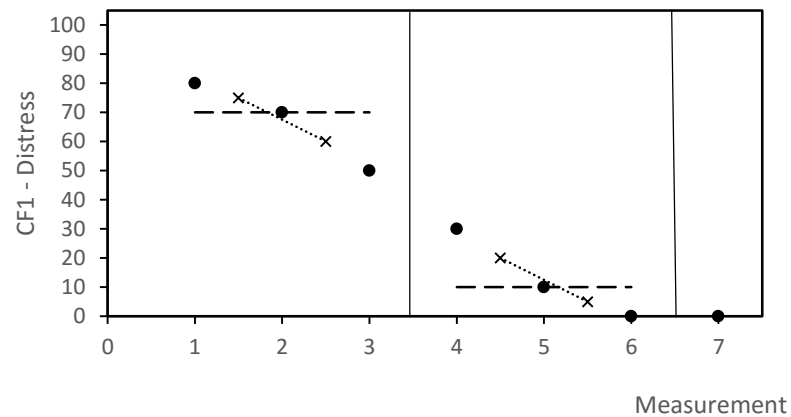
Figure PE8. CF1-Distress VAS: raw data (●), central tendency (------) and trend (··x··).
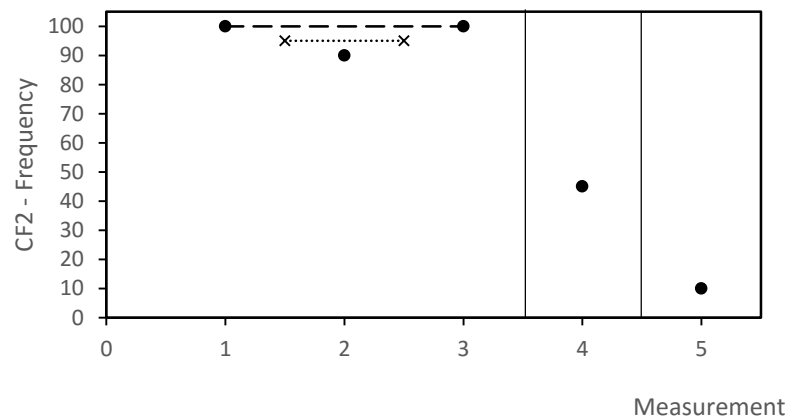
Figure PE9. CF2-Frequency VAS: raw data (●), central tendency (-----) and trend (··x··).
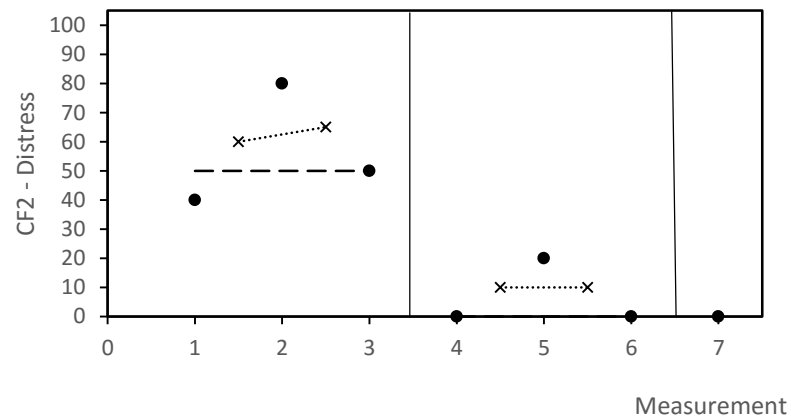
Figure PE10. CF2-Distress VAS: raw data (●), central tendency (------) and trend (··x··).
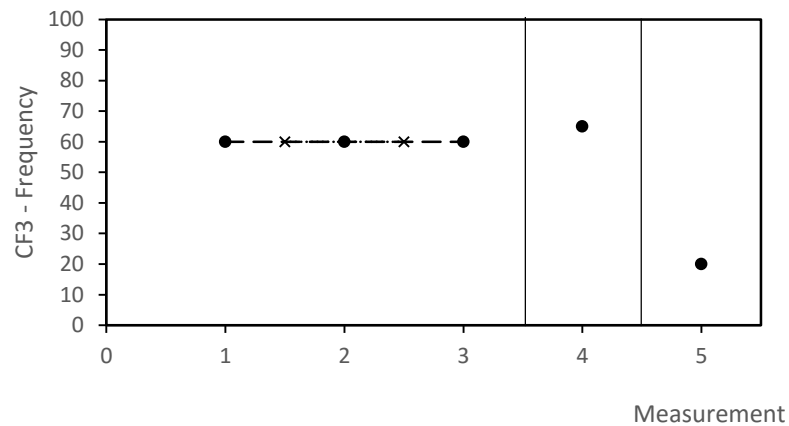
Figure PE11. CF3-Frequency VAS: raw data (●), central tendency (-----) and trend (··x··).
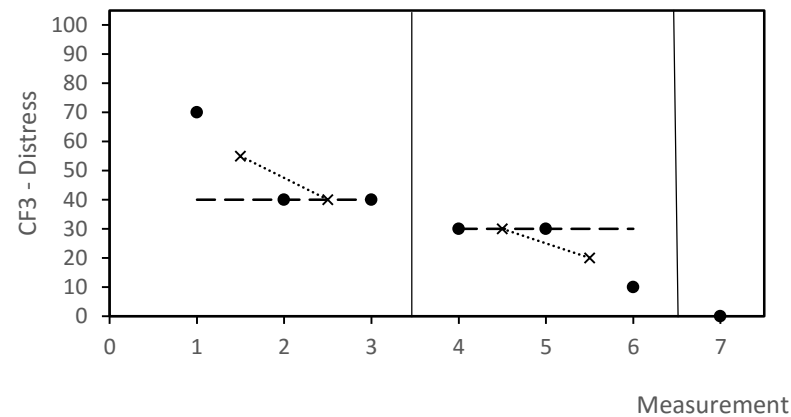
Figure PE12. CF3-Distress VAS: raw data (●), central tendency (------) and trend (··x··).

Table PE2.

Summary of GOS and Session Content Codes for PE.

GOS	Image Departure	Timing of Change	Staying with Image	Therapist Guidance	Original Imagery Activation	New Imagery Activation	Original Processes	New Processes	Cognitive/ Emotional Shift	Rescript Believability
6	2	3	3	1	1	3	1	3	3	2
12	2	3	3	3	2	3	2	3	3	3

Note: GOS coding ranges from 0-12 and Session Content codes range from 0-3.

Linking GOS and Session Content codes to outcome. GOS ratings increased from lower to maximum simulation levels across sessions. It was noted that while the actual rescript in Session 1 was well-simulated, this was largely due to therapist input, resulting in lower scores across all six GOS codes. Some original but mostly new imagery elements were used across sessions. Change was introduced during the image, including the worst point. PE had no difficulty staying with the image. Original, trauma related-imagery was given lower vividness ratings, while new imagery elements were consistently rated as very vivid. Therapist prompting was initially necessary to support this level of imagery activation before PE was able to do so independently.

A similar pattern was seen for internal processes. Lower ratings were given to emotions (guilt, feeling of doom) thoughts ('I'm going to die in this lift') and physical sensations (shaky/shuddering, tired) associated with original trauma-imagery, while new emotions (relief, gladness), thoughts ('I'm not trapped', 'I can do this') and physical sensations (energy, lightness) were rated as very high across sessions. Rescript believability ratings went from mostly to completely believable while cognitive/emotional shift was rated as consistently high.

In terms of Image Intrusiveness, the clearest and most consistent change was found for Distress which showed a large decrease that was maintained at follow-up. While initial clear decreases in Frequency and Interference occurred, these were not maintained at follow-up. Thus, while PE was still thinking of the image frequently and it was still interfering to a certain extent with daily life following rescripting, it no longer appeared to be creating distress. No concrete conclusions could be drawn about Nowness and Uncontrollability due to variability and baseline trend (see Table PE3 for Tau-U

analyses). A clearer, but non-significant decline in Level of Belief in the encapsulated belief was observed.

Table PE3.

Tau-U analysis for Nowness, Level of Belief and Counterfactual Distress for PE.

	TAUb	P Value	CI 90%
Nowness	-.35	.51	-1.17<>.5
Level of Belief	-.78	.13	-.16<>.06
CF1-Distress	-.67	.19	-1.5<>.17
CF2-Distress	-1.11	.03	-1.95<>-.27
CF3-Distress	-.78	.13	-1.62<>.06

In terms of counterfactual thinking, the largest changes were found for CF2, which was the only counterfactual to be fully integrated into both rescripts. Tau-U analyses showed that CF2 was the only counterfactual to show significant changes in Distress during treatment, which was maintained at follow-up. Similarly, while all 3 counterfactuals showed clear changes in Frequency, these were most pronounced for CF2, which showed a downward trend across treatment and follow-up following a stable baseline. An increase in simulation in Session 2 was not linked to larger reductions in counterfactual Frequency or Distress. Although, as noted earlier, lower simulation scores in Session 1 were largely due to therapist input, rather than an overall absence of coherence.

Participant F. Table PF1 shows PF's rescript details. PF's trauma related to a physical assault. English was spoken as a first language. PF had experienced multiple

traumas as an adult and was experiencing financial difficulties and significant social isolation at the time of treatment. PF also lost her job between the times when the 2nd and 3rd baseline points were completed.

Table PF1.

Target Image, Encapsulated Belief, Counterfactual Thoughts and Chosen Rescript for PF.

Target Image	Encapsulated Belief	Counterfactual Thoughts	Rescript
On the ground being physically and verbally assaulted by another woman.	'I am helpless and weak.'	'If only someone had stopped to help me.' 'If only I could have managed to get up and protect myself.' 'If only someone had done something to warn me.'	PE rescripted the image to incorporate a group of family members, friends and police men to support her from the beginning of the image. This meant that she did not end up on the ground. She also made herself bigger and the perpetrator smaller in the image so that she could confront her successfully.

Three baseline points were available for PF, followed by one rescripting session and one follow-up point. PF was likely to return to this image for further work, however, following this initial work, future sessions were to shift focus. There is no treatment phase data for Frequency and Interference measures. Due to a series of missed appointments, there was a gap of three weeks between the second and third baseline points and two weeks between the rescripting and follow-up appointment. All Counterfactual Frequency and Distress scores, with the exception of CF3 Frequency, showed a significant decline across baseline. Due to limited treatment phase data, Tau-U analyses were not carried out. Thus, data for these measures must be interpreted with caution.

One potential source of variability is that PF lost her job in the time between the second and third baseline points, which is where some of the biggest changes occur. It is possible that, due to this substantial change in life circumstances, PF became more preoccupied with other things, thus impacting on the Frequency and Distress of specific counterfactuals relating to the trauma incident. Image Intrusiveness, Encapsulated Belief and Counterfactual Thought VAS scales are graphically displayed in Figures PF1-5, Figure PF6 and Figures PF7-12 respectively. GOS and Session Content codes are summarised in Table PF2.
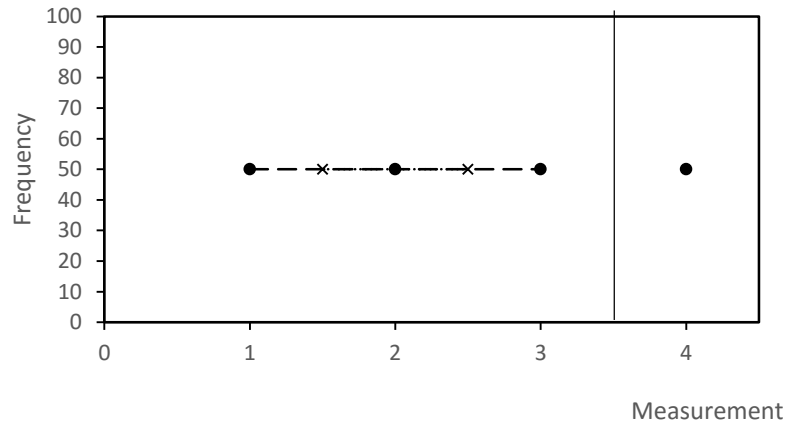
Figure PF1. Frequency VAS: raw data (●), central tendency (-------) and trend (. . x . .).
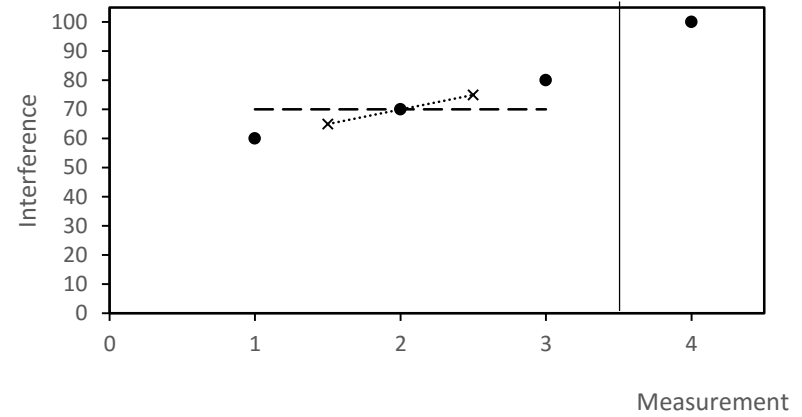
Figure PF2. Interference VAS: raw data (●), central tendency (------) and trend (. . x . .).
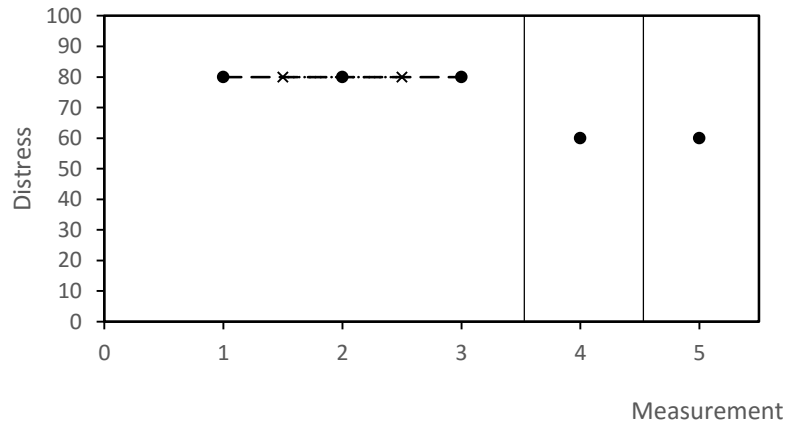
Figure PF3. Distress VAS: raw data (●), central tendency (------) and trend (. . x . .).
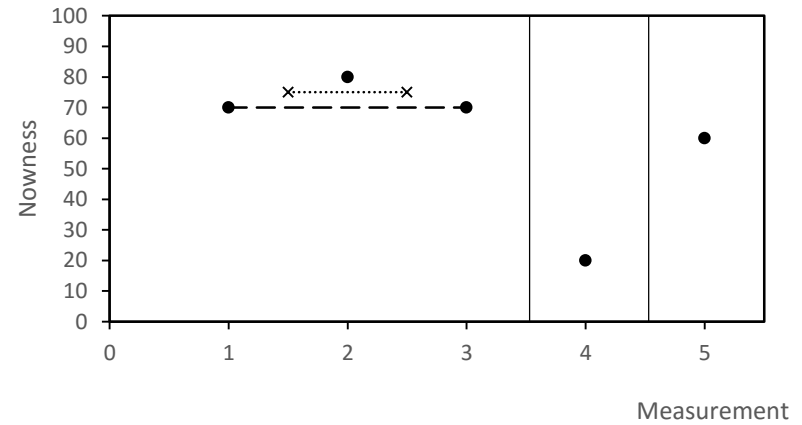
Figure PF4. Nowness VAS: raw data (●), central tendency (----) and trend (. . x . .).
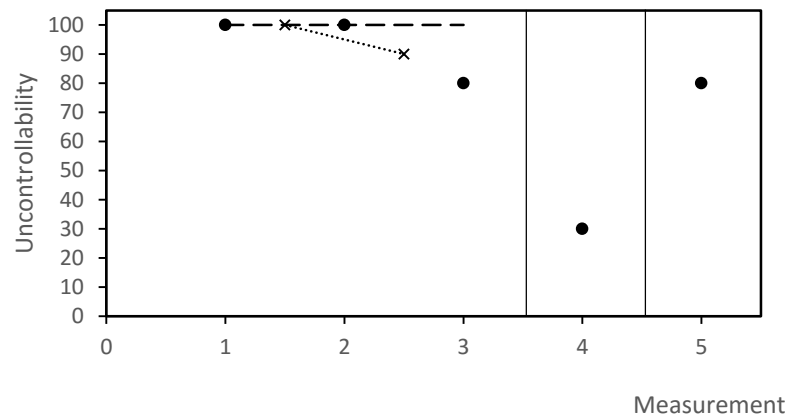
Figure PF5. Uncontrollability VAS: raw data (●), central tendency (------) and trend (·· x ··).
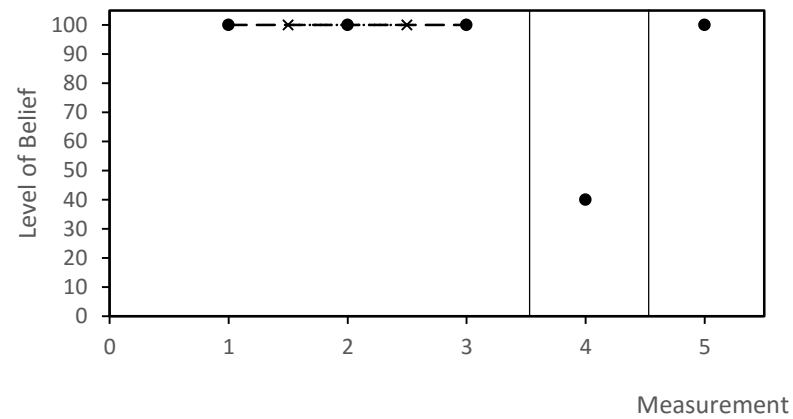
Figure PF6. Level of Belief VAS: raw data (●), central tendency (------) and trend (·· x ··).

Figure PF7. CF1-Frequency VAS: raw data (●), central tendency (-----) and trend (··x··).

Figure PF8. CF1-Distress VAS: raw data (●), central tendency (------) and trend (··x··).

Figure PF9. CF2-Frequency VAS: raw data (●), central tendency (-----) and trend (··x··).
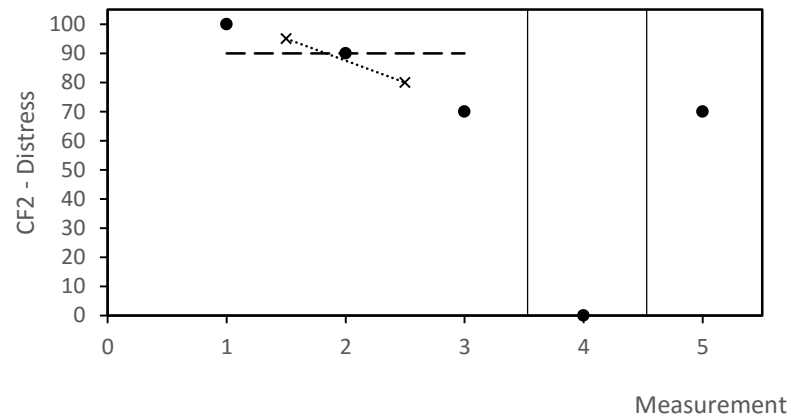
Figure PF10. CF2-Distress VAS: raw data (●), central tendency (------) and trend (··x··).

Figure PF11. CF3-Frequency VAS: raw data (●), central tendency (-----) and trend (··x··).

Figure PF12. CF3-Distress VAS: raw data (●), central tendency (------) and trend (··x··).

Table PF2.

Summary of GOS and Session Content Codes for PF.

GOS	Image Departure	Timing of Change	Staying with Image	Therapist Guidance	Original Imagery Activation	New Imagery Activation	Original Processes	New Processes	Cognitive/ Emotional Shift	Rescript Believability
7	2	2	3	1	1	3	0	2	2	2

Note: GOS coding ranges from 0-12 and Session Content codes range from 0-3.

Linking GOS and Session Content codes to outcome. PF's rescript was rated as moderately well-simulated. The actual narrative was well-simulated but this was largely due to therapist input, resulting in a lower rating across most GOS codes. PF's rescript consisted of mostly new, rescripted imagery and change was introduced immediately before the original event. PF pre-empted the attack by incorporating back-up before encountering her perpetrator. Thus, while she still faced the perpetrator, the physical assault/worst moments did not take place. PF did not have difficulty staying with the imagery although the rescript was largely guided by the therapist.

Elements associated with the original trauma-image were rated as somewhat vivid, while new imagery elements were rated as highly vivid. High levels of prompting were needed to enhance imagery activation. PF did not describe any internal processes associated with original trauma-imagery but new thoughts ('I don't care about what you say or do', 'She's not getting to me') emotions (relief, confidence) and physical sensations (standing up straight and firm) were rated as moderately intense. Ratings suggested a medium level of cognitive/emotional change regarding the image and that most, but not all of the rescript felt believable.

In terms of Image Intrusiveness, the only sustained changes were found for Distress which showed a small but clear decrease in scores that was maintained at follow-up. Notable decreases were initially seen for Nowness and Uncontrollability, but these were not maintained at follow-up. No changes occurred for Frequency or Interference. Initial treatment gains were also seen for Level of Belief in the encapsulated belief but, again, these disappeared at follow-up.

The most notable change in counterfactual thinking was for Frequency of CF3, which showed a large decrease at follow-up, following an increasing baseline. Counterfactual Distress for both CF1 and CF2, which were incorporated into the rescript, show a clear drop to floor levels during treatment. However, both showed a significant decreasing baseline trend and increase in scores to baseline levels at follow-up. Particular caution is needed across counterfactual results due to baseline instability. Furthermore, lack of sustained change in scores more generally may, in part, be due to stressful life events and sporadic nature of treatment at the time of this study.

Participant X. PX was part of the Phase 1 sample. Thus, no encapsulated belief or counterfactual thoughts were identified. Table PX1 shows PX's rescript details. Although not his first language, sessions were conducted in English. PX was currently seeking asylum in the UK, which was causing high levels of anxiety and preoccupation. PX had experienced repeat traumas throughout childhood.

Table PX1.

Target Image and Chosen Rescript for Participant X.

Target Image	Encapsulated Belief	Counterfactual Thoughts	Rescript
Being physically assaulted as a child by captor for not carrying out chores properly.	-	-	PX returned to trauma scene as adult self along with therapist and friends from the present. Rescript involved seeking revenge on perpetrator by physically assaulting him, comforting past self and taking him to safety to live with friends from present.

Only Image Intrusiveness measures, except Nowness, were administered to PX. Three baseline points are available for PX, followed by one session of rescripting and two follow-up data points. Due to the fact that measures were only administered once per session (before rescripting) there is no treatment phase data available for any of PX's measures. There was a gap of six weeks between the second and third baseline points, however, all measures met criteria for baseline stability. There was also a gap of two weeks between the treatment session and the first follow-up point. Image Intrusiveness VAS scales are graphically displayed in Figures PX1-4. GOS and Session Content codes are summarised in Table PX2.
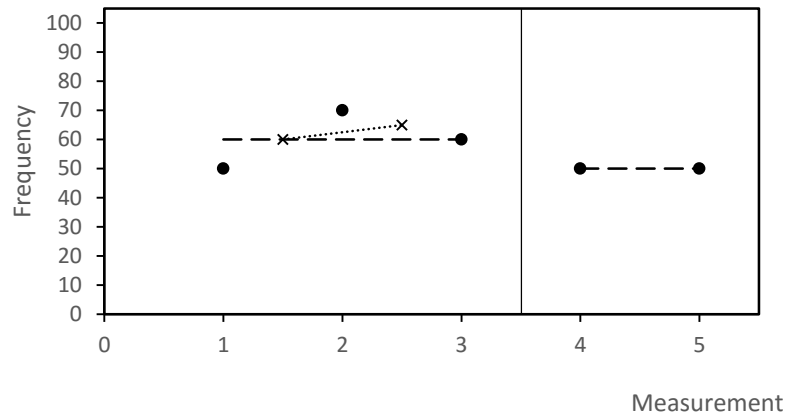
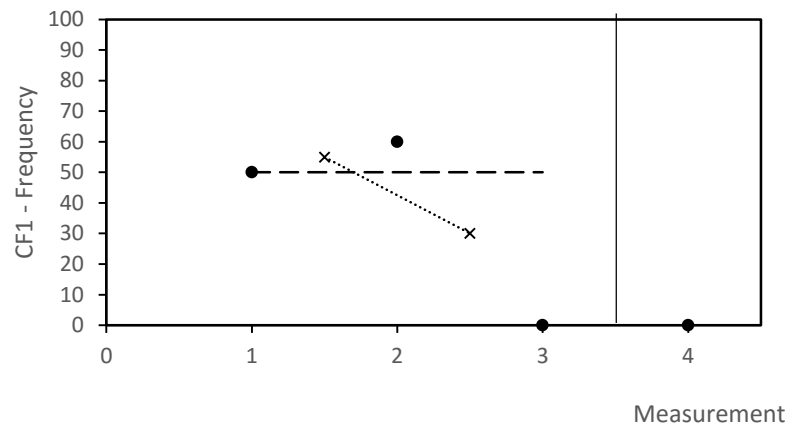*Figure PX1.* Frequency VAS: raw data (●), central tendency (------) and trend (·· x··).
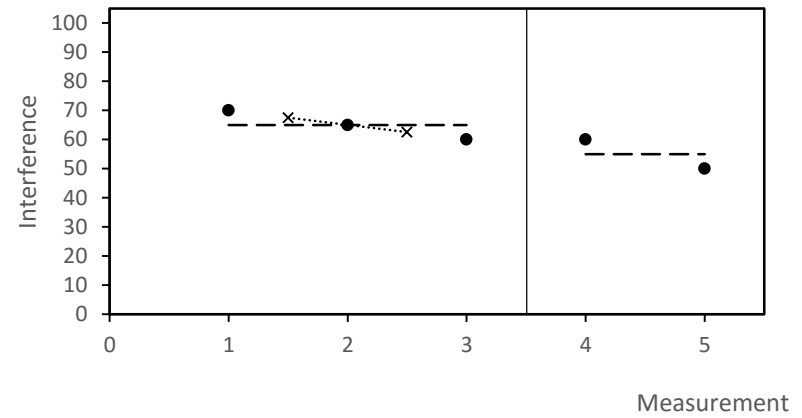
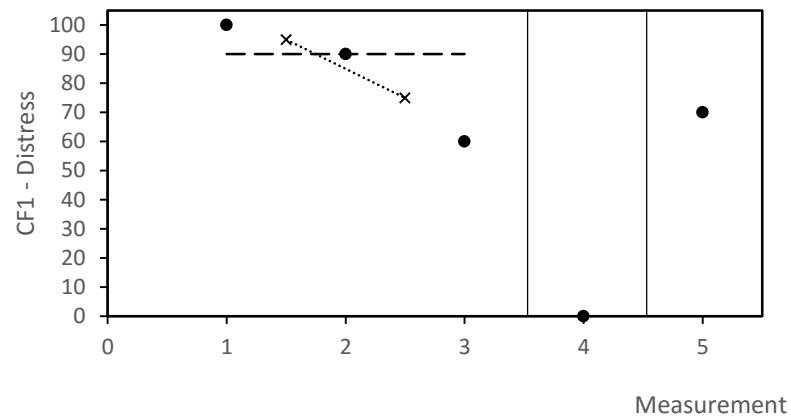*Figure PX2.* Interference VAS: raw data (●), central tendency (------) and trend (·· x··).
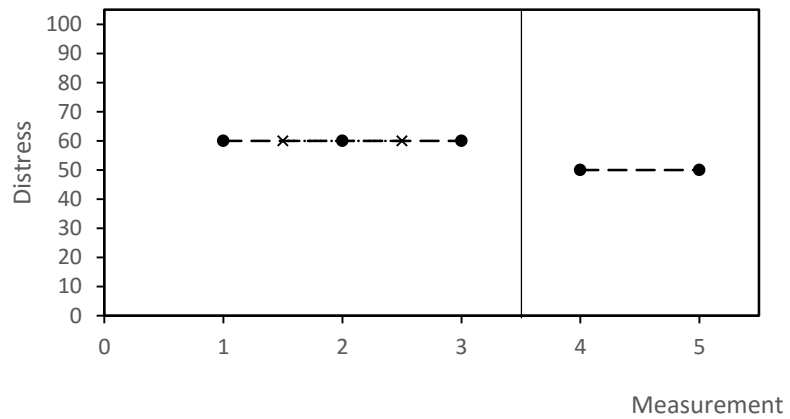
Figure PX3. Distress VAS: raw data (●), central tendency (------) and trend (·· x··).
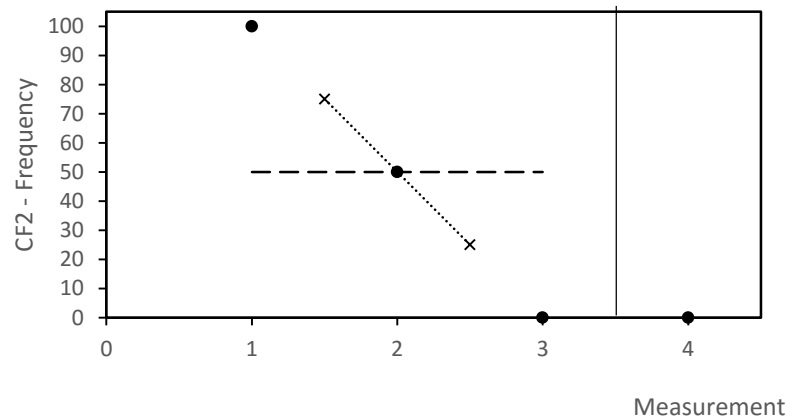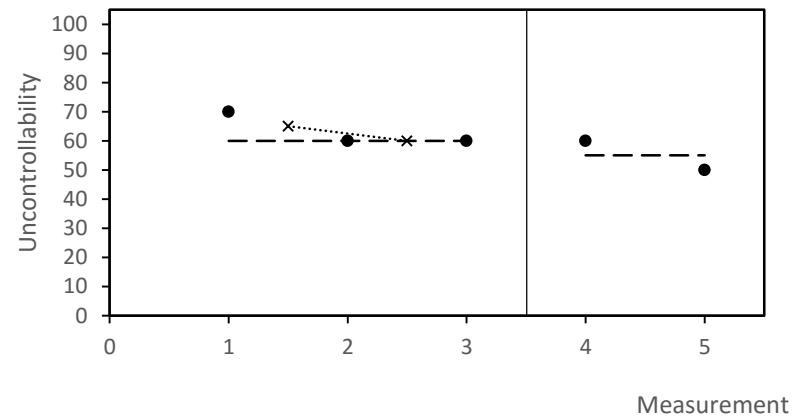

Figure PX4. Uncontrollability VAS: raw data (●), central tendency (------) and trend (·· x··).
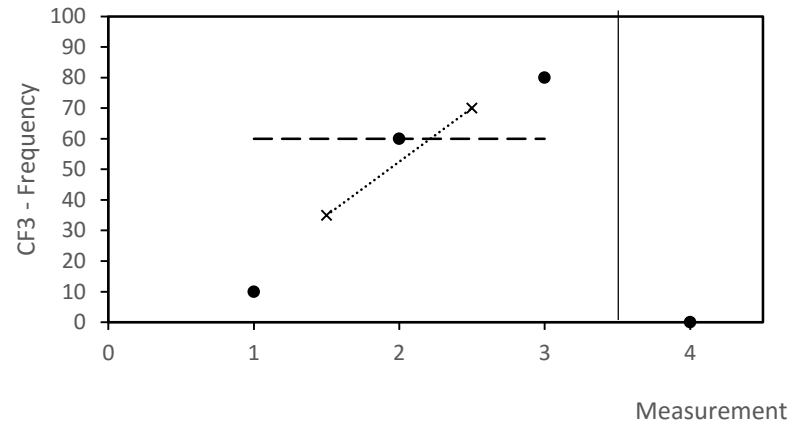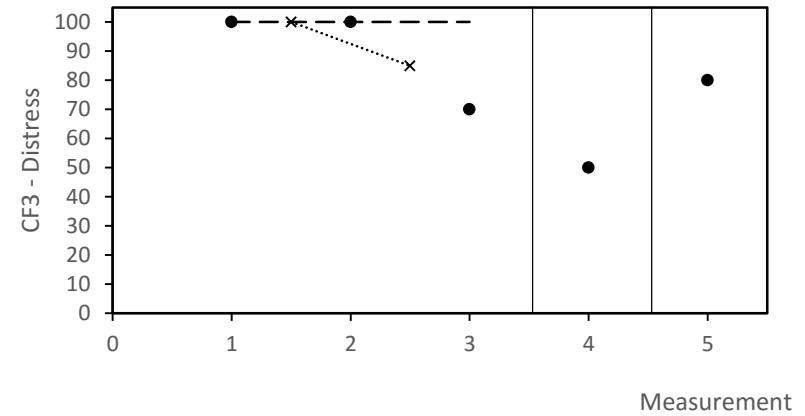
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Table PX2.

Summary of GOS and Session Content Codes for PX.

GOS	Image Departure	Timing of Change	Staying with Image	Therapist Guidance	Original Imagery Activation	New Imagery Activation	Original Processes	New Processes	Cognitive/ Emotional Shift	Rescript Believability
5	1	3	3	2	3	2	3	2	2	2

Note: GOS coding ranges from 0-12 and Session Content codes range from 0-3.

Linking GOS and Session Content codes to outcome. PX's overall GOS rating indicates a low level of simulation and coherence. PX's session contained more original trauma-imagery than new imagery. Change was introduced during the original image during the worst moment. PX was able to stay with the imagery during the session, although a certain amount of therapist guidance/prompting was necessary in order to facilitate more vivid and detailed imagery.

Original trauma-imagery elements were rated as very vivid and intense while new imagery was rated as only moderately so. Ratings of original emotions (fear, anger, helplessness), thoughts ('I'd rather die', 'I'm nothing') and sensations (fast heart beat) were very high. New emotions (happiness) and thoughts ('I'm worth something') from rescripted imagery were rated as less intense, although still highly activated. Cognitive/emotional shift and level of belief were rated as moderately strong.

Little change in outcome measures occurred. A very small decrease in Distress occurred at follow-up. A similar, but less clear change in Frequency was found. Interference and Uncontrollability show comparable trends across baseline and follow-up as well as phase overlap, suggesting no change with ImRs onset. Caution in interpretation is required due to the complete lack of treatment phase data.

Summary of patterns across participants. Patterns of codes and outcome measures across cases will now be discussed. Due to the limited number of participants, high variability in scores and baseline instability for some participants, these patterns are suggested tentatively. Image Intrusiveness and Encapsulated Belief outcomes will be discussed first, followed by counterfactual measures.

Changes in image intrusiveness and encapsulated belief. Those whose rescripts fell in the upper range of simulation ratings tended to experience decreases across most IVAS (Frequency, Interference, Distress, Nowness and Uncontrollability) and EBVAS (Encapsulated Belief) scales. Decreases ranged from small-large. Small-medium changes during treatment tended to be stable and sustained at follow-up. While some larger changes seen during treatment were also sustained, others were more variable and would often increase at follow-up but still remain below baseline levels. For one participant (PA), some IVAS scales increased during treatment before decreasing at follow-up. For some of these participants' GOS ratings increased across sessions. Lower GOS ratings usually co-occurred with no change or small, but reliable, changes in IVAS and EBVAS scales. However, one such participant (PF), whose poorly-simulated rescript was further enhanced by therapist prompting, did experience large changes at treatment, which subsequently returned to baseline at follow-up.

In terms of Session Content codes, image departure and ability to stay with the image did not differ across cases. All were able to stay with the imagery and all but one participant included some original but mostly new imagery across sessions. One participant used mostly original trauma-imagery elements and experienced very little change. Timing of change did differ across cases. All but one case that introduced change during the original image experienced clear decreases in IVAS and EBVAS scores. Those who introduced change immediately before the original imagery experienced no/small decreases. Therapist guidance also differed across cases. Participants who either consistently guided the rescript independently or progressed from therapist- to self-guided rescripting tended to experience the clearest decreases in IVAS and EBVAS scores, while those who continuously relied on therapist prompting

experienced smaller treatment gains. PA was the exception here as she did experience larger gains while relying on prompting. However, these gains were not particularly stable.

Vividness of original and new imagery elements, when examined in isolation (particularly the former), were not very clear. Although, those who showed treatment gains tended to have more vivid ratings of new imagery elements than those who showed no/small gains. When vividness of original trauma-imagery and new rescripted-imagery were taken together, those whose new imagery was rated as more vivid than the original imagery, or whose original and new imagery was equally vivid, tended to show clearer treatment gains. Only one participant who exhibited this pattern did not show gains. All whose original imagery elements were rated as more vivid than new imagery, showed no/small gains.

Original and new internal processes showed similar but clearer patterns. Larger and more stable treatment gains were experienced by those whose original, trauma-related thoughts/feelings/sensations were rated as moderately intense and whose new processes were rated as very intense. Some showed a pattern across sessions whereby ratings of original processes decreased in intensity while new processes increased. Smaller/no treatment gains were experienced by those with less intense ratings of new, rescript-related processes and original, trauma-related processes that were rated as either minimal/absent or very intense. Original processes for these participants tended to be rated more intensely than new processes.

Both cognitive/emotional shift and rescript believability ratings showed similar patterns across participants. Those who exhibited larger and more stable gains were rated as experiencing medium to high levels of cognitive/emotional shift in relation to the image and as experiencing the rescript as mostly or completely believable. Sometimes this involved an increase in ratings for these factors across sessions. Those who experienced smaller/no treatment gains had lower ratings of cognitive/emotional shift and belief levels.

Changes in counterfactual scores. All but one (PD) generated three dominant counterfactuals in relation to the target image. Fourteen of these were upward in nature and one was downward. Only one non-referent counterfactual was generated while the remaining were split equally between self- and other-referent. Highly variable levels of change in counterfactual Distress and Frequency were found within and across participants. All participants chose to incorporate at least one of their counterfactuals in at least one session.

In terms of GOS, those whose rescripts were less well-simulated (PC and PF) tended to experience small or inconsistent changes in counterfactual Frequency and Distress. PB and PE, whose rescripts were very well-simulated, tended to experience medium to large changes in scores that were more consistent. However, baseline instability presents a major issue with interpretation of these findings. Furthermore, PA who also produced a well-simulated rescript, experienced small or inconsistent decreases in counterfactual outcomes.

For some participants, overall decreases in Frequency and Distress were greatest for the counterfactual targeted by the rescript. However, this was not consistent. PB showed a comparable decrease for all three counterfactuals, all of which were incorporated into their rescript. PE's targeted counterfactual was the only one to show significant decreases in Distress and, while all counterfactuals showed a decrease in Frequency, this was most pronounced for the targeted counterfactual. PF's targeted counterfactuals also showed the greatest declines in Distress. However, their non-targeted counterfactual was the only one to decreases in terms of Frequency. PC's targeted counterfactual was the only one to show continuing decline in Frequency at follow-up, but changes in Distress were comparable across counterfactuals. While no overall gains in counterfactual Distress were seen for PA, session specific patterns can be seen. Session 1, which incorporated no core counterfactuals, showed no change. Session 3, which did, showed large decreases in Distress. However, this was comparable for targeted and non-targeted counterfactuals.

<center>**Discussion**</center>

This study employed a SCED design and the use of coding to investigate the underlying factors potentially contributing to change in ImRs. There was a particular focus on the role of simulation and how this might relate to reductions in image intrusiveness and counterfactual thinking as well as increases in meaning. It also aimed to replicate some of the findings of Salter's (2014) study in relation to Session Content codes responsible for change. Phase 1 of this study aimed to adapt existing GOS coding schemes for use within ImRs and to assess its inter-rater reliability. It also aimed to assess inter-rater reliability of the Session Content coding scheme. This was successfully completed and inter-rater reliability deemed adequate. Phase 2 then applied these schemes to a series of seven cases in order to link codes to outcome. Phase 2 findings will first be discussed in relation to each of the hypotheses as well as existing literature. This will be followed by considerations of how findings fit with existing theories. Clinical implications, strengths/limitations and future research will then be discussed.

Symptom Severity, Image Intrusiveness and Encapsulated Belief

The first hypothesis predicted that, because ImRs and the simulation heuristic (SH) both involve the mental construction of imaginary events that did not happen, higher GOS ratings would link to greater reductions in outcome measures following rescripting. Group and individual level analyses offer tentative support for this hypothesis. At group level, all high-responders produced well-simulated rescripts while low-responders' rescripts were less well-simulated. At an individual level, higher GOS ratings were also linked to larger and more stable reductions in frequency, interference, distress, nowness and uncontrollability of the intrusive images, as well as in the level of belief of the key

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meaning, while lower GOS ratings tended to link with smaller or larger, but inconsistent, gains. However, these findings remain tentative due to the small sample size, observational nature of results and baseline inconsistency for some individual analyses. The lack of statistical analyses in particular warrants caution in interpretation.

Role of simulation. These results offer tentative, initial support to the idea that effective ImRs may rely, in part, on the level of simulation and coherence of the rescript. Previous findings have suggested that GOS predicts subjective probability (Tversky & Kahneman, 1973, 1982) and enhances one's ability to interpret past events and alter their emotional states (Taylor & Schneider, 1989). In terms of Session Content, the biggest differences between high- and low-responders at group level were for ratings of new processes, with pronounced differences also found for cognitive/emotional shift and rescript believability. Similar patterns were found at an individual level for Image Intrusiveness. Furthermore, individual analysis showed that those with higher GOS scores tended to experience greater reductions in level of belief in the key meaning of the intrusive image (although changes were not always stable). Thus, through producing a highly-simulated rescript, it may be that high-responders subsequently experienced more intense new thoughts, emotions, and sensations, a higher level of cognitive/emotional shift and strong levels of belief in the rescript, relative to low-responders who rescripts were less well-simulated. While this fits with previous GOS findings, links between codes were not assessed in the current study, so causality cannot be assumed. Whether GOS is responsible for the generation of new thoughts/emotions or whether these new processes need to be attended to separately is not clear from the current results.

Role of cognitions/emotions. Findings in relation to the Session Content coding scheme mentioned above replicate findings of Salter (2014) and fit with previous suggestions that generation of new mental imagery may facilitate strong changes in cognition and emotion (Holmes & Matthews, 2005; Long & Quevillon, 2009). It is also possible that the intensity of these new processes somehow inhibits negative arousal associated with original imagery (Rusch et al., 2000) and makes the imagery safer to approach. However, the strength of ImRs is unlikely to rely on the production of new processes alone. Otherwise, the generation of unrelated, positive imagery should produce symptom reduction. Previous research has shown that ImRs is superior to positive imagery techniques in facilitating symptom relief (Hagenaars & Arntz, 2012). It has been suggested that, in order to be effective, ImRs must also link to the key cognitions and emotions linked with the original event (Wheatley & Hackmann, 2011).

While the mean difference in original processes at a group level did not suggest any pronounced differences between high- and low-responders, a closer look at individual analyses sheds more light in this area. Those who experienced greater changes in outcome tended to activate original thoughts/emotions to a moderate-high degree, but to a lesser extent than new processes. Again, whether simulation of original material automatically facilitates the associated thoughts/emotions was not tested. Similar to Salter's (2014) findings, those who experienced less change in outcome measures tended to experience original processes either minimally or very intensely, and sometimes to a lesser degree than new processes. These findings fit, to some extent, with original PTSD theories (Brewin et al., 1996, 2010; Ehlers & Clark, 2010; Foa et al., 1989, 1998) in that a certain amount of exposure to original imagery elements may

be necessary to facilitate processing of original material and symptom reduction. However, if experienced too strongly, ImRs may not be effective.

Role of vividness. ImRs vividness was encompassed in both coding schemes. Thus, as a facet of GOS, it would seem that higher levels of vividness linked to greater reductions in outcome. Previous findings suggest that, the more vivid an image is, the more likely it is to be recalled (regardless of accuracy) and the more that an image is brought to mind, the easier image access becomes (Tversky & Kahneman, 1973). Thus, perhaps ImRs vividness enhances accessibility and recall. It may also enhance a felt sense of believability in the rescript as brain activity for highly vivid, imagined stimuli is similar to activity produced by the actual stimulus (Gonsalves et al., 2004).

Original and new imagery activation were also considered separately in the Session Content coding scheme. At a group level, there were only small differences between high- and low-responders with both groups generating quite vivid new and original imagery. A similar range of vividness for each code was seen for both groups. This differs from Salter (2014), who found that symptom improvement was less likely if original trauma-imagery elements were highly vivid, as participants found it hard to stay connected with the imagery. This was not found in the current study, as some participants who experienced reduction in scores produced vivid original imagery.

Consideration of image departure, as well as activation/vividness of original and new elements in tandem at an individual level, may help to shed some light on these findings. Most participants included only a small amount of original imagery and mostly new, rescripted imagery. Perhaps a high level of vividness of original traumatic material can

be tolerated if it is only for a short duration. This may also enhance the connection to the original trauma, consolidating subsequent changes in affect/cognition and linking these changes more strongly to the traumatic image in question. Again, these links were not specifically tested. Furthermore, while original imagery was vivid for those who saw greater reductions in outcome, new imagery tended to be even more vivid.

Role of therapist guidance. Observations from group-level analysis suggested that low-responders required more overall therapist guidance than high-responders, who tended to rescript more independently. Individual analyses further contributed to these findings by suggesting that clearer decreases in Image Intrusiveness tended to occur for those who either consistently guided the rescript independently or progressed from therapist- to self-guided rescripting across sessions. Thus, initial therapist prompting may sometimes facilitate subsequent independent rescripting and associated relief of symptoms. These are similar to findings of Salter (2014) but at odds with those of Medin (2015), who found that high-responders' rescripts relied on therapist guidance while low-responders' rescripts were self-guided. However, these participants only had one rescripting session. It is possible that high-responders would have progressed to more independent rescripting, as in the current sample, and that the low-responders could have benefited from initial therapist guidance. These patterns require further research.

In terms of coding for GOS, therapist prompting is currently incorporated within the coding scheme in that simulation that relies heavily on therapist input is given a lower GOS rating. However, individual analyses showed that some participants who ultimately showed a decrease in scores progressed from lower to higher levels of

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simulation, incorporating elements originally introduced by the therapist. Furthermore, one participant, who showed little overall decline in outcome measures but large session specific gains, produced a rescript with low simulation ratings. However, it was noted that the rescript itself was highly simulated but that scores were lowered by amount of therapist input required. This participant only had one session so it was not possible to assess subsequent GOS and scores. However, it may be useful to code therapist input and GOS of the resultant rescript separately. It may be that higher GOS ratings produce change regardless of input, but that independent simulation is ultimately necessary for sustained change. However, initial therapist input may help to achieve this.

Staying with imagery and image departure. With regard to remaining codes, all participants were able to stay with the imagery in the current study. This has previously been linked to greater treatment gains (Salter, 2014). The current study neither supports nor contradicts these findings. Perhaps the ability to remain engaged with the imagery is necessary but not sufficient for change. Finally, there is some tentative support for previous findings that introducing change during the original imagery, rather than immediately beforehand, produces higher level of change in outcome measures, offering further support to previous findings (Salter, 2014). However, this was not true for all who introduced change during the imagery.

Summary. The above interpretations of links between codes and outcome remain tentative due to small sample size, observational nature of the results and baseline instability and phase variability at an individual level. However, a hypothesised overview of mechanisms for change in ImRs, based on the current findings, could be as follows. Change seems best facilitated when imagery consists of

some original, but mostly new imagery that coincides in time with the original traumatic event (rather than introducing change beforehand). In addition, emphasis should be placed on the level of simulation and coherence of the rescript in question. This encompasses elements such as logical and temporal sequencing, minimisation of uncertainty, detail and vividness.

Focus on a well-simulated rescript that includes both original and new imagery elements may naturally facilitate access to both original and new emotions, thoughts and sensation. This, in turn, may facilitate a sense of plausibility/belief in the rescript as well as a strong shift in cognition/emotion. Ensuring that only some of the original imagery is included may prevent high levels of vividness of original image elements and intense original processes from overwhelming people such that they come out of the imagery or fail to experience a shift in cognition/affect. In terms of therapist guidance, independent rescripting seems ultimately beneficial, although initial therapist prompting and guidance may be necessary to reach independent rescripting.

However, as already stated, the results of this study are only truly able to offer tentative, initial support for links between individual codes and outcome. Links between codes themselves, and whether GOS naturally generates other factors necessary for change (such as activation of original/new internal processes) were not assessed in this study and the links suggested above remain purely hypothetical in nature. That said, the factors themselves show potential links to reductions in the sense of uncontrollability and nowness of the image, as well as the associated distress, frequency and interference with daily life. A reduction in belief in the encapsulated belief was also seen. No comments can be made about PTSD symptom reduction specifically, as it was not

assessed in this study. However, it may be that, through the above factors, ImRs reduces the intrusiveness and distress of individual images. Over time, rescripting of multiple images, and subsequent reductions in intrusiveness and distress, may cumulatively facilitate general symptom reduction in PTSD. However, again, this was not tested and needs to be assessed in future research.

Counterfactual Thinking

Hypothesis two predicted that effective rescripting would be linked with more changes in counterfactual thinking and that GOS would play a role in this relationship. At a group level, high-responders showed some degree of change in counterfactual thinking, while low-responders experienced no change or an increase in scores. These results were descriptive in nature, rather than statistical, and thus must be considered cautiously. However, they offer tentative support for the first part of the hypothesis, that effective rescripting links to more changes in counterfactual thinking.

Due to the particularly small sample size for counterfactual data and lack of statistical analysis, extreme caution is required in relation to linking GOS to counterfactualising. Very tentative support is offered from the group analysis, where highly-simulated rescripts linked to change in SRC scores and partially-simulated rescripts linked to no change/increases. However, scores were not linked in a linear fashion and these findings were descriptive in nature. Support is strengthened by individual-level analysis. Those whose rescripts were well-simulated tended to experience medium-large changes in Frequency and Distress of specific counterfactual thoughts. However, this was not true for all well-simulated rescripts. Those with less well-simulated rescripts experienced small or inconsistent changes that were often not maintained at

follow-up. Baseline instability was a confounding factor, further underlining the tentative nature of these conclusions.

Overall, initial, tentative support is shown for the idea that effective ImRs may provide an effective means of reducing counterfactual thinking and that this may, in part, rely on rescript simulation levels. Findings are also in line with previous findings that suggested that repeated simulation of counterfactuals was associated with a decreases in their perceived plausibility (DeBrigard et al., 2013). Thus, while simulation may enhance one's sense of belief in the rescript itself, at the same time, it may serve to highlight divergent details between the actual event and the content of one's counterfactual thoughts. This may lead to a realisation of the level of change that would have been necessary to impact on the actual outcome, thus reducing the distress associated with the thoughts and the need for further counterfactualising.

Individual analysis from the current study offers further support for this concept. There was some evidence within and across participants that those counterfactuals that were specifically targeted and incorporated into the rescripting process showed greater declines in Frequency and Distress than non-targeted counterfactuals. This suggests that, by targeting specific thoughts, ImRs may provide a way of channelling counterfactual thinking in a way that is useful, perhaps conferring some of the usual benefits of counterfactual thinking found in the non-clinical population following traumatic events (Epstude & Roese, 2008), although this was not specifically tested. Causal relations have also been found between counterfactual thinking and an increase in meaning whereby reflecting on counterfactuals in relation to an event enhanced

event-meaning as well the sense that the event fit more coherently with one's life narrative (Kray, et al., 2010).

 It should be noted that differential gains for targeted counterfactuals were not consistent across all cases. It may be that inclusion of one's core, most distressing counterfactuals in relation to the target image may also somehow enhance the overall process of counterfactual reduction. This, however was not tested by the current study as all participants incorporated at least one of their core counterfactuals at some point. Thus, it is not possible to compare these with ImRs that does not target core counterfactuals. An alternative explanation for reductions in counterfactuals is also possible. Previous research (e.g. Sanna, Chang & Meier, 2001) has shown that negative mood predicts upward counterfactual thinking and rumination, while positive mood predicts downward counterfactual thinking. Thus, rather than specifically targeting the distress associated with counterfactuals, it may be that rescripting simply reduces counterfactual thinking by improving overall mood and reducing distress associated with the image. However, this would not explain why some counterfactuals reduced more than others. It is likely that both processes operate in tandem.

Nevertheless, while tentative, these results have potentially important clinical implications given the high levels of distress and shame associated with counterfactual thinking in PTSD (Branscombe et al., 2003; Davis et al., 1995; El-Leithy et al., 2006) and that fact that high levels of counterfactual thinking styles at the beginning of treatment have been found to predict poor treatment response. Furthermore, while group analyses focused on self-referent counterfactualising due to the emphasis placed on this in the literature (Davis et al, 1995), individual-level analysis yielded an

interesting pattern whereby an equal number of self- and other-referent counterfactuals were spontaneously generated. All were associated with high levels of distress. Thus, future research may want to expand its line of questioning to encompass a broader range of counterfactual thinking. In line with previous research (De Brigard et al., 2013), all but one of the spontaneously generated thoughts were upward, rather than downward, in nature.

Global Meaning

The third hypothesis, that high-responders would show greater increases in global meaning than low-responders and that this would be linked to GOS ratings, was not supported by the current results. Firstly, it is important to point out again that the limited sample size reduces interpretive power in relation to these results. However, there are additional reasons might explain these findings.

The IoC subscale, which measures how well life events have been integrated into one's overall narrative, was chosen as a measure of global meaning. Unlike the SRC scale used to measure counterfactual thinking, IoC questions do not pertain to a specific event, but to events in general. Thus, it is perhaps understandable that differential effects for high- and low-responders were not seen following rescripting of one image from one event, given that most participants had experienced multiple and/or repeated trauma. Meaningful change in such a measure may be more accessible following ImRs in its entirety, across multiple images. Alternatively, it would be useful to devise a questionnaire that specifically measures and tracks how well a specific life event is integrated into one's overall life narrative.

Results as a whole are not necessarily at odds with existing theories of meaning. Theories suggest that discrepancies between global meaning and the specific meaning assigned to negative events creates distress (Park & Folkman, 2007, 2010). This prompts a process whereby people attempt to reduce this discrepancy either through shifting their global beliefs or by changing the event-specific meaning. In the latter case, it is possible that, following meaning change of a particular event, it does not immediately become integrated into one's overall life narrative. This is likely to involve further, potentially time-consuming processes. Individual analysis discussed earlier showed that participants did experience a decrease in the event-specific meaning initially assigned to the image in question. However, this decline was not always sustained or stable. Thus, in relation to theories of meaning, it is possible that the current participants were still in the stage of negotiating the meaning change process for the traumatic event and had not yet reached the stage of incorporating this meaning into their overall sense of global meaning.

While high- and low-responders could not be differentiated in terms of meaning, it is noteworthy that all but one participant did experience an increase in IoC scores, with two achieving clinically significant change. One explanation for this is that it simply reflects shifts in the meaning making process that are likely to be seen by those in therapy. As there was no control group, this possibility cannot be ruled out. It is also possible that this measure does not reliably measure global meaning in the current sample or that, similar to previous findings where subjective measures of personal growth were unrelated to actual growth (Frazier et al., 2009), the subjective rating given by participants in the current sample did not reflect actual levels of integration of circumstances.

Interpretation of the current findings would have been enhanced through the use of Jacobson and Traux's (1991) reliable change index (RCI). Only the cut-off for clinically significant change was calculated in the current study as insufficient data was available to calculate the RCI. The current sample was heterogeneous in nature and at differing stages of treatment. The RCI offers a systematic way of comparing levels of change across such participants, regardless of the numerical differences in their follow-up scores. The clinical change cut-off is a less reliable means of comparing across participants as it concerned with the final numerical score, regardless of how much change this represents from the pre-treatment score. That said, given the variable IoC scores in the current sample, it is unlikely that RCI scores would have elucidated findings/interpretations much further in this particular case.

Theories

While this study has taken steps towards the question regarding factors necessary to produce clinical change in ImRs presented in the Introduction, the current results shed little, if any, light on how ImRs impacts on the underlying memory representation. Many of the findings would seem to support both the idea of retrieval competition (Brewin et al., 2006, 2010) and a change in meaning of the original image (Arntz, 2015; Kindt et al., 2007) without differentiating significantly between them. For example, GOS has been linked to increased image access (Raune et al., 2005) which could offer support for the idea that higher GOS in the current sample enhanced retrieval of the new image over the old. However, GOS also facilitates plausibility (Tversky & Kahneman, 1973) and, in the current sample, was linked to reduced belief of the key meaning of the image. Thus, GOS could have facilitated higher levels of belief and connection with new meanings of the rescript, thus supporting the idea of a re-

evaluation of the US of the original image (Arntz, 2011; Arntz & Weertman, 1999) such that the original memory is reconsolidated with a different meaning. Thus, the current research can offer some tentative suggestions as to what may be necessary to produce clinical change within the ImRs process, as well as offering suggestions as to where future research should focus. However, at the level of memory change and underlying processes affected by ImRs, little can be said.

Study Strengths

Design. One of the major strengths of this study was its use of SCED design. While a limited number of studies used this design to look at overall ImRs efficacy (e.g. Veale et al., 2015), to our knowledge, only one existing study (Salter, 2014) used SCED to explore underlying ImRs processes. Due to the paucity of knowledge regarding underlying ImRs mechanisms, SCED designs offer a useful opportunity to explore these in depth as they unfold across treatment. While Salter (2014) provided a much needed first step, the majority of cases lacked baseline and follow-up data, making it difficult to attribute changes in outcome to ImRs factors. A further strength of the current study was that all participants had the minimum number of baseline points to constitute a phase and at least one follow-up data point. Where possible, baseline instability was controlled for.

Furthermore, the current design was relatively successful in isolating the treatment component in question (ImRs) without interrupting routine treatment. For most cases, where spontaneous rescripting did not occur, stable baselines were achieved for most measures, allowing subsequent changes to be linked to the onset of ImRs. Isolating

ImRs from other treatment components, such as reliving, is a major challenge within PTSD research.

A further design strength was the level of specificity of the continuous measures used. Relating VAS scales to the specific image in question, rather than to one's traumatic imagery more generally meant that (a) it was possible to consider a heterogeneous group of participants at differing stages of treatment at group level and (b) changes in scores could be attributed more specifically to the target intervention.

Coding. Similar to the use of SCED, coding frameworks further facilitate in-depth analysis of the underlying processes at work within treatment, allowing research to adequately address gaps in knowledge with regard to ImRs. A particular strength of the current study was the use of both top-down and bottom-up coding. Using Salter's (2014) Session Content coding scheme encompassed those components of ImRs that are readily observable and manifest within sessions. The added use of GOS coding enhanced this process by highlighting those factors not so readily observable. Thus, coding from these two perspectives allowed the study to encompass a wider range of potentially important factors for change in ImRs. This study was also the first to apply the GOS Coding scheme to ImRs.

External Validity. Due to its naturalistic design, the current study did not impose any limitations on treatment implementation, either in terms of style or time. While some basic ImRs principles exist (Arntz, 2012), there is no single, agreed-upon ImRs method. Therapists in the current study implemented ImRs in various ways, and the decision as to when ImRs should commence was a clinical judgement, with no

relation to study participation. Thus, in so far as was possible, the current study is reflective of the type of therapy that one would receive within mental health services.

A further strength was that the sample in this study was quite a heterogeneous group. There was a diverse range of cultural backgrounds, age, nature of traumatic event and duration of trauma. Participants also varied in terms of the amount of treatment they had received (both ImRs and session numbers in general). This, combined with the specificity of the measures used, enhances the external validity of the study as improvements are less likely to be related to a particular phase in treatment or particular demographic factors.

Study Limitations and Alternative Explanations

Sample. One of the biggest shortcomings was the limited sample size. Phase 2 of this study aimed to recruit a minimum of ten participants. The final sample size fell short of this. Due to limited participant numbers, the current study lacks power to make concrete interpretations. Despite the heterogeneity of the sample, the fact that participation numbers were low also increases the possibility that sampling was selective.

A number of factors contributed to recruitment difficulties. Firstly, ImRs is not necessarily used routinely in PTSD treatment. Even when ImRs does form part of standard practice within services, the current study protocol could not always be applied without significant changes to routine treatment (e.g., using isolated sessions of ImRs within regular reliving work). Further attempts to broaden recruitment were limited by such factors. Secondly, many people with PTSD experience high levels of shame and

guilt (Lee, Scragg & Turner, 2001). Given that participation in the study required a stranger to listen to recordings of therapy sessions, it is understandable that more people did not consent.

A further factor to consider is that, for three participants, English was not their first language. While their level of English was deemed good enough to participate in therapy without the use of an interpreter, it is generally advised that therapeutic work is most effective when carried out in one's first language as this enables people to communicate more fluently (Costa, 2010). This may also have had an impact on session coding as these participants did sometimes struggle to describe particular image elements and experiences. This was often noticed in the description of emotional or cognitive content which were sometimes limited to words such as 'good' or 'bad'.

Design. While effort was made to accurately adhere to SCED protocols, this was not always possible given the naturalistic study design. Of particular note were the four participants who only received one rescripting session, resulting in an absence of treatment phase data for some measures. Gaps between sessions also occurred frequently.

Secondly, while all participants had a minimum of three baseline data points, these were not always stable. Extending the baseline period in such cases, as suggested by Kratochwill and colleagues (2010), would not have been in the best interest of the participants. While statistical analyses were used to control for this where possible, in those cases with limited/no treatment phase data, this was not possible. This significantly reduces the ability to attribute symptom change to rescripting factors as

the core of SCED analysis is its reliance on comparing treatment data to a stable baseline. Furthermore, the small number of data points available per phase in cases where statistical analyses were carried out means that only large effect sizes would have been detected. An increased number of data points per phase would have increased the power or the Tau-U analysis to detect smaller changes.

While the availability of follow-up data for all participants is a strength, most participants only have one follow-up data point. Lack of further data prevented analysis of trend and variability beyond treatment. Such information is key to determining whether effects extend beyond treatment. Those participants that did have more than one follow-up data point varied as to whether scores were maintained, showed further decrease (suggesting further benefits beyond treatment) or increased (suggesting that effects were not maintained).

Finally, all participants had received some form of reliving prior to their involvement in this study. Thus, while the current study was successful in isolating ImRs effects to some extent, it is not possible to comment on the efficacy of ImRs as a stand-alone treatment. ImRs efficacy as a stand-alone treatment for PTSD has been demonstrated previously (Raabe, Ehring, Marquenie, Olff & Kindt, 2015). However, this does not preclude the idea that, for the current sample, initial reliving work was necessary in order for the mechanisms of action suggested here to be effective. Nor is it possible to comment on the most appropriate timing for ImRs to occur.

Measures. One potential criticism of the current study is the lack of a disorder specific measure (e.g. Posttraumatic Diagnostic Scale, Foa, 1995). There were a

number of reasons for excluding such measures. Firstly, they are often time consuming for participants to complete on a weekly basis. Secondly, most participants had experienced multiple, severe traumas and were mid-way through treatment. It was thus unlikely that overall symptom scores would reduce significantly following 1-3 sessions that focus on one of multiple images. Thirdly, the strength of such standardised measures lies in their ability to detect broad clinical changes at a group level. Due to the fact that that they are unlikely to change over a short time frame (indeed many measures specify that people complete the measures in relation to the past 2 weeks/month), and are not designed to measure differences in behaviour within an individual, they are less appropriate for SCED designs (Morley, 2015b, 2015c). Idiographic measures, such as the VASs used here are readily applicable to SCEDS due to their ability to capture changes within an individual over short time periods.

However, the VASs used here were still standardised to some extent in that the same scales were presented to all participants. Some have argued that measures should be further tailored to each individual. Morley (2015c) has suggested that both the criterion being measured and the specific scale anchors used ought to be tailored to each participant. This was not done in the current study.

Unaccounted factors. While no study can attend to all potential mechanisms of change, there are two in particular that were not addressed in the current study that deserve attention. Firstly, no measure of the quality of therapeutic relationship was used. Such factors (e.g., warmth, empathy) have often been shown to correlate more highly with outcome than specific intervention techniques (Lambert & Barley, 2001). Thus, it is possible that changes in scores were dependent on more general factors of

therapeutic alliance, or that those factors identified were dependent on the quality of the relationship.

Secondly, the extent to which participants practiced rescripting between sessions was not measured. This is likely to have an impact on many factors relating to ease of recall of the image. However, of particular note for the current study is the potential link between practice and ease of simulation. Repeated simulation has been linked to increased level of detail and ease of imagining (De Brigard et al., 2013). Thus, daily practice of the rescript is likely to have enhanced GOS. Through practicing the rescript, participants are also likely to have made further amendments and changes, further enhancing GOS ratings of the resulting rescript.

Thus, the ratings given to the rescripts in this study may not fully reflect the actual rescripts being rehearsed on a day to day basis by participants. Two additional study components would have been useful: (1) a measure of weekly practice and (2) a recording of one's rescript at the end of each week, or at least at the end of rescripting for the target image, in order to assess GOS factors of resultant rescripts.

Another possible explaining factor in the current study is number of sessions, particularly given that all low-responders only had one rescripting session. However, this was also true for PB, who experienced the second highest level of change. Treatment duration could also be considered as a contributing factor. PD, who had the longest treatment duration, did indeed experience the highest level of symptom change. However, beyond this, treatment duration did not seem to predict outcome. Indeed, PC,

who experienced the second highest level of treatment, was categorised as a non-responder.

Future Research

Current and previous research have provided a starting point by identifying particular ImRs factors that seem to link to outcome. These findings will need to be replicated. Furthermore, larger scale studies are necessary to disentangle mechanisms of action *between* these factors. For example, both GOS and particular Session Content codes showed some links to outcome in the current study. Further work is needed to identify whether these contribute independently to outcome, whether factors such as emotional/cognitive processes and rescript believability are dependent on GOS or vice-versa.

There is some preliminary evidence from this study to suggest that targeting key counterfactuals in rescripting may reduce their distress and frequency. However, this was not true for all participants and was based on a very small sample size. It would be useful to investigate this further, by manipulating whether people target key counterfactuals and comparing groups. Whether changes in outcome are related to GOS should also be explored. Furthermore, evidence from individual analysis suggests that participants' dominant counterfactuals are not necessarily self-referent, suggesting that research should not necessarily limit itself to an investigation of self-referent thoughts.

Similarly, associations between ImRs, GOS and meaning need to be further explored. One avenue would be to use a more image-specific measure of meaning to explore whether rescripting facilitates incorporating a specific event into one's overall life

narrative. Another avenue would be to use the MMM to explore whether rescripting of a series of images relates to an overall shift in global meaning. The field would also benefit from research on potential links between shift in image specific meaning and its impact on global meaning.

The current study offers little insight into the changes happening at level of memory-change. Further work is needed to test the two competing ideas of retrieval competition (Brewin et al., 2006, 2010) and meaning change (Arntz, 2015; Kindt et al., 2007). In terms of current methodology, when asking participants to re-rate measures at the end of sessions, it was not specified whether they should hold the original image, new image or a combination of the two in mind. This was done partially to coincide with routine practice. However, it is unclear whether differences between participants was simply a reflection of the type of image being held in mind during ratings. Future research should test the differences in focusing on different image types. This may also help to shed light on whether one or two images are involved in rescripting.

Clinical Implications

While the current results and interpretation remain tentative, they offer some possible suggestions for clinical practice. It may be useful for clinicians to consider clients' rescripts from a simulation perspective. Enhancing factors such as temporal and logical sequencing, level of detail and minimisation of uncertainty may enhance ImRs efficacy. Internal processes should also be attended to, with a particular emphasis on the strength of new cognitions/emotion. Clients' level of belief in the rescript should also be monitored and attempts to increase this should be made. Findings in relation to counterfactual thinking are particularly tentative. However, when discussing ways in

which to incorporate change into intrusive images, it may be fruitful to explore a client's

core counterfactual thoughts in relation to that image for possibilities.

Conclusions

The first phase of this study successfully adapted a reliable GOS coding scheme for use

within ImRs in PTSD and established the reliability of an abbreviated version of the

Session Content coding scheme. Through the use of SCED and both bottom-up and

top-down coding, Phase 2 provided initial, tentative support for the role of simulation

in ImRs efficacy. This is the first study to apply GOS coding to ImRs. Phase 2 also

replicated previous findings that point to the importance of original and new processes,

shift in cognition/emotion, rescript believability and level of therapist guidance as

factors that produce change in ImRs. Image activation (vividness), the amount of

original/new imagery and the point at which change is introduced within the imagery

were also highlighted as potential factors for change, although to a lesser degree than

those already mentioned. Hypothetical links between these factors have been suggested,

although further research is required to investigate these.

Phase 2 also offers initial support for the idea that one of the ways in which ImRs effects

change is through a reduction in counterfactual thinking (and associated distress), and

that higher levels of GOS may facilitate this relationship. Some tentative evidence also

suggests that specifically targeting core counterfactual beliefs within the rescript may

be beneficial. Findings relating to links between ImRs and global meaning are unclear

because, while many participants experienced an increase in global meaning following

rescripting, there seemed to be no differences between those for whom rescripting was

and was not effective.

These results offer some useful insights into which factors may be necessary to produce clinical changing in ImRs. However, findings remain tentative due to the observational nature of results, the small sample size and the variability and baseline instability observed for some individual cases. Future research will be necessary both to substantiate the current findings and to further investigate the causal mechanisms hypothesised in this discussion.

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List of Acronyms

BDI-II – Beck Depression Inventory II

BMED – Broadened Median

CAPS – Clinically Administered PTSD Scale

CI – Confidence Intervals

C-memory – Contextual Memory

C-rep – Contextual Representation

CTNES – Counterfactual Thinking for Negative Events Scale

SRC – Self-Referent Upward Counterfactual scale (subscale of CTNES)

CTVAS – Counterfactual Thinking Visual Analogue Scales

EBVAS – Encapsulated Belief Visual Analogue Scale

EMDR – Eye Movement Desensitisation and Reprocessing

GOS – Goodness of Simulation

IAPT – Increasing Access to Psychological Therapist service

ICU – Intensive Care Unit

IE – Imaginal Exposure

ImRs – Imagery Rescripting

IoC – Integration of Circumstances scale (subscale of MMM)

IVAS – Image Intrusiveness Visual Analogue Scales

MMM – Measure of Mundane Meaning

NHS – National Health Service

OCD – Obsessive Compulsive Disorder

PDS – Posttraumatic Diagnostic Scale

PTSD – Posttraumatic Stress Disorder

R&D – Research and Development

RCI – Reliable Change Index

RHUL-DEC – Royal Holloway University Department of Ethics

RM2 – Running Median of 2

SAM – Situationally Accessible Memory

SCED – Single Case Experimental Design

SD – Standard Deviation

SH – Simulation Heuristic

S-memory – Sensation based Memory

S-rep – Sensations based Representation

TF-CBT – Trauma-focused Cognitive Behavioural Therapy

TR – Trended Range

US – Unconditioned Stimulus

VAM – Verbally Accessible Memory

VAS – Visual Analogue Scale

WAS – World Assumption Scale

Appendices

Appendix 1. National Research Ethics Service Ethical Approval

NHS
Health Research Authority

National Research Ethics Service

NRES Committee North West - Lancaster

HRA NRES Centre - Manchester
Barlow House
3rd Floor 4 Minshull Street Manchester
M1 3DZ

Telephone: 0161 625 7818
Facsimile: 0161 625 7299

22 May 2013

Miss Caroline Salter
Department of Clinical Psychology
Department of Psychology
Royal Holloway,
University of London
Egham TW20 0EX

Dear Miss Salter

Study title:	**What makes a good imagery rescript: Using verbal analysis to investigate the characteristics required to make a successful rescript in a clinical sample**
REC reference:	13/NW/0432
IRAS project ID:	124012

The Proportionate Review Sub-committee of the NRES Committee North West - Lancaster reviewed the above application on 22 May 2013.

We plan to publish your research summary wording for the above study on the NRES website, together with your contact details, unless you expressly withhold permission to do so. Publication will be no earlier than three months from the date of this favourable opinion letter. Should you wish to provide a substitute contact point, require further information, or wish to withhold permission to publish, please contact the Co-coordinator Mrs Carol Ebenezer, nrescommittee.northwest-lancaster@nhs.net.

Ethical opinion

The Committee commented that this is a well thought through application

On behalf of the Committee, the sub-committee gave a favourable ethical opinion of the

above research on the basis described in the application form, protocol and supporting documentation, subject to the conditions specified below.

Ethical review of research sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.

Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at http://www.rdforum.nhs.uk.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of approvals from host organisations.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

You should notify the REC in writing once all conditions have been met (except for site approvals from host organisations) and provide copies of any revised documentation with updated version numbers. The REC will acknowledge receipt and provide a final list of the approved documentation for the study, which can be made available to host organisations to facilitate their permission for the study. Failure to provide the final versions to the REC may cause delay in obtaining permissions.

Approved documents

The documents reviewed and approved were:

Document	Version	Date
Evidence of insurance or indemnity		
GP/Consultant Information Sheets	1	01 March 2013
Investigator CV	Salter	
Investigator CV	Brown	
Investigator CV	Parker	
Investigator CV	XXXX	
Investigator CV	XXXX	
Other: Post interview information sheet	1	01 April 2013
Other: Impact of Event Scale		
Other: Patient Health Questionnaire-9		
Other: Weekly rating of intrusive memories/images		
Other: Clarification of sponsor		
Participant Consent Form	1	01 May 2013
Participant Information Sheet	1	01 May 2013
Protocol	1	01 March 2013
REC application	3.5	01 May 2013

Membership of the Proportionate Review Sub-Committee

The members of the Sub-Committee who took part in the review are listed on the attached sheet.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research
Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document "After ethical review – guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

Notifying substantial amendments
Adding new sites and investigators
Notification of serious breaches of the protocol
Progress and safety reports
Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

Feedback

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.
Information is available at National Research Ethics Service website > After Review

13/NW/0432	Please quote this number on all correspondence

We are pleased to welcome researchers and R & D staff at our NRES committee members' training days – see details at http://www.hra.nhs.uk/hra-training/

With the Committee's best wishes for the success of this project.

Yours sincerely

[signature]

pp.

Dr Lisa Booth, Chair
Email: nrescommittee.northwest-lancaster@nhs.net

Enclosures: *List of names and professions of members who took part in the review "After ethical review – guidance for researchers" [SL-AR2]*

Copy to: *Dr Gary Brown*
Ms Gill Dale, South London And Maudsley NHS Foundation Trust

NRES Committee North West - Lancaster

Attendance at PRS Sub-Committee of the REC meeting on 22 May 2013 Committee Members:

Name	Profession	Present	Notes
Dr Nigel Calvert	Associate Director of Public Health	Yes	
Mrs Gillian Rimington	Paralegal	Yes	
Professor Jois Stansfield	Professor of Speech Pathology	Yes	

Appendix 2. National Research Ethics Service Substantial Amendment Approval

(A)

NHS
Health Research Authority
National Research Ethics Service

NRES Committee North West - Lancaster

Barlow House
3rd Floor
4 Minshull Street
Manchester
M1 3DZ

Tel: 0161 625 7818
Fax: 0161 625 7299

28 May 2015

Ms Kathy Looney
Trainee Clinical Psychologist
Royal Holloway University of London

Dear Ms Looney

Study title:	**What makes a good imagery rescript: Using verbal analysis to investigate the characteristics required to make a successful rescript in a clinical sample**
REC reference:	**13/NW/0432**
Protocol number:	**N/A**
Amendment number:	**3**
Amendment date:	**10 May 2015**
IRAS project ID:	**124012**

Change of CI
Change to duration and outcome measures

The above amendment was reviewed by the Sub-Committee in correspondence.

Ethical opinion

The members of the Committee taking part in the review gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation.

The members had no ethical issues with this amendment.

Approved documents

The documents reviewed and approved at the meeting were:

Document	Version	Date
Notice of Substantial Amendment (non-CTIMP)	3	10 May 2015
Other [NHS to NHS letter]		

Other [Debrief form]	2	10 May 2015
Other [GP info sheet]	3	10 May 2015
Other [CI Declaration Page Signed]		22 May 2015
Research protocol or project proposal	3	10 May 2015
Summary CV for Chief Investigator (CI)		
Validated questionnaire [MMM]		

Membership of the Committee

The members of the Committee who took part in the review are listed on the attached sheet.

R&D approval

All investigators and research collaborators in the NHS should notify the R&D office for the relevant NHS care organisation of this amendment and check whether it affects R&D approval of the research.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

We are pleased to welcome researchers and R & D staff at our NRES committee members' training days – see details at http://www.hra.nhs.uk/hra-training/

13/NW/0432:	Please quote this number on all correspondence

Yours sincerely

pp.

Dr Lisa Booth
Chair

E-mail: nrescommittee.northwest-lancaster@nhs.net

Enclosures: *List of names and professions of members who took part in the review*

Copy to: *Ms Enitan Eboda, South West London and St Georges Mental Health NHS Trust*
                Dr Gary Brown

NRES Committee North West - Lancaster

Attendance at Sub-Committee of the REC meeting on 28 May 2015

Committee Members:

Name	Profession	Present	Notes
Dr Lisa Booth	Senior Lecturer / Chair	Yes	
Professor Jois Stansfield	Professor of Speech Pathology	Yes	

Also in attendance:

Name	Position (or reason for attending)
Mrs Carol Ebenezer	REC Manager

Appendix 3. National Research Ethics Service Substantial Amendment Approval

(B)

NHS
Health Research Authority
National Research Ethics Service

NRES Committee North West - Lancaster

Barlow House
3rd Floor
4 Minshull Street
Manchester
M1 3DZ

Tel: 0161 625 7818
Fax: 0161 625 7299

08 September 2015

Ms Kathy Looney
Trainee Clinical Psychologist
Royal Holloway University of London

Dear Ms Looney

Study title:	What makes a good imagery rescript: Using verbal analysis to investigate the characteristics required to make a successful rescript in a clinical sample
REC reference:	13/NW/0432
Protocol number:	N/A
Amendment number:	4
Amendment date:	21 August 2015
IRAS project ID:	124012

Additional measures, additional coding, changes in administration time,

The above amendment was reviewed by the Sub-Committee in correspondence.

Ethical opinion

The members of the Committee taking part in the review gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation.

The members had no ethical issues with this amendment.

Approved documents

The documents reviewed and approved at the meeting were:

Document	Version	Date
Notice of Substantial Amendment (non-CTIMP)	4	21 August 2015
Other [Cribsheet]	1	20 August 2015
Other [Declaration]		

Other [encapsulated belief FIRST]	1	20 August 2015
Research protocol or project proposal	4	20 August 2015
Validated questionnaire [CTNES]		
Validated questionnaire [CTVAS]		

Membership of the Committee

The members of the Committee who took part in the review are listed on the attached sheet.

R&D approval

All investigators and research collaborators in the NHS should notify the R&D office for the relevant NHS care organisation of this amendment and check whether it affects R&D approval of the research.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

We are pleased to welcome researchers and R & D staff at our NRES committee members' training days – see details at http://www.hra.nhs.uk/hra-training/

13/NW/0432:	Please quote this number on all correspondence

Yours sincerely

pp.

Dr Lisa Booth
Chair

E-mail: nrescommittee.northwest-lancaster@nhs.net

Enclosures:	List of names and professions of members who took part in the review
Copy to:	Ms Enitan Eboda, South West London and St Georges Mental Health NHS Trust
	Dr Gary Brown

NRES Committee North West - Lancaster

Attendance at Sub-Committee of the REC meeting on 08 September 2015

Committee Members:

Name	Profession	Present	Notes
Dr Lisa Booth	Senior Lecturer / Chair	Yes	
Professor Jois Stansfield	Professor of Speech Pathology	Yes	

Also in attendance:

Name	Position (or reason for attending)
Mrs Carol Ebenezer	REC Manager

Appendix 4. Royal Holloway Departmental Ethics Committee Approval

From: Psychology-Webmaster@rhul.ac.uk [mailto:Psychology-Webmaster@rhul.ac.uk]
Sent: 06 August 2013 12:52
To: XXXX@rhul.ac.uk;
Cc: PSY-EthicsAdmin@rhul.ac.uk;
Subject: Ref: 2013/010 Ethics Form Approved

Application Details:

Applicant Name: **Caroline Salter**

Application title: **Characteristics of a successful imagery re-script**

Comments:

Approved. (Reviewers' feedback is given, below, for your information).

Reviewer 1.
Ethical issues for this study have clearly been carefully considered and ethical approval has already been obtained from NHS ethics. I have just a couple of minor comments:

Section 5: How many years should the transcriptions be kept for following study completion?

Information sheet: On page 2, para 2, 'All the information we do collect will stored' should be 'All the information we do collect will be stored'.

Consent form: It is mentioned that the therapist would obtain consent from participants. It wasn't clear who would be signing the consent forms. It might be ideal if both the therapist and one of the researchers sign the form. It's fine for the researcher to sign the form at a later date after receiving the forms from the therapist.

Reviewer 2.
Minor points: Length of time following which transcriptions will be destroyed is missing from section 5 (but information sheet says two years). Phone number missing from information sheet.

Despite the sensitive nature of this study, the ethical issues appear to have been considered fully and addressed carefully and I have no additional concerns.

Appendix 5. Royal Holloway Departmental Ethics Committee Substantial Amendment Approval

Application Details:	View the form click [here](#) Revise the form click [here](#)
Applicant Name:	**Kathy Looney**
Application title:	**What makes a good imagery rescript: Using verbal analysis to investigate the characteristics required to make a successful rescript in a clinical samp**
Comments:	Approved

Appendix 6. South West London and St George's Research and Development

Substantial Amendment Approval (A)

South West London and St.George's **NHS**
Mental Health NHS Trust

Research and Development

Miss Kathy Looney
Trainee Clinical Psychologist
Department of Clinical Psychology
Royal Holloway, University of London
Egham Hill
Egham
Surrey TW20 0EX

Acting Director: Dr Robert M. Lawrence
POPULATION HEALTH RESEARCH
INSTITUTE
ST GEORGE'S, UNIVERSITY OF LONDON
HUNTER WING, LEVEL 6
CRANMER TERRACE
LONDON SW17 0RE

R&D Co-ordinator: Ms Enitan Eboda
E-mail: eeboda@sgul.ac.uk

| Direct Line: | 020 8725 3463 |
| Fax: | 020 8725 3538 |

08 July 2015

Dear Miss Looney,

Research Title: What makes a good imagery rescript: using verbal analysis to investigate the characteristics required to make a successful rescript in a clinical sample.
Principal Investigator: Miss Eleanor Parker
Project reference: PF569
REC reference: 13/NW/0432
Substantial amendment: 3
Amendment date: 10 May 2015
Project ID: PF569
Sponsor: Royal Holloway, University of London.

I refer to your e-mail of 6th July 2015, in which we were notified of substantial amendment 3 to the previously approved proposal.

I hereby confirm that I do not have any objections to the amendment to your study, since you have gone through the correct channels to seek approval from the relevant bodies. You may therefore accept this letter as official notification, on behalf of the R&D Committee, that the amendment has been accepted and the terms of R&D approval originally stated in our letter of 28 August 2013 still apply.

If you have any further queries regarding the above, please contact Enitan Eboda, R&D Co-ordinator on 020 8725 3463 (St. George's), e-mail: eeboda@sgul.ac.uk.

Yours sincerely,

Dr Robert Lawrence
Research & Development Director
Chair, Research & Development Committee.

Appendix 7. South West London and St George's Research and Development

Substantial Amendment Approval (B)

South West London and St.George's **NHS**
Mental Health NHS Trust

Research and Development

Miss Kathy Looney
Trainee Clinical Psychologist
Department of Clinical Psychology
Royal Holloway, University of London
Egham Hill
Surrey TW20 0EX

Acting Director: Dr Robert Lawrence
SECTION OF MENTAL HEALTH, PHSE
DIVISION
HUNTER WING
CRANMER TERRACE
LONDON SW17 0RE

R&D Co-ordinator: Ms Enitan Eboda
E-mail: eeboda@sgul.ac.uk

21 September 2015

Direct Line: 020 8725 3463
Fax: 020 8725 3538

Dear Miss Looney,

Research Title: What makes a good imagery rescript: using verbal analysis to investigate the characteristics required to make a successful rescript in a clinical sample.
Principal Investigator: **Miss Eleanor Parker**
Project reference: **PF569**
REC reference: **13/NW/0432**
Substantial amendment: **4**
Amendment date: **20 August 2015**
Project ID: **PF569**
Sponsor: **Royal Holloway, University of London.**

I refer to your e-mail of 10 September 2015, in which we were notified of substantial amendment 4 to the previously approved proposal.

I hereby confirm that I do not have any objections to the amendment to your study, since you have gone through the correct channels to seek approval from the relevant bodies. You may therefore accept this letter as official notification, on behalf of the R&D Committee, that the amendment has been accepted and the terms of R&D approval originally stated in our letter of 28 August 2013 still apply.

If you have any further queries regarding the above, please contact Enitan Eboda, R&D Co-ordinator on 020 8725 3463 (St. George's), e-mail: eeboda@sgul.ac.uk.

Yours sincerely,

Dr Robert Lawrence
Research & Development Director
Chair, Research & Development Committee.

Appendix 8. Homerton University Hospital Research and Development Approval

Homerton University Hospital **NHS**

NHS Foundation Trust

Research & Development
Chair: Dr Claire Gorman

Homerton University Hospital
Research and Development
Yellow Roof Top Office
Homerton Row
London
E9 6SR

Christine Mitchell-Inwang
Research & Development Manager
Christine.Inwang@homerton.nhs.uk

Tel: 020 8510 5134
Fax: 020 8510 7850
www.homerton.nhs.uk

9th February 2016

Dr Jon Wheatley
Homerton University Hospital NHS Foundation Trust
Homerton Row
Hackney
London
E9 6SR

Dear Dr Wheatley,

Re: Characteristics of a successful imagery rescript

R&D No: 1625

Thank you for sending all the relevant documents for Homerton University Hospital Trust Research and Development Approval of the above research study. As part of the Research and Development approval process we have conducted a site specific assessment for this study. I am happy to inform you that the Trust has approved the conduct of the study and that the Trust will indemnify against negligent harm that might occur during the course of this project.

The following main document/s has been received by R&D department as part of the approval process;

Research Protocol V4	20/08/2015
Cribsheet V1	20/08/2015
Encapsulated belief FIRST V1	20/08/2015
Participant Information Sheet V1	01/05/2013
Consent Form V1	01/05/2013

All other document/s you have sent in as part of the process has also been received.

I would like to draw your attention to the following conditions of the approval of this research project with which you must comply. **Failure to do so may result in the Trust withdrawing R&D approval which allows you to conduct this research project at Homerton University Hospital NHS Foundation Trust.**

Untoward events - Should any untoward event occur it is **essential** that you complete a clinical incident form and write on the form 'R&D'. Contact the R&D Office immediately and if

patients or staff are involved in an incident you must also contact the Risk Manager on 020 8510 7649.

Status of Research - Inform us if your project is amended or if your project terminates early/requires an extension as well as informing the Research Ethics Committee. This is necessary to ensure that your indemnity cover is valid and also helps the office to maintain up-to-date records. A copy of any publications arising from the research should be sent to the R&D Office for use in the R&D Annual Report. Please be reminded that this hospital should be acknowledged in any publication.

Research Information - You will be required to complete a project update as required by the R&D Office to ensure that we have up to date information so that we can send accurate reports to the DoH and research networks. The project update form will be emailed or sent to you by the R&D Office.

Research Governance - As part of research governance, all investigators accessing identifiable personal information are required to comply with current data protection requirements.

Intellectual Property - If you believe that protectable intellectual property may arise from your research, please contact the Christine Mitchell-Inwang, R&D Manager on ext 5134 who will advise you on the proper course of action.

Monitoring of Studies – You must comply with the Trust's legal responsibility as host of this research project to monitor and audit the research to ensure that the Research Governance Framework and Good Clinical Practice (GCP) if applicable is being adhered too. Monitoring questionnaires will be sent to you and random audit visits will also take place across the trust and will be conducted following at least a seven day notice period. **Failure to respond to any of these monitoring or auditing requests may result in the Trust withdrawing your R&D approval to conduct this research at Homerton University Hospital NHS Foundation Trust.**

Please note that all NHS and social care research is subject to the DoH *Research Governance Framework*. If you are unfamiliar with the standards contained in this document, you may obtain details from the Trust R&D Office or from the DoH website (www.dh.gov.uk).

Please do not hesitate to contact Christine Mitchell-Inwang, Research and Development Manager or me if you have any further questions.

Yours sincerely,

Dr Claire Gorman
Director of Research & Development

Appendix 9. Goodness of Simulation (GOS) Coding Scheme

Each of the following six cretieria are rated on a scale of 1-3 where 3=Mostly True (clearly there), 2=Partially True (a little bit) and 1=Not True or Mostly Not True.

Therapist Prompts: Think about whether or not they were filling in *essential* vs *extra* detail. Former ought to be taken into consideration while the latter should not. Prompts that reflect general therapeutic support should not impact ratings.

Keep in mind: To what extent does the *narrator* have, in <u>their mind</u>, a coherent simulation that feels believable, like it could/could have happened.

Criterion	Details of what you are looking for in the rescript	Rating
Logically Sequenced Extent to which successive elements of a scenario are connected logically, with each step following from the previous one.	Logical gap/jump indicated when two adjacent statements do not logically connect. Transitions within scenario do not have to be *physically* possible, but should make logical sense within the context of the rescript.	
Temporally Ordered Extent to which there is a sense of temporal flow, with the scenario unfolding over time.	Temporal ordering can be communicated explicitly or clearly implied so that sense of temporal flow is established. The emphasis is on the presence of a clear sense that the elements of the scenario are ordered in time and that the narrator knows what happens and when so that their description unfolds in a smooth and ordered manner. Score lower if there the rescript jumps back and forth in time or response mainly focus on thought rather than progress of events over time.	

Uncertainty is Minimised Extent to which scenario either increases or decreases a sense of uncertainty about what is being described.	Extent to which the narrator adequately addresses (i) inherently uncertain aspects of the rescript OR (ii) uncertain elements introduced by the narrator themselves. Direct expressions of the narrator's own uncertainty should also be taken into account. Note: Relates to uncertainty from the **narrator's** point of view – if it is apparent that elements are clear in the mind of the narrator even if not to the rater, this should not impact rating given.	
Good Level of Detail Extent to which scenario gives a comprehensive account of all the **basic elements** of the situation.	Extent to which the narrator provides details **necessary for following** the scenario. Score lower when enough detail is omitted/unspecific such that substantial portions of the scenario need to be inferred.	
Easy to Imagine Extent to which scenario is **vividly** described and easy to imagine.	Extent to which imagery description can be easily pictured/imagined in the mind of the rater. Assesses how clear and detailed the rescript is.	
Flows Smoothly Subjective, global judgement of how well the scenario flows.	Extent to which rater has to work to make the story 'fit' in their mind and the degree to which they must make inferences. Assesses how halting and tentative the rescript is. Note: Does not include individual habits or ways of talking (e.g. 'you know').	

Appendix 10. Session Content Coding Scheme

Departure from the original imagery
Summary: This item rates the extent to which the rescript departs from the original imagery in terms of the amount of new material being introduced. Consider the setting and time taken up by the new imagery.

3 = **All new**: All new (e.g., safe place imagery);

Additional guidance: none of the original imagery is included in the rescript.

2 = **Mostly new**: Mostly new imagery, some old material;.

Additional guidance: a small portion of the original intrusive imagery is incorporated into the rescript.

1 = **Some new**: the majority of the imagery is taken up with the original
intrusive imagery.

Additional guidance: Less than half of the imagery incorporates new material,

0 = **Mostly old/no change**: Mostly old imagery or no change from original intrusive imagery (e.g., reliving only);

Additional guidance: a minimal amount of new material is incorporated

Timing of change

Summary: This item rates the point in time when new information is introduced into the imagery.

3 = **During the imagery:** The rescript coincides in time with the original imagery.

Additional guidance: Change in the imagery is introduced part way through the original imagery –. .

2 = **Immediately (1) before OR (2) after the imagery**: The rescript occurs immediately before or in the aftermath of the original imagery (specify before or after).

Additional guidance: Change in the imagery is introduced immediately before or at the end of events in the original imagery (i.e., one follows consecutively after the other). For example, events in the new imagery pre-empt events in the original imagery or build on the ending of the original imagery.

1 = **Some time (1) before or (2) after the imagery:** The rescript occurs a while before or after the original imagery (specify before or after).

Additional guidance: A new imagery is created that, if real, would have occurred some length of time before or after the original imagery (i.e., one does not follow consecutively after the other) but the temporal link is clear. For example, the new imagery changes the story of the original imagery by adding new content at an earlier or later point in time (e.g., days, weeks or years earlier or later).

0 = **No temporal relationship to the imagery**: The rescript occurs at a time that appears unrelated to the original imagery or the temporal relationship between original and new imagery is not apparent.

Additional guidance: New imagery is created that, if real, would have occurred at a time that is unrelated to the original imagery - the temporal link is not clear. The new imagery is thus not part of the original imagery

Ability to stay with the imagery
Summary: This item rates the client's ability to continuously activate and stay with the imagery throughout the rescripting process.

3 = Mostly stays with: The client stays with the imagery throughout.

Additional guidance: The client for the most part is able to bring to mind and stay with the imagery through the entire rescripting session.

2 = Stays with moderately: The client stays with the imagery but falls short of doing so for the entire session.

Additional guidance: The client is able to bring to mind and stay with the imagery for the majority of the rescripting session, but comes out of the imagery at times ().

1 = Stays with somewhat: The client struggles to stay with the imagery.

Additional guidance: Although the client is able to bring to mind and stay with the imagery at times, he/she frequently come back to the therapy room.

0 = Stays with minimally/not at all: The client cannot stay with imagery.

Additional guidance: The client is unable to bring the imagery to mind for most of the session.

Amount of guidance given by the therapist
Summary: This item rates the client's ability to follow the rescripting process and incorporate changes in the imagery without significant guidance from the therapist.

3 = Mostly self-guided: Little guidance from therapist is needed; the client is able to incorporate change into the imagery and guide themselves through the rescript with little or no prompting.

Additional guidance: The client is able to bring to mind and describe the rescripted imagery with little input from the therapist. For example, the therapist provides <u>infrequent minor/general</u> prompts to capture more details or to bring in additional changes.

2 = Moderately self-guided: Some guidance from therapist is provided; the client and therapist guide the rescript equally.

Additional guidance: The client is able to follow therapist prompts in order to bring to mind and vividly describe the rescripted imagery. Without these prompts, it is likely that the client would leave out details or become stuck.

1 = Somewhat self-guided: The rescript is mostly guided by the therapist; the client struggles to guide the rescript.

Additional guidance: Rescripting is mostly guided by the therapist; the client finds it difficult to describe the imagery and to incorporate change. For example, the therapist provides <u>frequent specific</u> prompts to capture more details or to bring in additional changes.

0 = Minimally/not at all self-guided: The rescript is mostly/completely guided by the therapist.

Additional guidance: The client is reliant on the therapist for guiding the rescript. It is necessary for the therapist to become actively involved in the description of the event and to ensure changes to the imagery are incorporated

Activation of imagery – original imagery elements

Summary: This item rates the client's ability to visualise the imagery as indicated by the vividness of their description.

3 = Mostly able: The client can see the imagery easily in the mind's eye; the imagery is very vivid ("I can see, hear, smell, feel and/or taste it very clearly").

Additional guidance: The client creates imagery that is very clear and intense for the majority of the session. All or most of the imagery is experienced in great detail. The imagery is mostly or entirely described in present tense and first person.

2 = Moderately able: Parts of the imagery can be seen easily in the mind's eye; most of the imagery is vivid ("Mostly all of the details are there").

Additional guidance: The client creates imagery where parts are clear and intense, while other parts are lacking in clarity. Both present and past tense, and first and third person may be used.

1 = Somewhat able: Some of the imagery can be seen easily in the mind's eye; some parts of the imagery are vivid ("Some of the details are there").

Additional guidance: The client creates imagery where many parts are lacking in clarity. The imagery may be mostly described in third person but first person may also be used.

0 = Minimal/not at all able: Very little or none of the imagery can be seen clearly in the mind's eye; the imagery is not vivid ("Everything is a bit blurred").

Additional guidance: Client is not able to bring to mind imagery that is clear. The imagery is not likely to be described in present tense and first person

Activation of imagery – new imagery elements
Summary: This item rates the client's ability to visualise the imagery as indicated by the vividness of their description.

3 = **Mostly able:** The client can see the imagery easily in the mind's eye; the imagery is very vivid ("I can see, hear, smell, feel and/or taste it very clearly").

Additional guidance: The client creates imagery that is very clear and intense for the majority of the session. All or most of the imagery is experienced in great detail. The imagery is mostly or entirely described in present tense and first person.

2 = **Moderately able:** Parts of the imagery can be seen easily in the mind's eye; most of the imagery is vivid ("Mostly all of the details are there").

Additional guidance: The client creates imagery where parts are clear and intense, while other parts are lacking in clarity. Both present and past tense, and first and third person may be used.

1 = **Somewhat able:** Some of the imagery can be seen easily in the mind's eye; some parts of the imagery are vivid ("Some of the details are there").

Additional guidance: The client creates imagery where many parts are lacking in clarity. The imagery may be mostly described in third person but first person may also be used.

0 = **Minimal/not at all able:** Very little or none of the imagery can be seen clearly in the mind's eye; the imagery is not vivid ("Everything is a bit blurred").

Additional guidance: Client is not able to bring to mind imagery that is clear. The imagery is not likely to be described in present tense and first person

Activation of original internal processes

Summary: This item rates activation of emotions, cognitions and/or physical sensations associated with the original imagery.

3 = Very high activation: Most or all trauma-related thoughts, feelings and/or physiological reactions are present in the session. Processes are very intense.

Additional guidance: The client experiences very intensely exactly how they felt emotionally or physically or what they thought at the time of the original event.

2 = High activation: A high amount of trauma-related thoughts, feelings and/or physiological reactions are present during the session. Processes are intense.

Additional guidance: Trauma-related internal experiences are experienced intensely. Select this option if the client reports or appears to be experiencing these internal processes in the session (e.g., more than 50% if the client were asked to rate the intensity).

1 = Moderate/low activation: A moderate or low amount of trauma-related thoughts, feelings and/or physiological reactions are present during the session. Processes are moderately intense.

Additional guidance: Trauma-related internal experiences are present in the description of how the client feels but are experienced at a moderate or low level (e.g., less than 50% if the client were asked to rate the intensity).

0 = Minimal/no activation: Trauma-related thoughts, feelings and/or physiological reactions are minimal/absent during the session. Processes are of very low intensity.

Additional guidance: The client does not access trauma-related thoughts, feelings and/or physiological reactions during the session. It may be that the client does not express these internal experiences, or that the client reports how he/she felt/thought at the time but does not feel/think that way now in the therapy room.

Activation of new internal processes

<u>Summary:</u> This item rates activation of emotions, cognitions and/or physical sensations associated with change in the imagery.

3 = Very high activation: New emotions, cognitions and/or physiological sensations are present and very intense during the rescripted part of the imagery.

Additional guidance: Change-related internal processes are experienced very intensely. .

2 = High activation: New emotions, cognitions and/or physiological sensations are present and intense during the rescripted part of the imagery.

Additional guidance: Change-related internal experiences are experienced intensely. Select this option if the client reports or appears to be experiencing these internal processes but at less than full intensity.

1 = Moderate/low activation: New emotions, cognitions and/or physiological sensations are present but of moderate/low intensity during the rescripted part of the imagery.

Additional guidance: Change-related internal experiences are present in the description of how the client feels, but are experienced at a moderate or low level.

0 = Minimal/no activation: New emotions, cognitions and/or physiological sensations are not accessed during the rescripted part of the imagery.

Additional guidance: The client does not access change-related thoughts, feelings and/or physiological reactions during the session. Either they are completely absent, or the client can hypothetically describe how he/she might feel/think but does not experience them directly from the rescript.

Cognitive and emotional shift

Summary: This item rates the extent to which the meaning (as indicated by expressed thoughts and/or feelings) associated with the original imagery changes during the rescripting process.

3 =   **High change**: The client thinks and/or feels markedly differently towards the original imagery at the end of the session. It is clear a shift has taken place.

Additional guidance: Rescripting has produced a high degree of cognitive and/or emotional change.

2 =   **Medium change**: The client thinks and/or feels distinctly differently towards the original imagery at the end of the session. It is likely a shift has taken place.

Additional guidance: Rescripting has produced a moderate degree of cognitive and/or emotional change.

1 =   **Some change**: The client thinks and/or feels somewhat differently towards the original imagery at the end of the session. It is unclear whether a shift has taken place.

Additional guidance: Rescripting has produced a low degree of cognitive and/or emotional change.

0 =   **Minimal/No change**: The client thinks and/or feels the same towards the original imagery at the end of the session.

Additional guidance: Rescripting has produced no cognitive and/or emotional change.

Believability of rescript

Summary: This item rates the extent to which the rescript feels believable and compelling to the client regardless of whether it is physically possible.

3 = Completely believable: The rescript feels completely believable.

Additional guidance: The client describes the new outcome as feeling believable and something they can connect with.

2 = Mostly believable: The client cannot connect with some aspects of the rescript.

Additional guidance: The client describes the new outcome as feeling mostly believable but may not be able to connect with some aspects.

1 = Somewhat believable: The rescript mostly does not feel believable but the client can connect with some aspects.

Additional guidance: The client mostly does not feel that the new outcome is believable.

0 = Minimally/Not at all believable: The rescript seems alien and the client cannot connect with it.

Additional guidance: The client does not feel that the new outcome is believable.

Appendix 11. Image Intrusiveness Visual Analogue Scales (IVAS)

1. **Over the past 3 days, how frequently have you experienced this image or memory?**
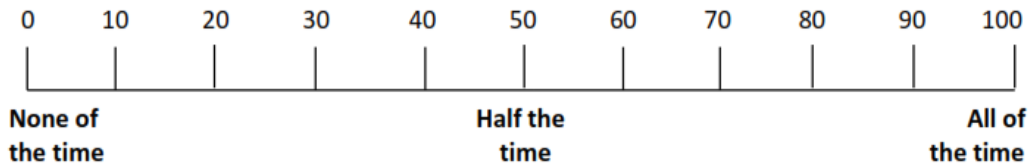
| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

None of
the time   Half the
time   All of
the time

2. **Over the past 3 days, how much ahs the image or memory interfered with your daily life?**

| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

Not at all   Moderately   Severely
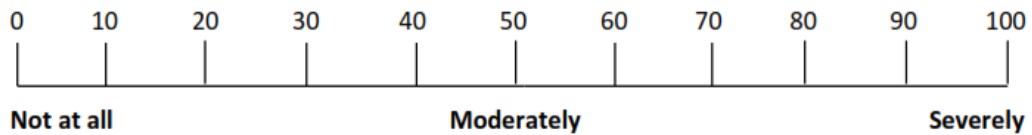
3. **At the moment, how distressing is your intrusive image or memory?**

| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

Not at all   Moderately   Severely
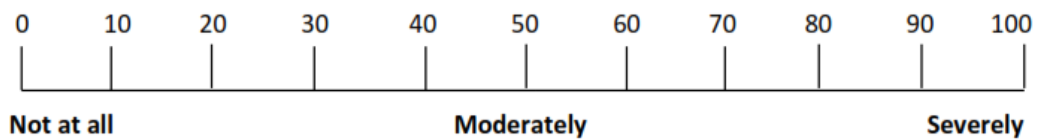
4. **At the moment, how uncontrollable is your intrusive image or memory?**

| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

Not at all   Moderately   Completely
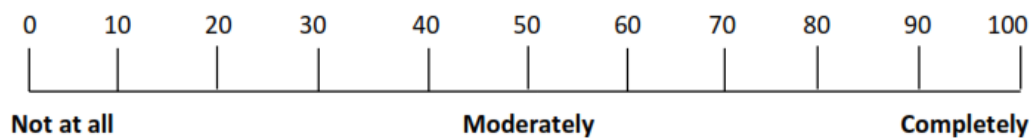
5. **At the moment, how much does it feel as if this image/memory is happening in the here and now?**

| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

Not at all   Moderately   Completely
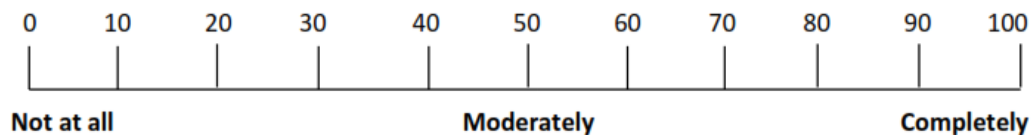
Appendix 12. Encapsulated Belief Visual Analogue Scales (EBVAS)

Key Meaning:

_____

_____

How much do you believe this/these statement(s) to be true right now?

|----------|----------|----------|----------| ----------|----------|----------|----------|----------|----------|

0   10   20   30   40   50   60   70   80   90   100

Not at all   Extremely

Appendix 13. Counterfactual Thought Visual Analogue Scales (CTVAS)

1.

In the past 3 days, how frequently has this thought come into your mind?
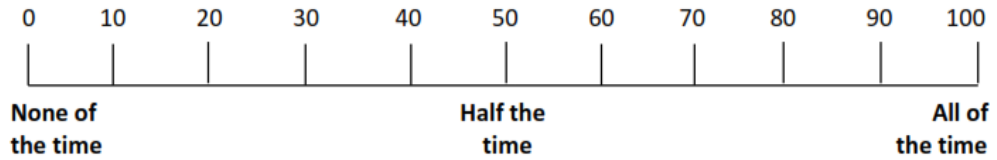
| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

None of
the time   Half the
                                            time   All of
                                                                                    the time

In the past 3 days, how distressing has this thought been/how upset does it make you feel?

| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

Not at all   Moderately   Severely

2.

In the past 3 days, how frequently has this thought come into your mind?

| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

None of
the time   Half the
                                            time   All of
                                                                                    the time

In the past 3 days, how distressing has this thought been/how upset does it make you feel?

| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

Not at all   Moderately   Severely

3.

In the past 3 days, how frequently has this thought come into your mind?

```
0     10    20    30    40    50    60    70    80    90    100
|     |     |     |     |     |     |     |     |     |     |
```

None of   Half the   All of
the time   time   the time

In the past 3 days, how distressing has this thought been/how upset does it make you feel?

```
0     10    20    30    40    50    60    70    80    90    100
|     |     |     |     |     |     |     |     |     |     |
```

Not at all   Moderately   Severely
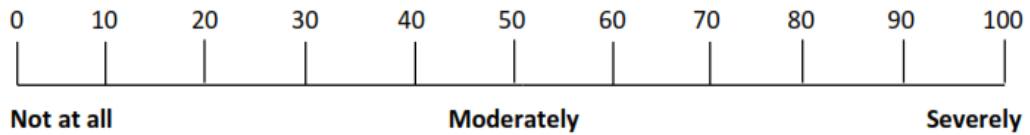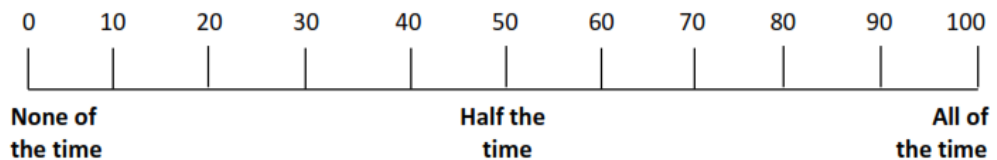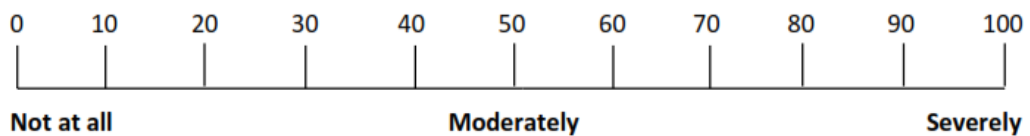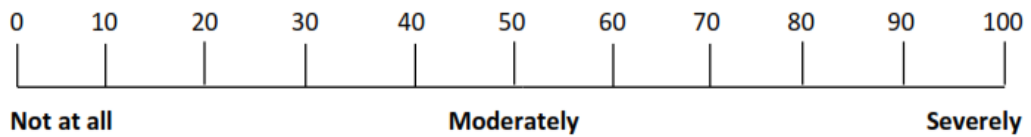
Appendix 14. Measure of Mundane Meaning (MMM) – Integration of

Circumstances subscale (IoC)

INSTRUCTIONS: Below is a list of statements that someone might make about themselves and their life experiences. Please read each statement and decide how true the statement is of you *right now*.   Then, choose a response corresponding to how true the statement is of you. Try not to think too much about each item--people are different, so there is no best answer.

	NOT AT ALL TRUE OF ME					COMPLETELY TRUE OF ME
EXAMPLE						
You can't always get what you want in life.	0 20 40 50 60 (80) 100					

In the example, the number "80" has been circled, indicating that the statement is very true of the person responding, but not completely true.

	NOT AT ALL TRUE OF ME					COMPLETELY TRUE OF ME
1. I have been able to find benefit from even my negative experiences.	0 20 40 50 60 80 100					
2. I have been able to fit all my life experiences into my life story.	0 20 40 50 60 80 100					
3. I have been able to make sense of difficulties that I have experienced in my life.	0 20 40 50 60 80 100					
4. I have come to terms with events that have happened to me in my life.	0 20 40 50 60 80 100					
5. I have been able to put the past behind me and move on in my daily life.	0 20 40 50 60 80 100					

Appendix 15. Counterfactual Thinking for Negative Events Scale – Self Referent

Subscale (SRC)

Please think of the distressing intrusive image or memory that you identified with your therapist. Take a few moments to vividly recall that experience and what it was like for you.

Now, think about the types of thoughts that you experience in relation to this undesirable event. Using the following scale, rate the frequency with which you have experienced the thoughts described below in the past week.

Scale:
1=Never   2=Rarely   3=Sometimes   4=Often   5=Very Often

Thought	Rating
I think about how much better things would have been if I had acted differently	
I wish I had a time machine so I could just take back something I said or did.	
If only I had listened to my friends and/or family, things would have turned out better.	
I think about how much better things could have been if I had not failed to take action.	

Appendix 16. Participant Information Sheet and Consent Form

Participant Information Sheet

REC number: **13/NW/0432**

Dear Potential Participant,

I am a trainee studying for a Clinical Psychology Doctorate at Royal Holloway, University of London. For my thesis, I am conducting a research project in which I would like to invite you to participate.

<u>You should only participate if you wish to do so; choosing not to take part will not disadvantage you in any way or alter your current care.</u>

Before you decide whether you want to take part, it is important for you to understand why the research is being done and what your participation will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask me if there is anything that is not clear or if you would like more information.

WHY?

You have been invited to participate in this research project as you are currently receiving therapy for trauma. One of the ways your therapist may work with you to overcome your difficulties is through the use of imagery. This technique has been shown to be an effective treatment method. However, more research is required to find out exactly how it works. It is important for psychologists to gain this deeper understanding in order for the technique to progress and for the health service to provide even more effective treatment for people who have experienced trauma. This study will therefore attempt to look in greater detail at what exactly makes using imagery work in therapy effective.

HOW?

You will be asked to complete some questionnaires, which will ask you about your current mood, and any distressing images that you might experience. These will be completed on a number of occasions, before starting your course of treatment, before your treatment sessions and, possibly, one week after finishing treatment.

The study will involve your therapist recording at least one and at most three of your therapy sessions that included imagery work. You will always be informed if the therapist would like to record the session, and can chose to decline if you wish. This data will be kept strictly confidential. To ensure this, recordings will be password protected and stored on a password protected computer. Participant numbers will be

used instead of names. This way information given cannot be linked back to you. No one other than the researcher will have access to the data collected. Recordings will be destroyed after 5 years.

I will also need to access your records held by your therapist during the course of the study. This is so that I can collect information such as how many treatment sessions you have had, your gender and the type of traumatic event that you have experienced. I will NOT take a record of your name, date of birth, address or any other information that may make you identifiable. All the information that I do collect will be stored in password-protected computer files that only I have access to.

Potential disadvantages and/or advantages to taking part in this research

Completing these questionnaires may be tiring. In addition, some questions which ask you to think about your mood and other symptoms may stir up upsetting thoughts. If this is the case, please feel free to stop the questionnaires and speak to your clinician. However, by completing the questionnaires, it may be nice for you to see any change that might have occurred over the week. Also, on a wider level, taking part in this research may further improve this type of therapy and benefit people in the future who are experiencing similar difficulties to you

Other information

I would like to be able to contact your GP to let them know that you will be participating in the study.

Participation in this study is strictly voluntary and you have the right to withdraw at any time without giving a reason. You may also withdraw your data after participation from the study up until submission of the final report (June 2016). Leaving the study and/or withdrawing the data will have no negative consequences. You may ask questions at any point before, during or after the study.

The researcher can be contacted using the following e-mail address:

Kathy Looney – Kathy.Looney.2013@rhul.live.ac.uk

Or, leave a message on my answer machine on the number below with your name and contact number, and I will return your call as soon as possible: 01784 414 012. Please also state that the message is for me, Kathy Looney, as the line is used by more than one researcher.

Thank you for your time,

Kathy

Royal Holloway
University of London

Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.

Title of Study: What makes a good imagery rescript: Using verbal analysis to investigate the characteristics required to make a successful rescript in a clinical sample.

College Research Ethics Committee Ref: 2015/089

Thank you for considering this research project. The person organising the research must explain the project to you before you agree to take part. If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you decide whether to join in. You will be given a copy of this Consent Form to keep and refer to at any time.

- *I understand that if I decide at any other time during the research that I no longer wish to participate in this project, I can notify the researchers involved and be withdrawn from it immediately.*

- *I agree for the researchers to access my medical notes*

- *I consent to the processing of my personal information for the purposes of this research study,. I understand that such information will be treated as strictly confidential and handled in accordance with the provisions of the Data Protection Act 1998*

- *I understand that relevant, sections of my medical notes and data collected during the study, may be looked at by individuals from Royal Holloway University, from regulatory authorities or from the NHS Trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records.*

- *I do/do not (please delete as appropriate) give consent for the researchers to alert my General Practitioner (GP) to my involvement in this study.*

Participant's Statement: I_____ agree that the research project named above has been explained to me to my satisfaction. I agree to take part in the study. I have read both the notes written above and the Information Sheet about the project, and understand what the research study involves.

Signed   **Date**

Therapist's Statement: I _____confirm that I have carefully explained the nature, demands and any foreseeable risks (where applicable) of the proposed research to the volunteer.

Signed   **Date**

Appendix 17. Extract from Participant Folders

Imagery Rescripting Session 1   DATE: _____

Collect the Questionnaires and Between Session Visual Analogue scales and tick when completed. These can be put in the clear plastic pocket provided at the front of this session section.

1. Measure of Mundane Meaning ☐
2. Counterfactual Thinking of Negative Events Scale ☐
3. Visual Analogue Scales ☐

Start audio recording session

A: Introducing Measures before rescripting starts:

> Before we start working on the image today, I would like to go through the questions about your memory, its impact, meaning and associated thoughts that we wrote down during our previous session. Then we will do some work with the image/memory.
>
> Afterwards, I will ask you to re-rate some of these questions to see if there has been any change.
>
> We will do this each week while we are working on this memory, up to a maximum of three weeks, so that we can see how things progress over time. Do you have any questions?

Give the participant a copy of the Visual Analogue scales (second Red tab - towards the back of the folder) to hold and refer to as needed.

> Here is a copy of the questions that I will be asking you. You can refer to it as we go through them if you want to.

B: Image related Visual Analogue Scales Administration - last 3 days:

> I would like you to think about the image that we have chosen to work on and answer the following questions in relation to that image. I will read the summary that we wrote down during the first week and I would like you to bring it to mind now:

Read the following Image Summary aloud (taken from previous week):

_____
_____
_____
_____

For each question below, read the question aloud and mark their response on the scale provided.

> 1. Over the past 3 days, how frequently have you experienced this image or memory?

0	10	20	30	40	50	60	70	80	90	100

None of the time   **Half the time**   **All of the time**

2. 🗣 Over the past 3 days, how much has the image or memory interfered with your daily life?

0	10	20	30	40	50	60	70	80	90	100

Not at all   **Moderately**   **Severely**

C: Key Meaning:

✍ *Read the Key Meaning aloud, then read the question and mark the participant's response on the scale provided.*

🗣 Now we will rate the 'Key Meaning' of your image that we identified previously. The key meaning that you identified is:

✍ _____

_____

_____

🗣 I would like you to close your eyes and try to get a clear picture of the traumatic image in your mind, as if it is happening in the here and now.

How true does this key meaning feel right at this moment? Please rate how true it feels on a scale from 0-100 where 0 is 'Not at all true' and 100 is 'Extremely true'.

|---------|---------|---------|---------| ---------|---------|---------|---------|---------|---------|

0   10   20   30   40   50   60   70   80   90   100

Not at all   Extremely
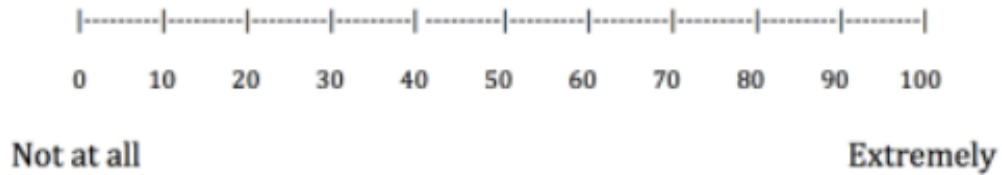
D: Visual Analogue Scales - right now

≤ Keep that image in mind, I am going to ask you a few more questions.

Read through the following questions and mark the participant's responses on the scales provided. Give them copies of the visual analogue scales to refer to (Red Tab).

1.   ≤ At this moment, how distressing is the image or memory?

0   10   20   30   40   50   60   70   80   90   100

Not at all   Moderately   Severely
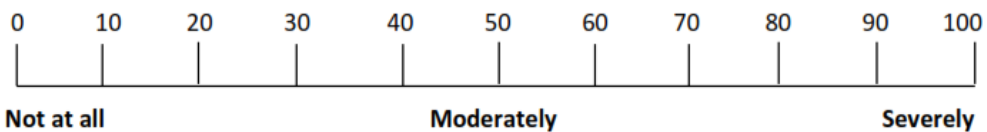
2.   ≤ At this moment, how much does it feel as if this image/memory is happening "right here and now"?

```
0    10    20    30    40    50    60    70    80    90    100
|    |    |    |    |    |    |    |    |    |    |
Not at all                    Moderately                    Extremely
```

3. 🗣At this moment, how uncontrollable dos the image or memory feel?

```
0    10    20    30    40    50    60    70    80    90    100
|    |    |    |    |    |    |    |    |    |    |
Not at all                    Moderately                    Completely
```

E: Counterfactual Thought Visual Analogue Scale administration:

🗣 Last week, we also identified some of the main thoughts that you have in relation to your image, about how the traumatic event might have turned out differently.

So, bringing that image to mind again now, I am going to read out the thoughts that we identified and ask you two questions about each one.

If you have not done so already, insert the counterfactual thoughts identified in the first session. Read out each thought below in turn and ask the accompanying questions. Allow them to refer to copies of the scales (Red Tab)

1.

👤 In the past 3 days, how frequently has this thought come into your mind?
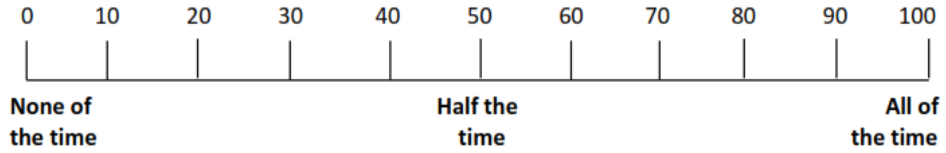
```
     0    10    20    30    40    50    60    70    80    90    100
     |    |     |     |     |     |     |     |     |     |     |

  None of                      Half the                    All of
  the time                      time                      the time
```

👤 At this moment, how distressing is this thought/how upset does it make you feel?

```
   0     10    20    30    40    50    60    70    80    90    100
   |     |     |     |     |     |     |     |     |     |     |

  Not at all                  Moderately                   Severely
```

✍ 2.

👤 In the past 3 days, how frequently has this thought come into your mind?

```
     0    10    20    30    40    50    60    70    80    90    100
     |    |     |     |     |     |     |     |     |     |     |

  None of                      Half the                    All of
  the time                      time                      the time
```

👤 At this moment, how distressing is this thought/how upset does it make you feel?

```
   0     10    20    30    40    50    60    70    80    90    100
   |     |     |     |     |     |     |     |     |     |     |

  Not at all                  Moderately                   Severely
```

3.

In the past 3 days, how frequently has this thought come into your mind?

0	10	20	30	40	50	60	70	80	90	100

None of the time   **Half the time**   **All of the time**

At this moment, how distressing is this thought/how upset does it make you feel?

0	10	20	30	40	50	60	70	80	90	100

Not at all   **Moderately**   **Severely**
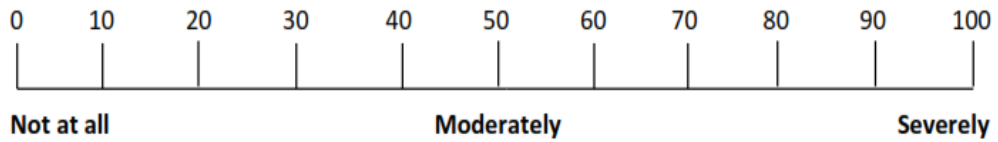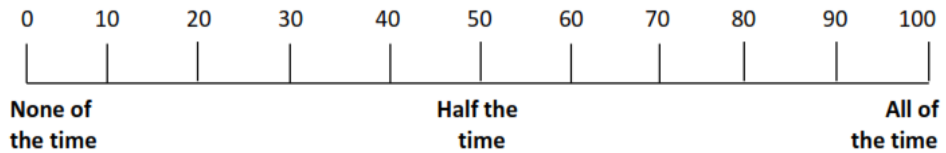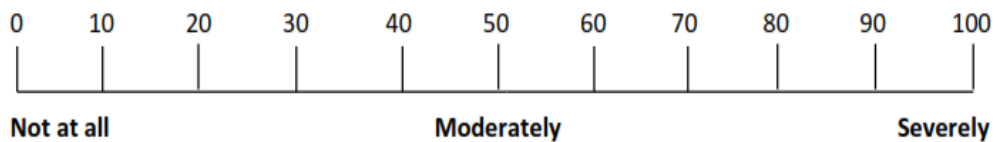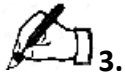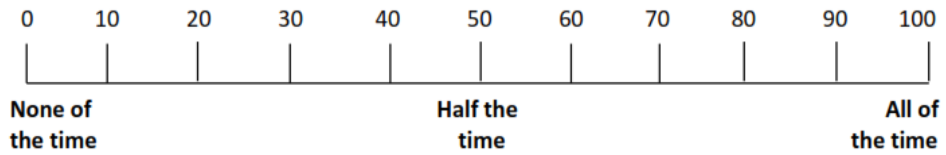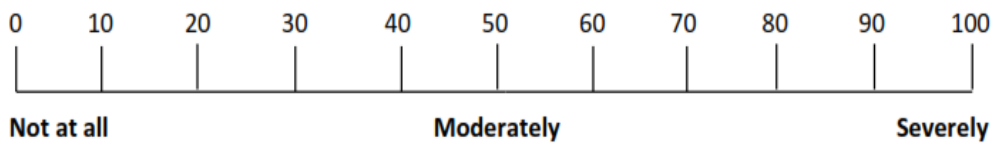
CARRY OUT IMAGERY RESCRIPTING

ON THE CHOSEN IMAGE

After Imagery Rescripting on the chosen image

> Now that we have done some rescripting, I would like to go through some of the questions again and re-rate them.

F: Key Meaning - After:

> Let's start by re-rating the 'Key Meaning'. Close your eyes if you'd like, and get a clear picture of your image.

Read the Key Meaning aloud, then read the question and mark the participant's response on the scale provided.

> The key meaning that you identified is:
>
> _____
>
> _____
>
> How true does this key meaning feel now, on a scale from 0-100 where 0 is 'Not at all true' and 100 is 'Extremely true'.
>
> |----------|----------|----------|----------| ----------|----------|----------|----------|----------|----------|
>
> 0   10   20   30   40   50   60   70   80   90   100
>
> Not at all   Extremely

G: Visual Analogue Scales - After

> 🗣 Keep that image in mind, I am going to ask you a few more
> questions

✍ *Read through the following questions and mark the participant's responses on the scales provided.*

---

1. 🗣 How distressing is the image or memory now?

```
0    10   20   30   40   50   60   70   80   90   100
|    |    |    |    |    |    |    |    |    |    |
Not at all              Moderately              Severely
```

2. 🗣 How much does it feel as if this image/memory is happening
   "right here and now"?

```
0    10   20   30   40   50   60   70   80   90   100
|    |    |    |    |    |    |    |    |    |    |
Not at all              Moderately              Extremely
```

3. 🗣 How uncontrollable does the image or memory feel now?

```
0    10   20   30   40   50   60   70   80   90   100
|    |    |    |    |    |    |    |    |    |    |
Not at all              Moderately              Completely
```

H: Counterfactual Thought Visual Analogue Scale - After

> 👤⊰ I am now going to read out the key thoughts that we identified. Keeping your image in mind again, please answer the following questions.

✍ *Read out each thought below (taken from previous session) and ask the accompanying question.*

✍ 1.

👤⊰ At this moment, how distressing is this thought/how upset does it make you feel?

0	10	20	30	40	50	60	70	80	90	100

Not at all   Moderately   Severely

✍ 2.

👤⊰ At this moment, how distressing is this thought/how upset does it make you feel?

0	10	20	30	40	50	60	70	80	90	100

Not at all   Moderately   Severely

3.
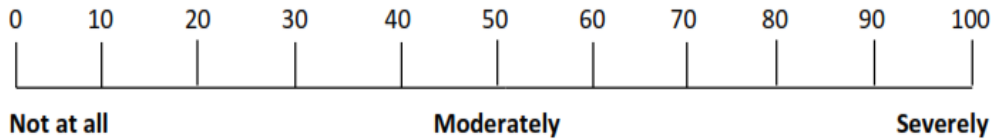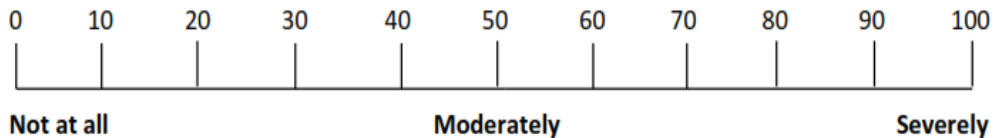
At this moment, how distressing is this thought/how upset does it make you feel?

```
  0    10    20    30    40    50    60    70    80    90   100
  |    |     |     |     |     |     |     |     |     |     |
Not at all                   Moderately                 Severely
```

Stop audio recording session

Appendix 18. Participant Debrief Form

Royal Holloway
University of London

What makes a good re-script?

Identifying important factors for re-script efficacy

Post-Participation Information Sheet

Thank you for allowing me to record and listen to your imagery re-scripting session(s). Below is a description of the background, purpose and potential implications of this research project.

Numerous studies have found that Imagery Re-scripting (ImRs) can be an effective treatment for a range of mental health problems, including depression and post-traumatic stress disorder (PTSD). However, little is understood about the reasons why ImRs is effective or how it works.

A number of researchers have suggested various factors that might increase the efficacy of ImRs. Vividness of the image, believability, image coherence and the emotions elicited by the image have all been suggested as potential important factors, to name but a few. Currently however, few studies have tried to systematically understand the factors involved in ImRs.

This research aims to use real ImRs sessions to identify factors that may be key in promoting re-script efficacy. It is hoped that by doing so, ImRs can continue to develop, so that future clients undergoing ImRs can receive the most effective treatment possible.

Further information and contact details

If you would like to receive a copy of the final report or have any questions or comments, please email **Kathy Looney** at the address below.

Researcher:
Kathy Looney

Clinical Psychology Department
Royal Holloway
University of London
Egham
Surrey
TW20 0EX

Email: **Kathy.Looney.2013@live.rhul.ac.uk**

Tel: 01784 414 012

Research Supervisor:
Dr Gary Brown

Clinical Psychology Department
Royal Holloway
University of London
Egham
Surrey
TW20 0EX

Email: **gary.brown@rhul.ac.uk**

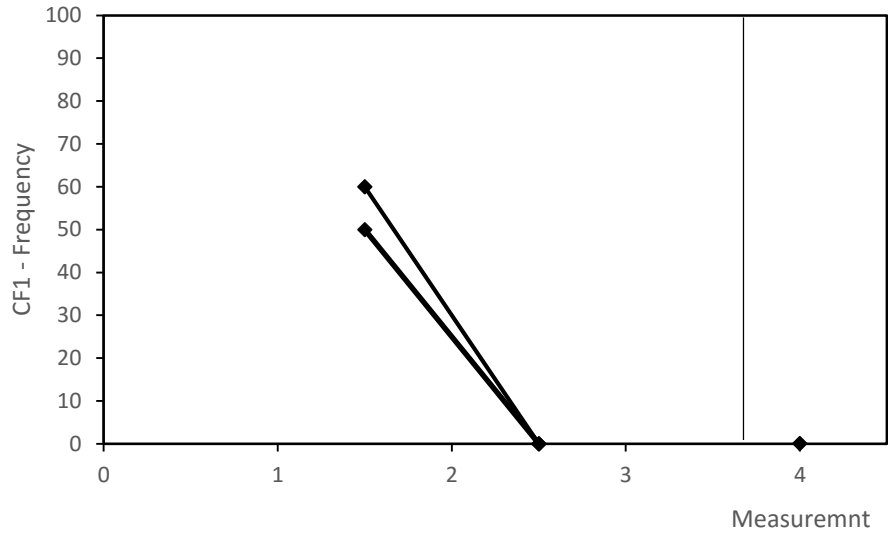**Appendix 19. PA: Variability Analysis (Trended Range) IVAS, EBVAS and CTVAS**
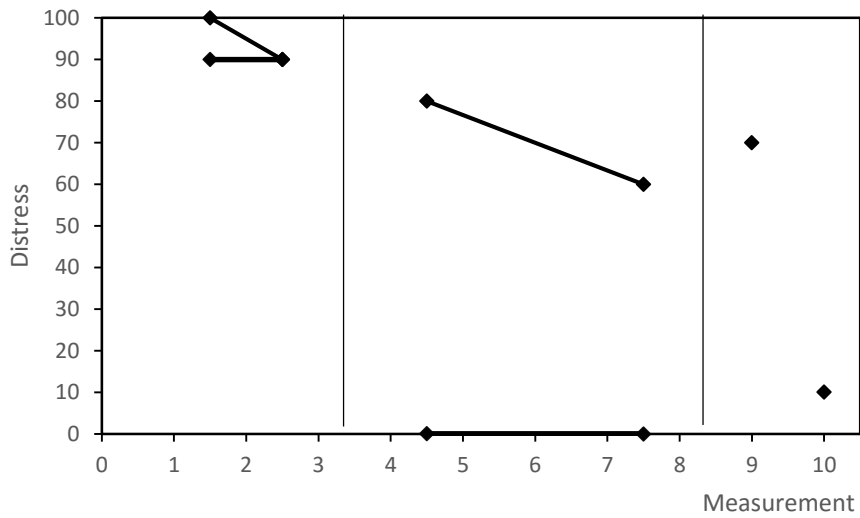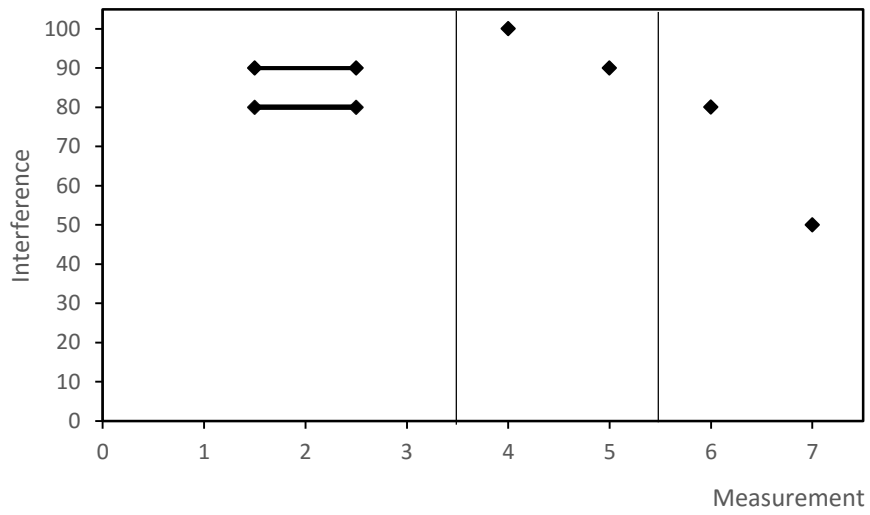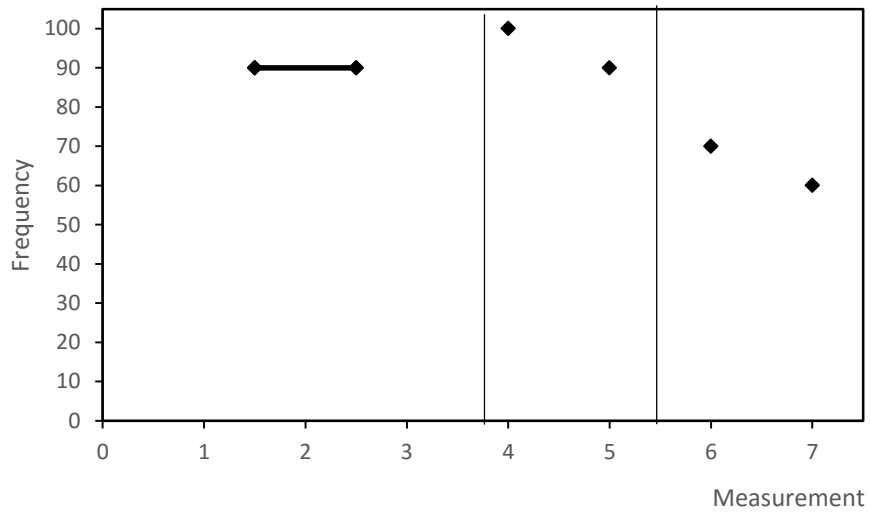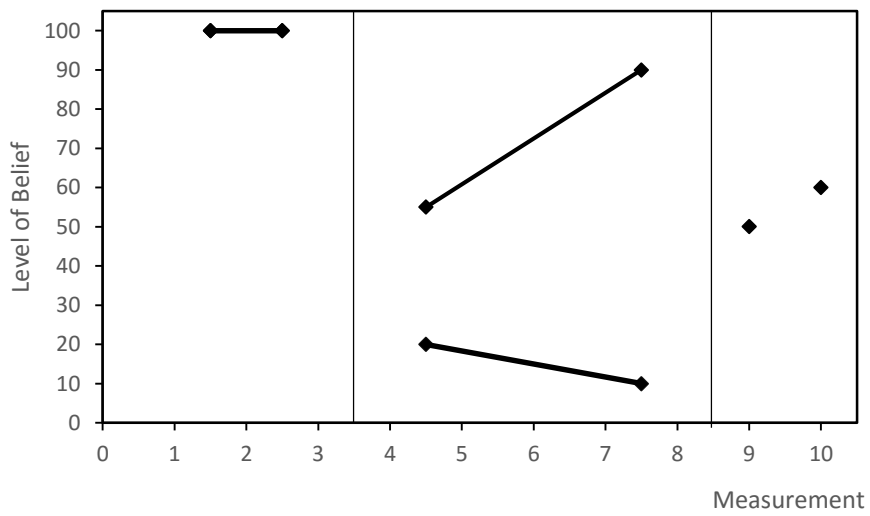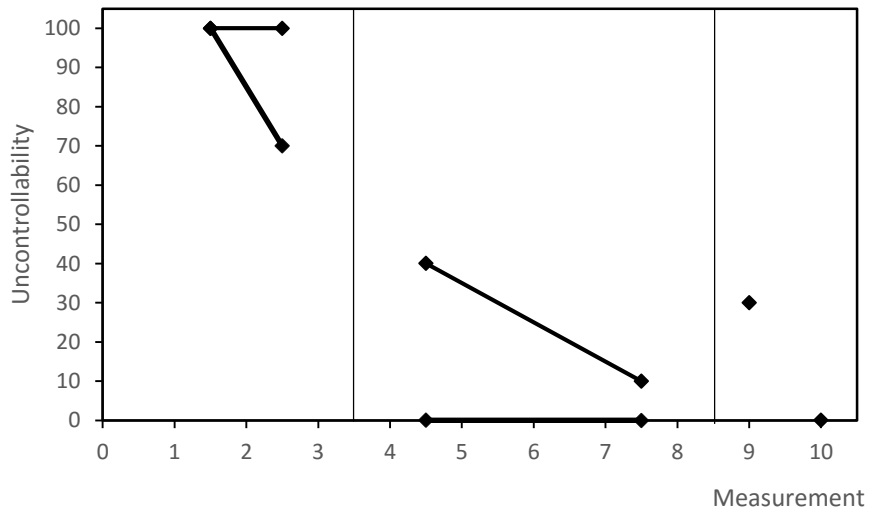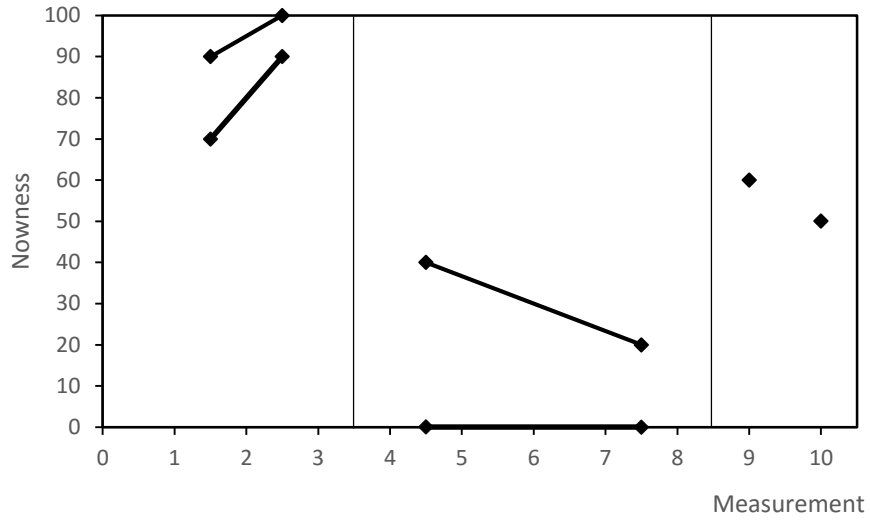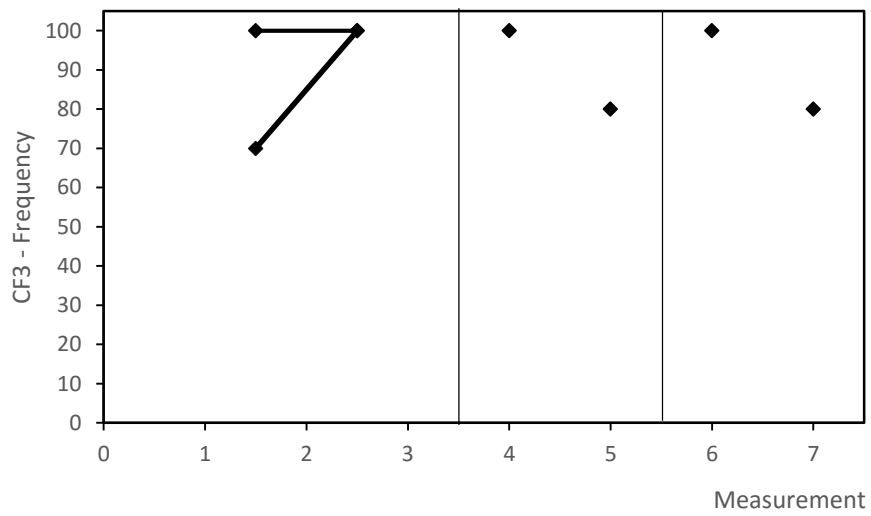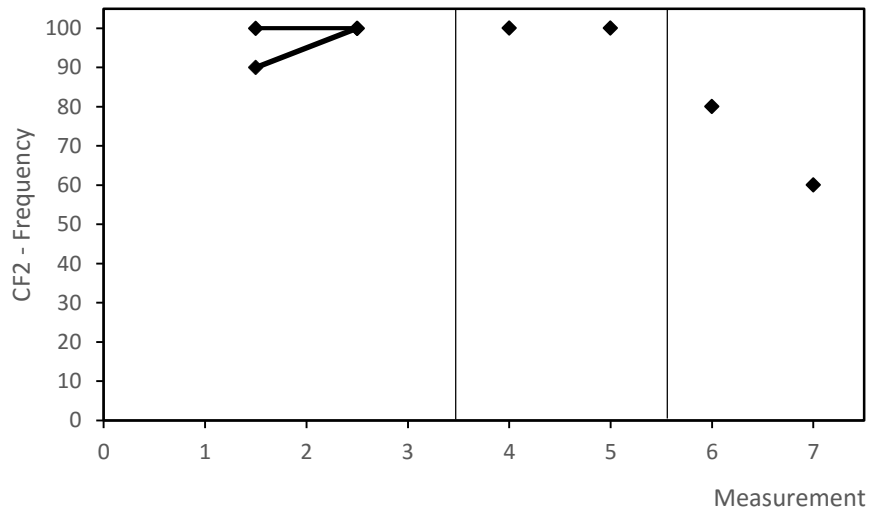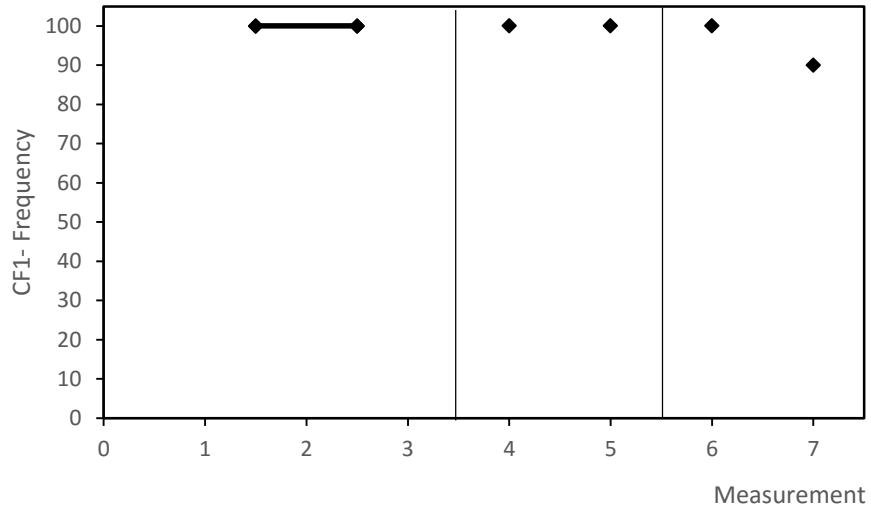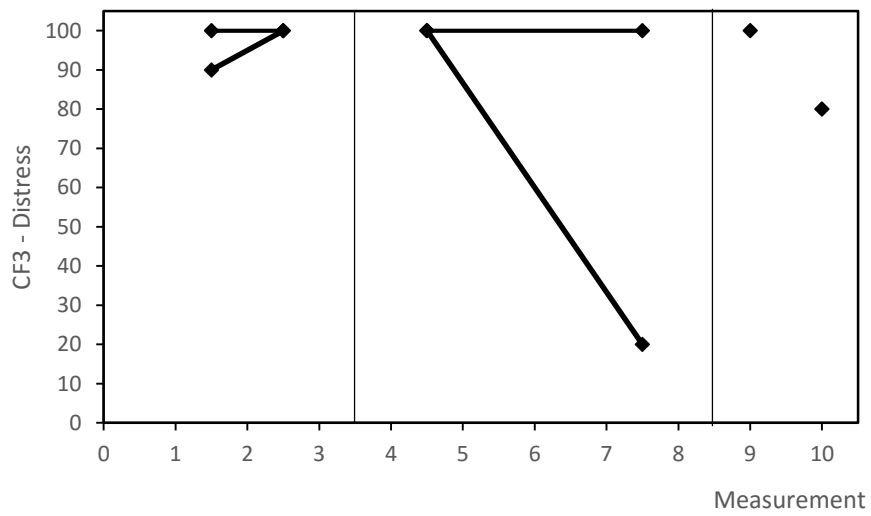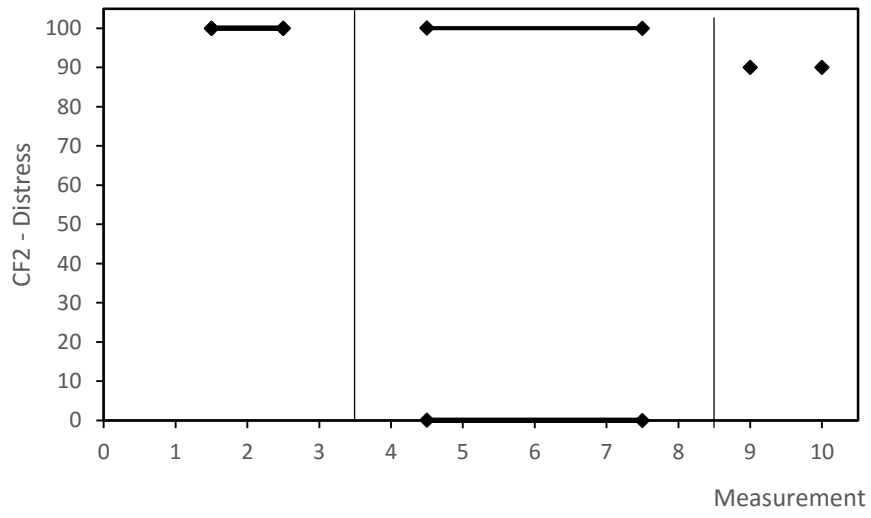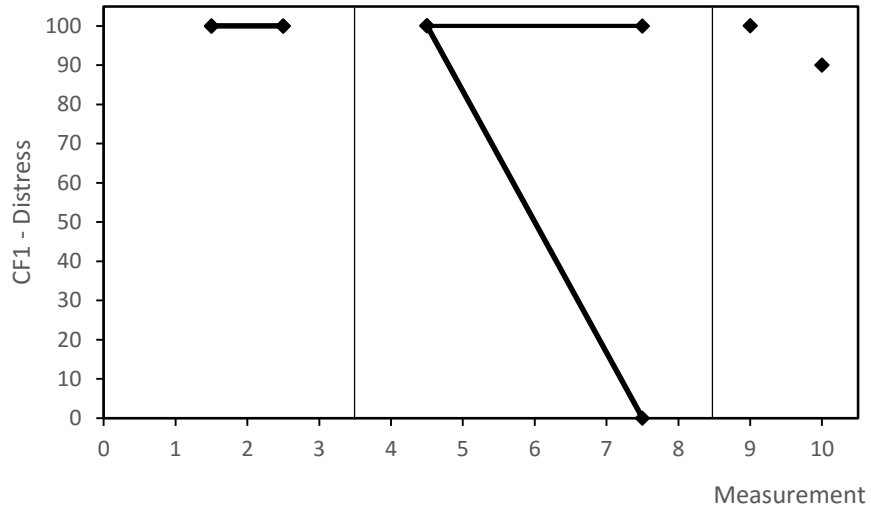
Appendix 20. PB's Variability Analysis (Trended Range) IVAS, EBVAS and CTVAS
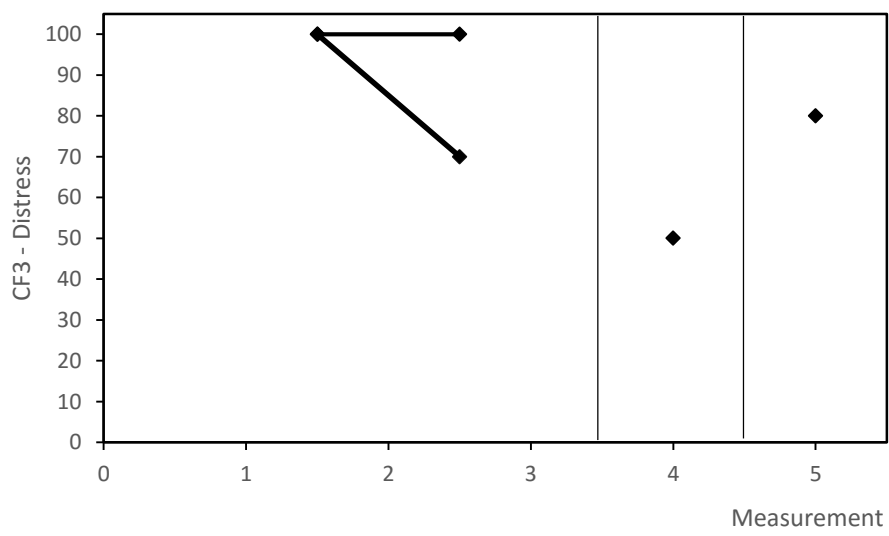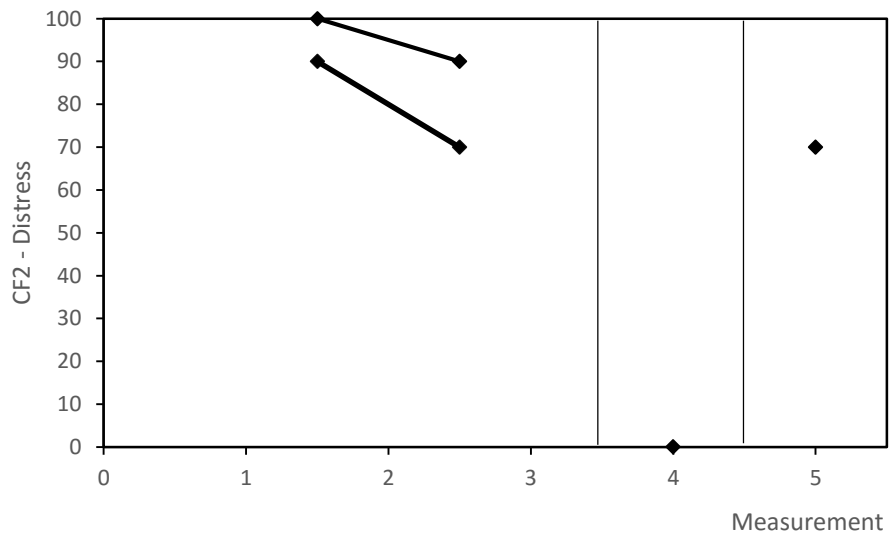
228
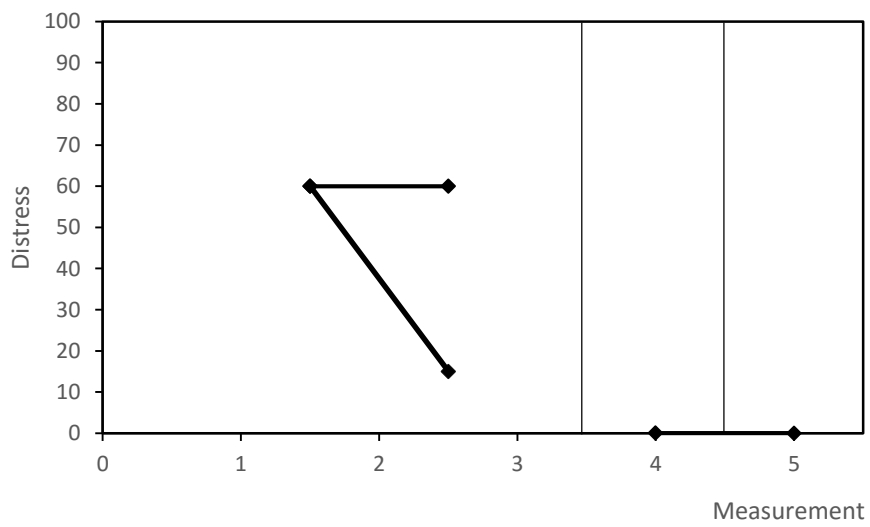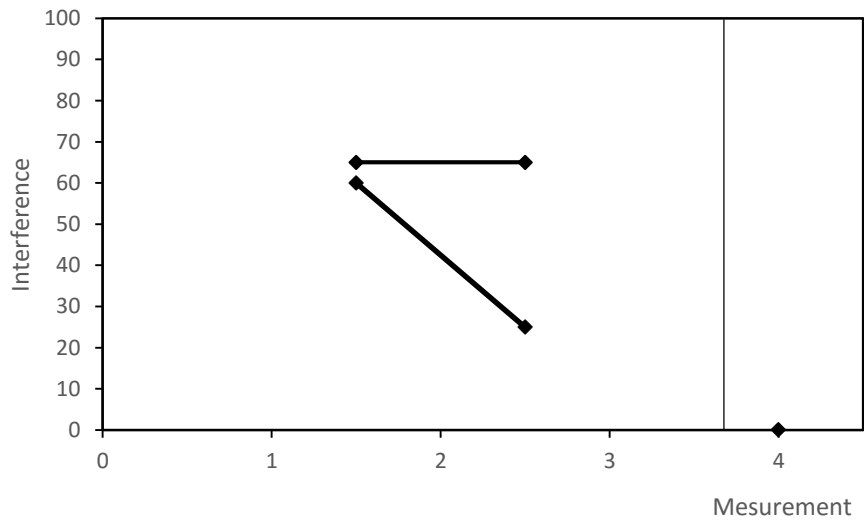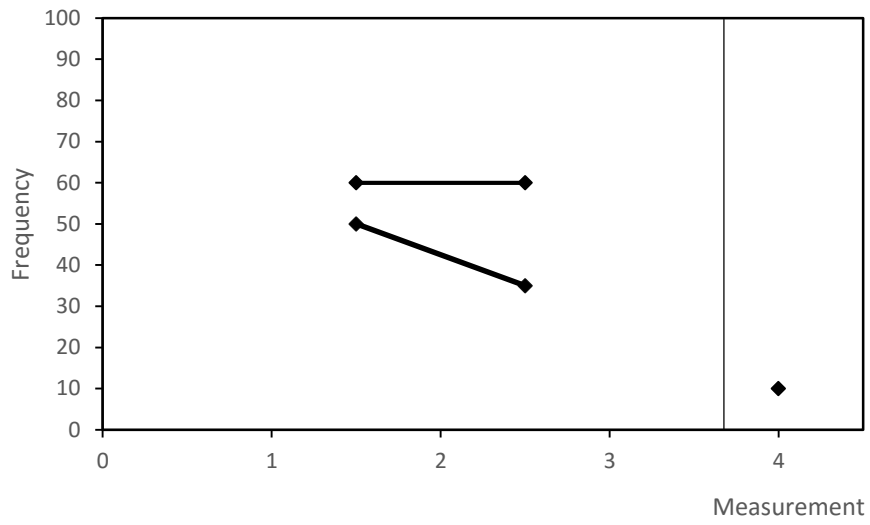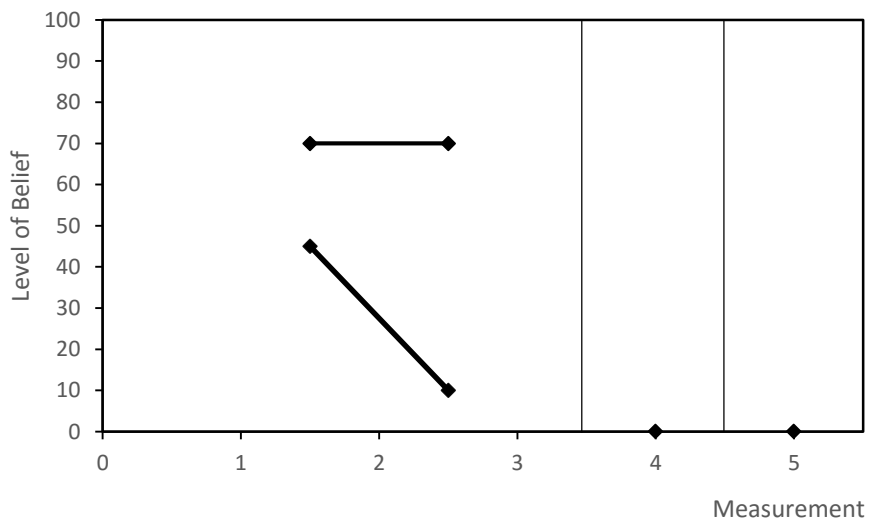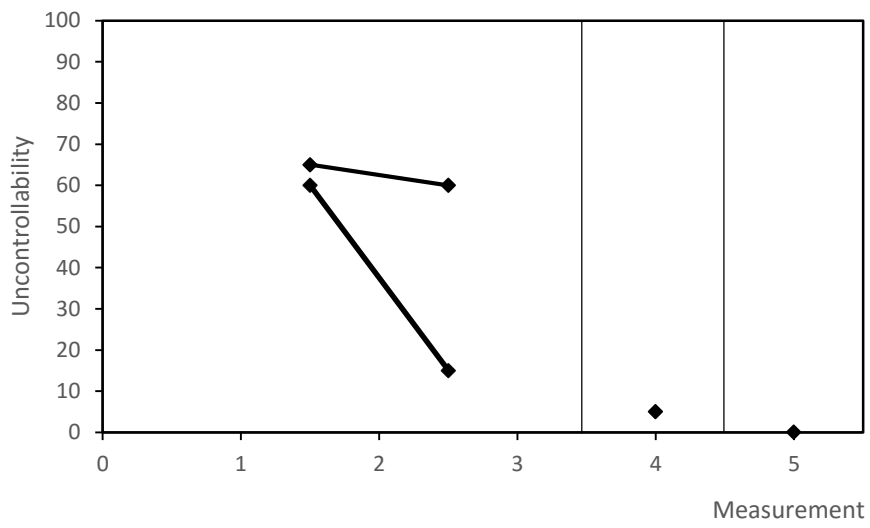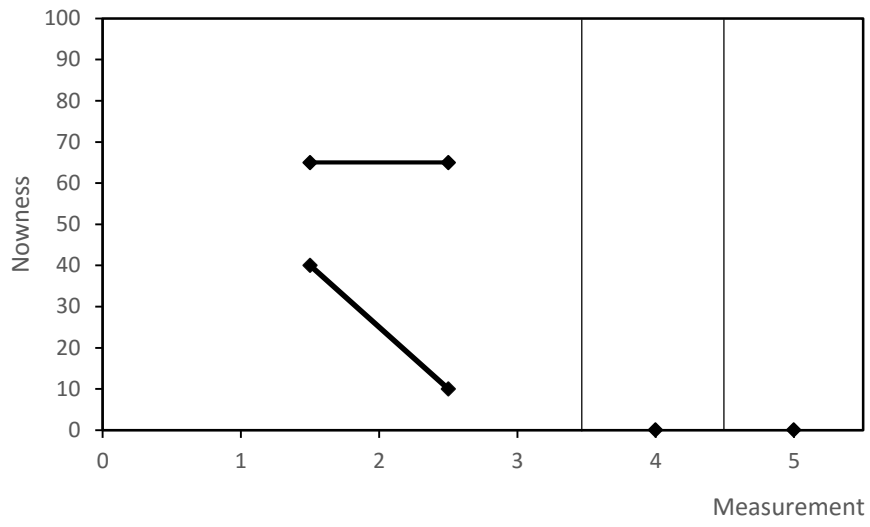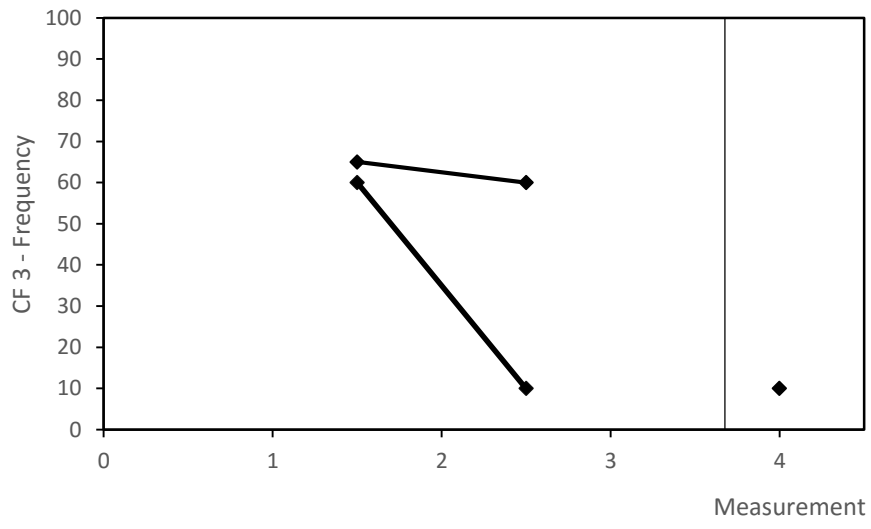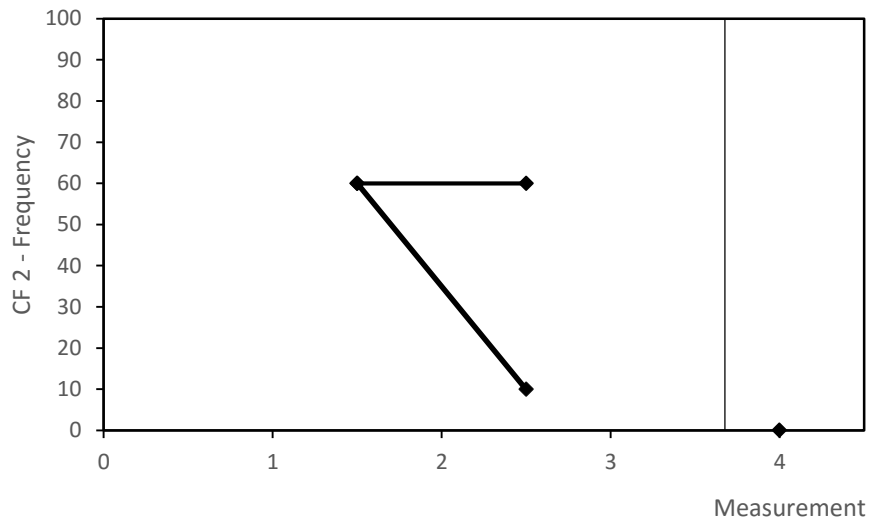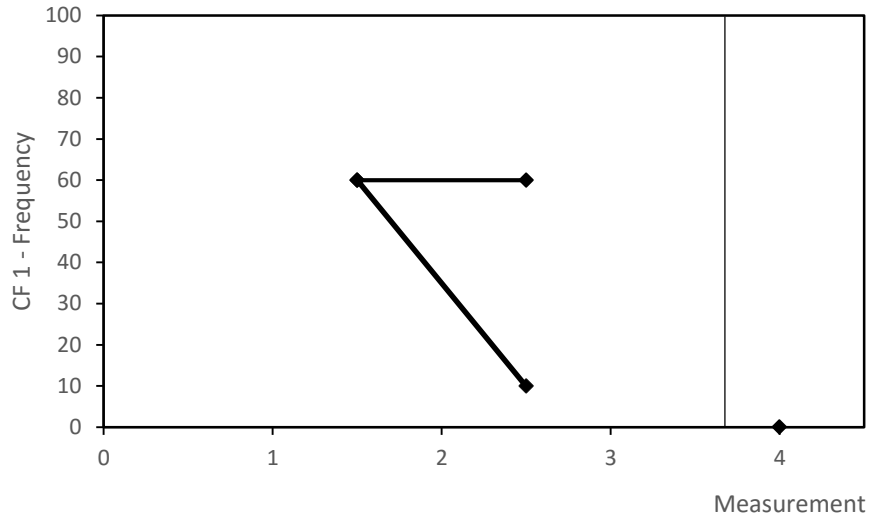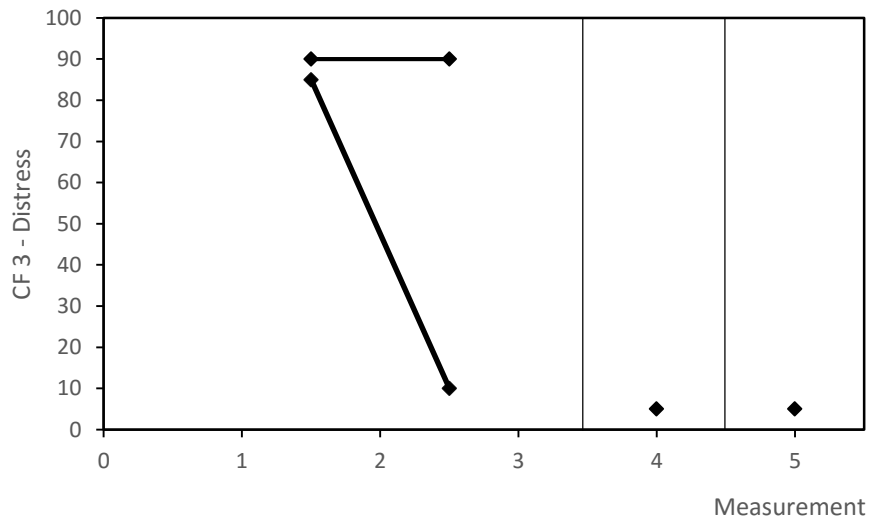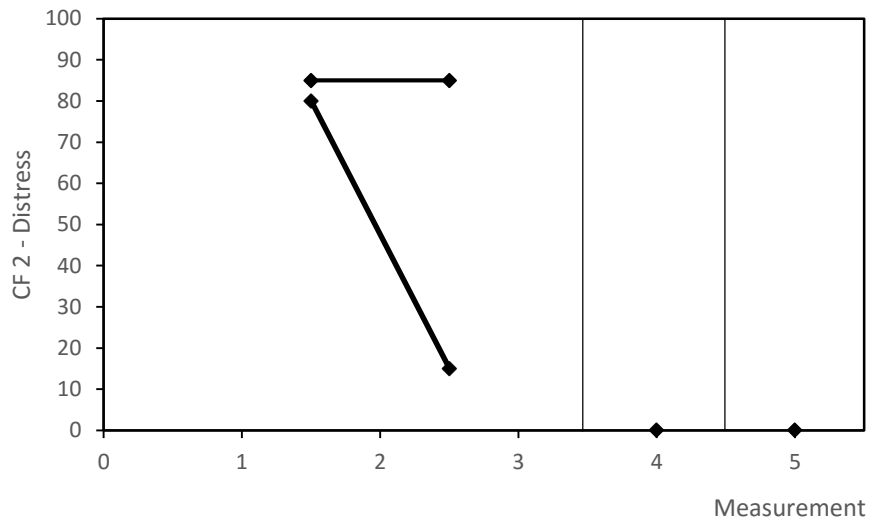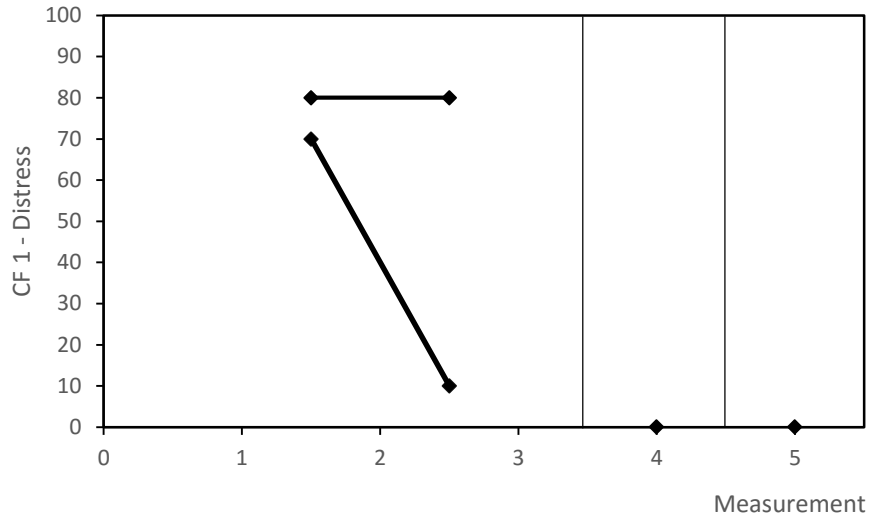
Appendix 21. PC's Variability Analysis (Trended Range) IVAS, EBVAS and CTVAS
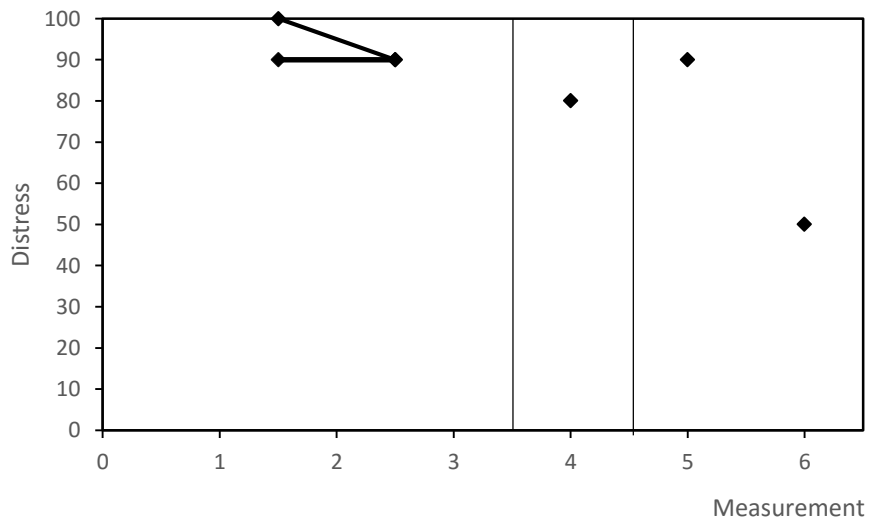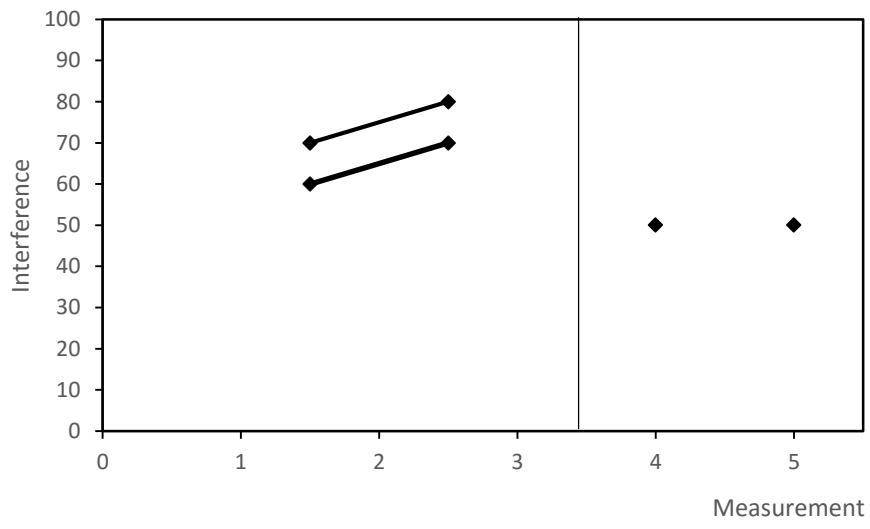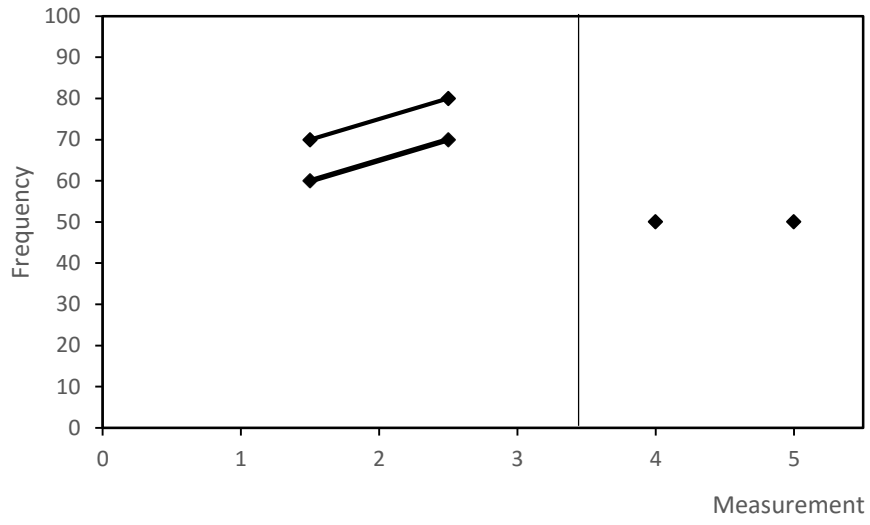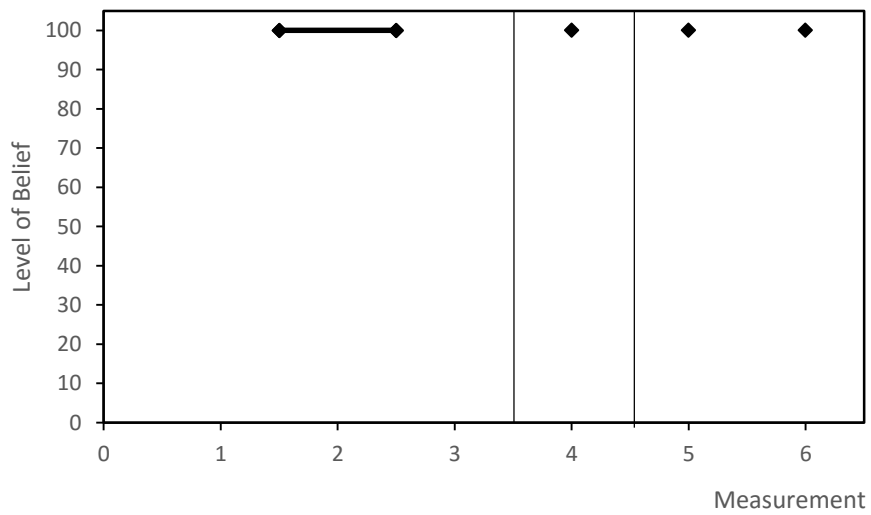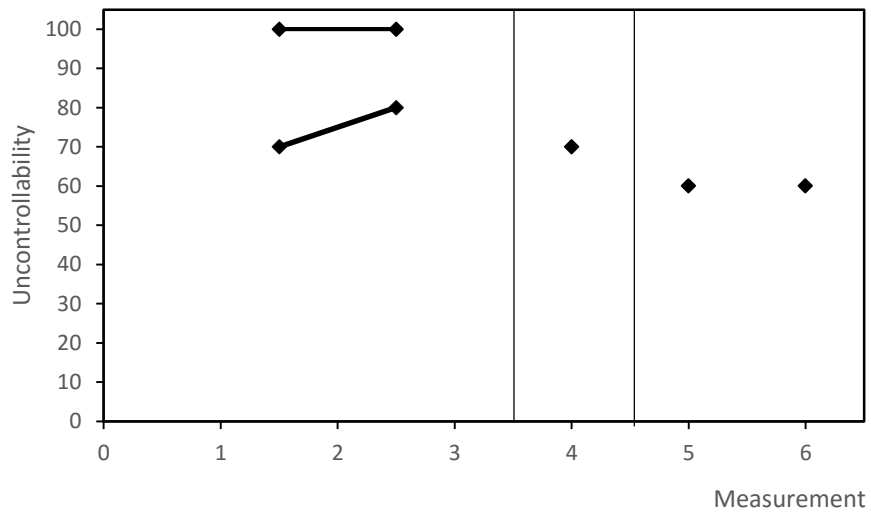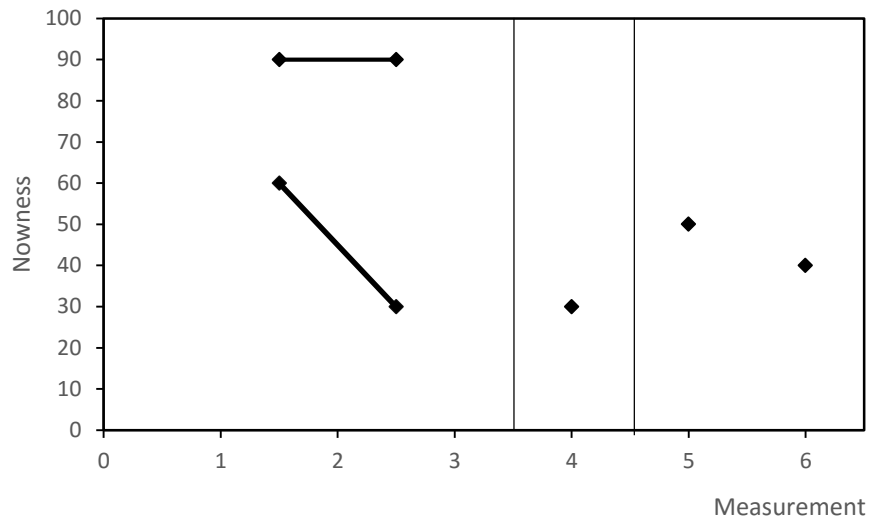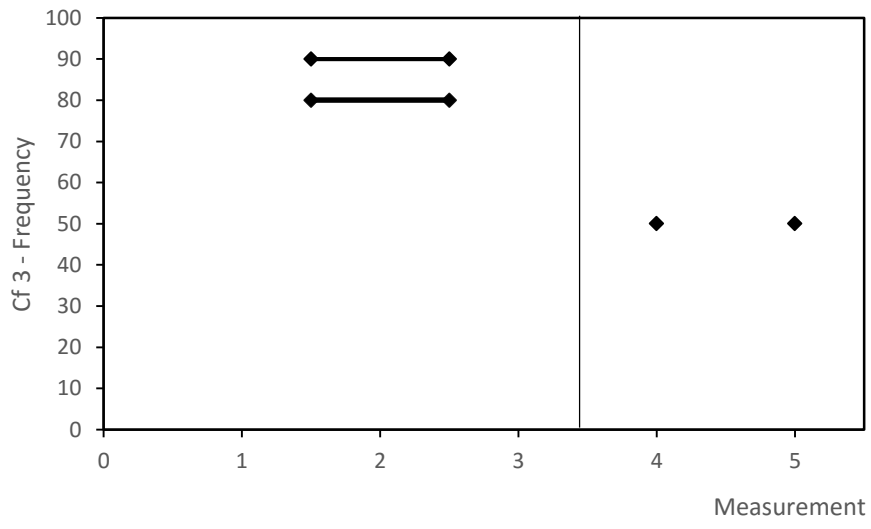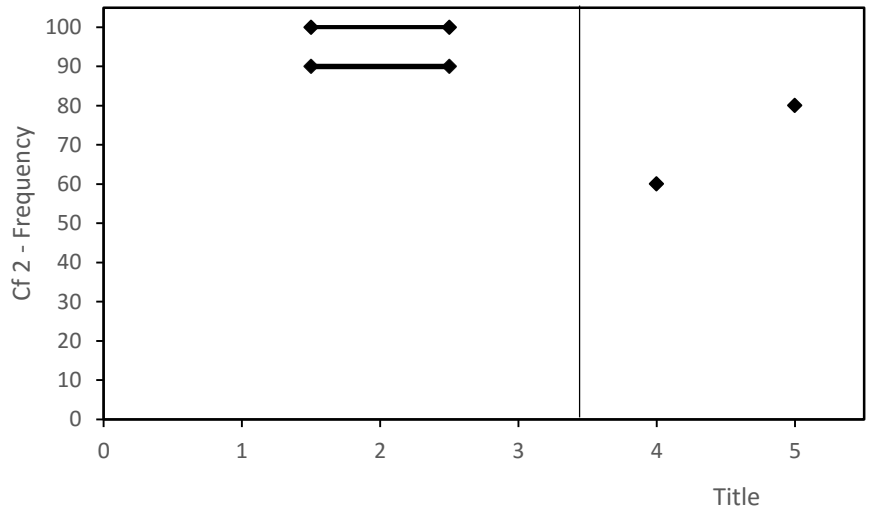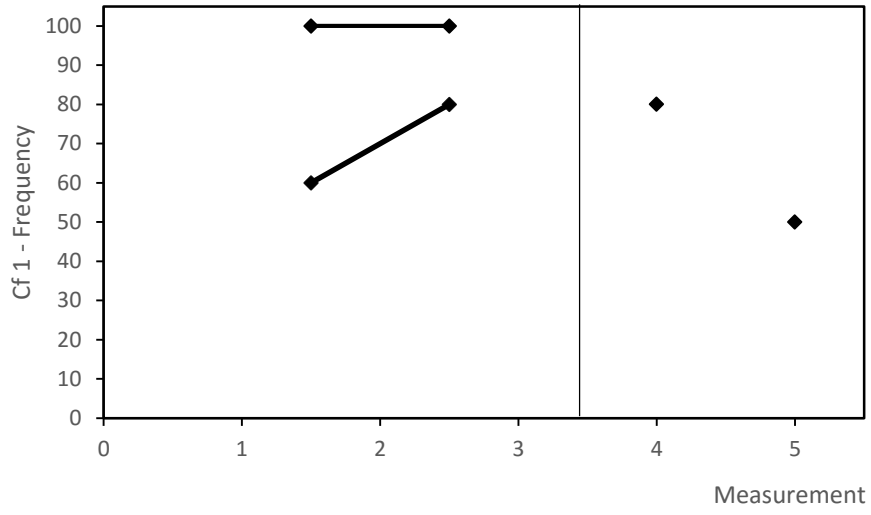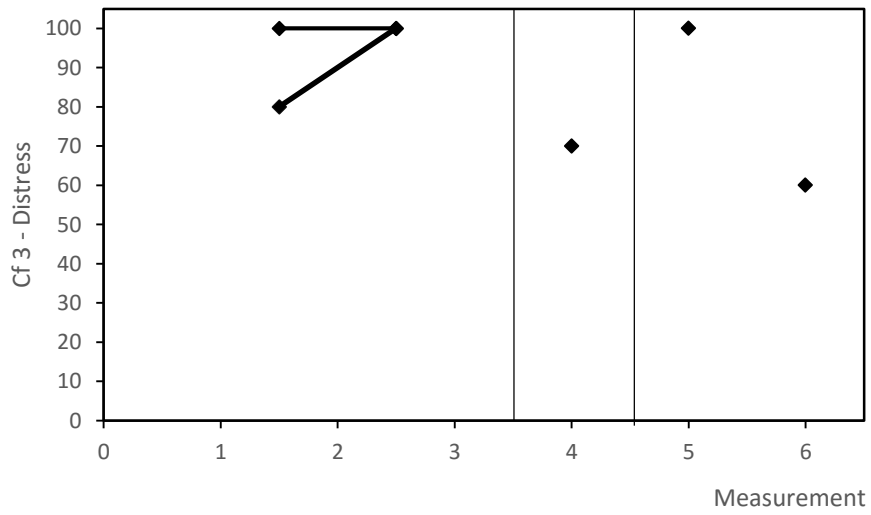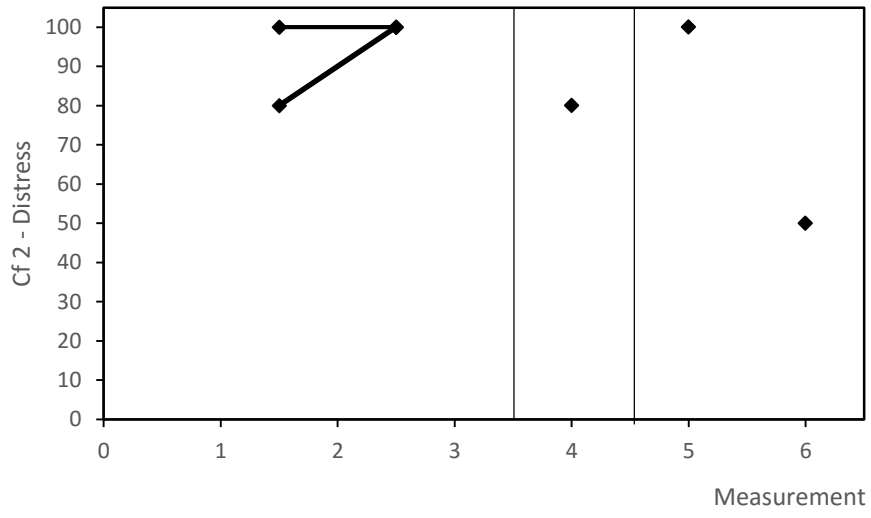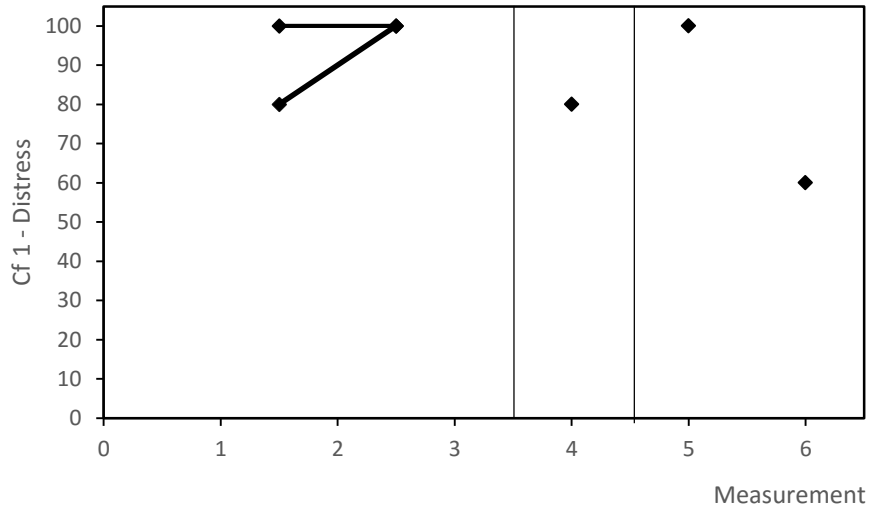
Appendix 22. PD's Variability Analysis (Trended Range) IVAS and EBVAS
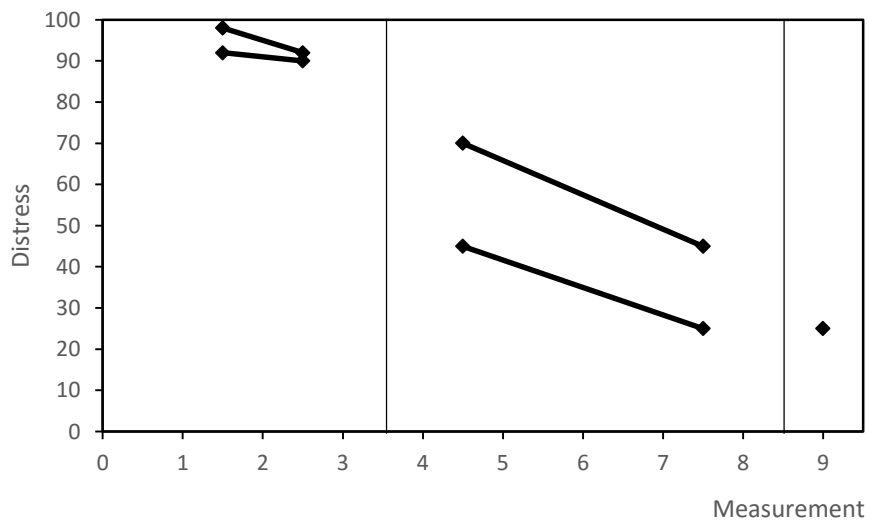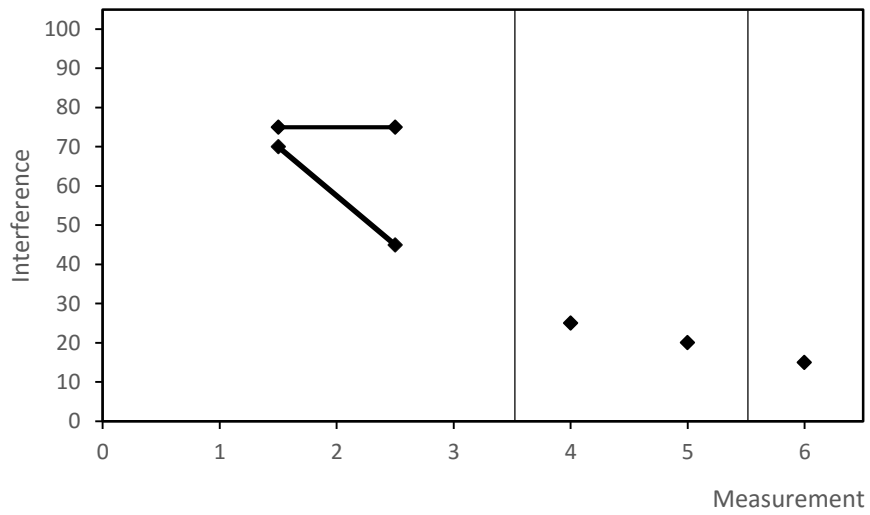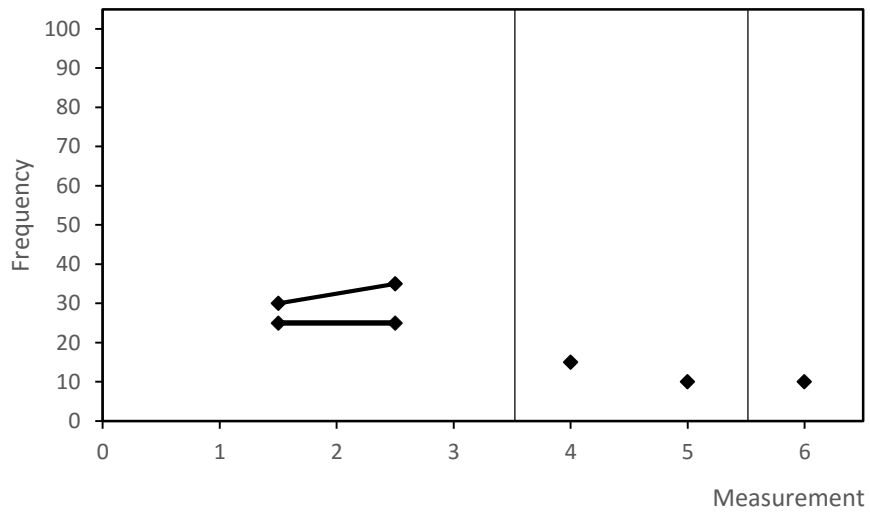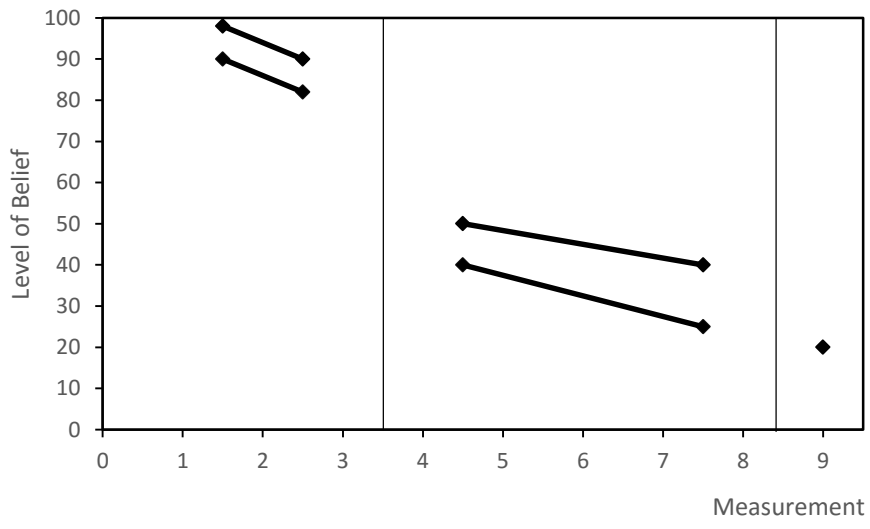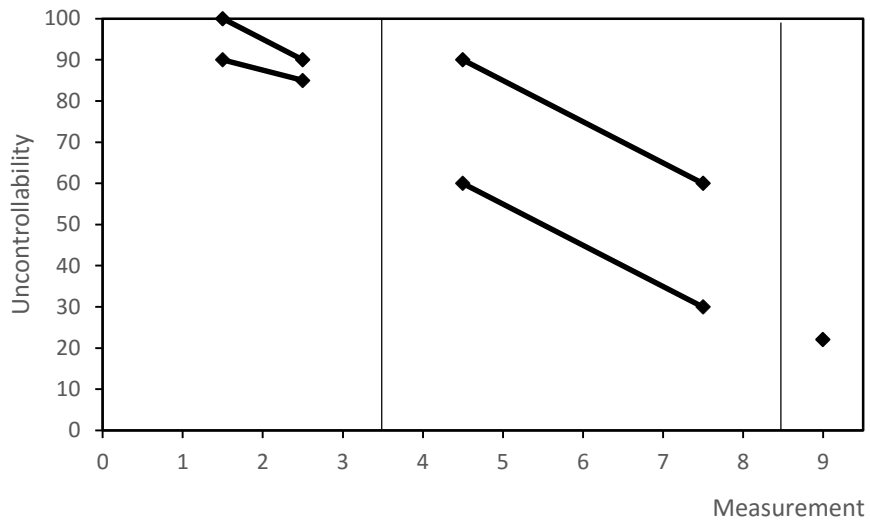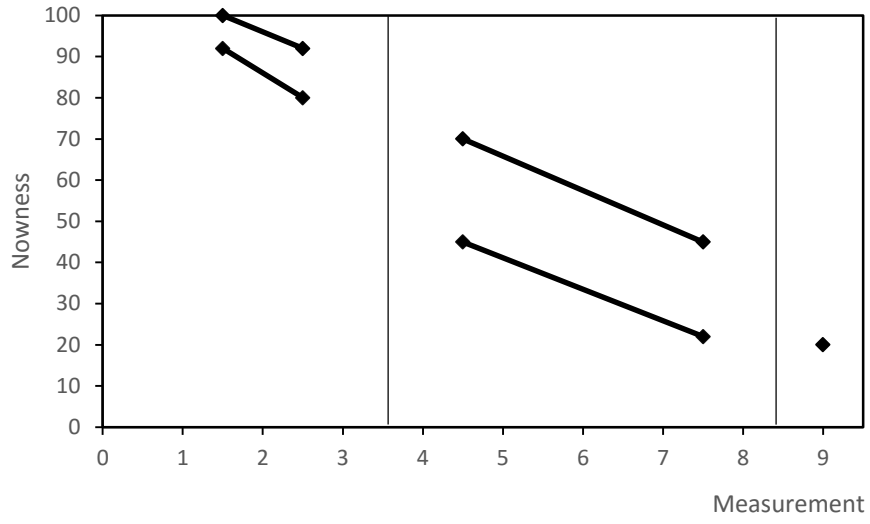
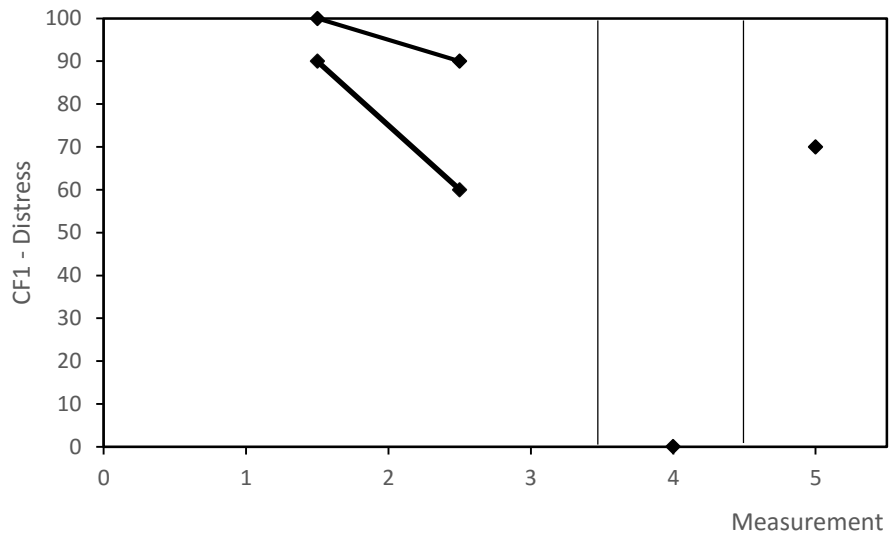**Appendix 23. PE's Variability Analysis (Trended Range) IVAS, EBVAS and CTVAS**
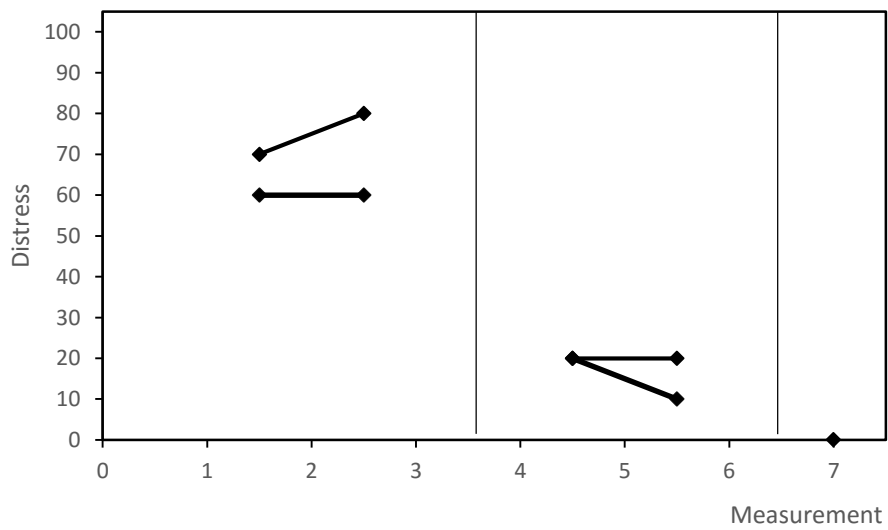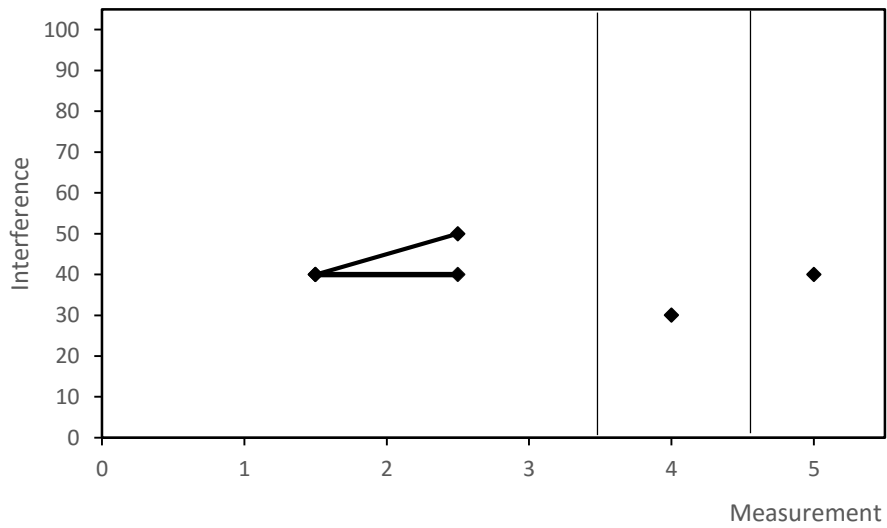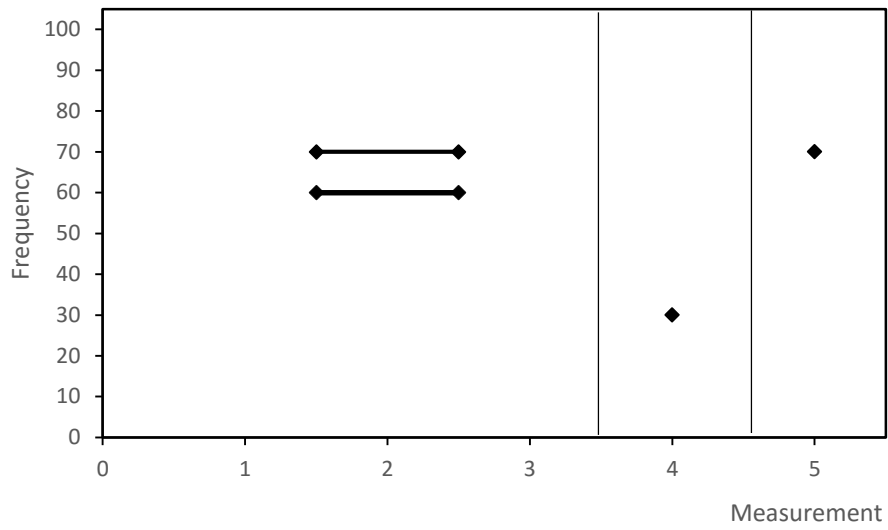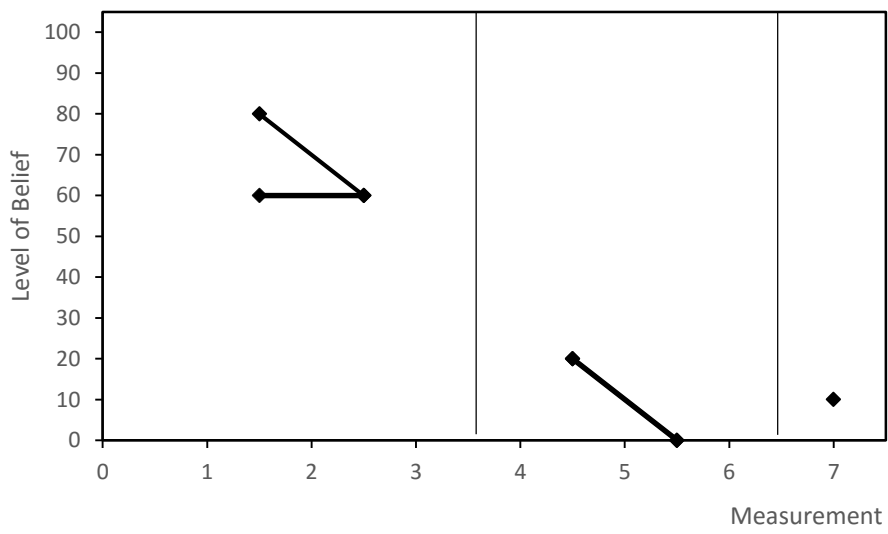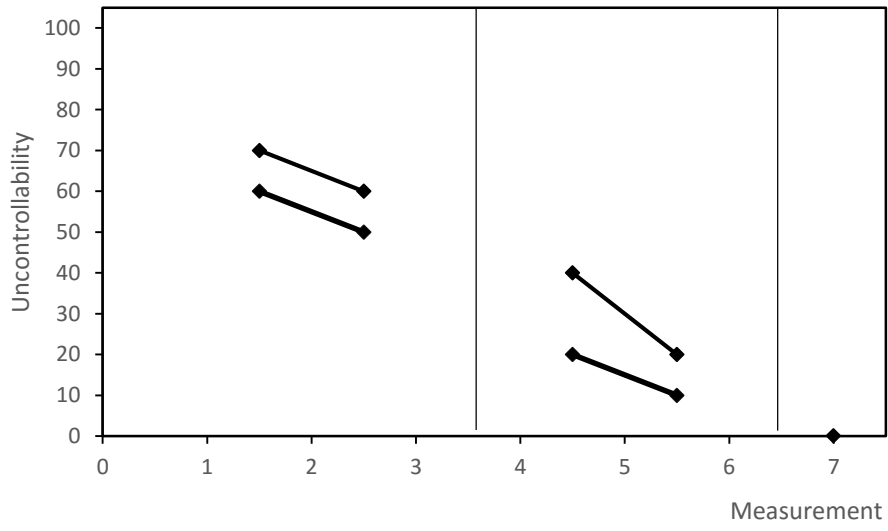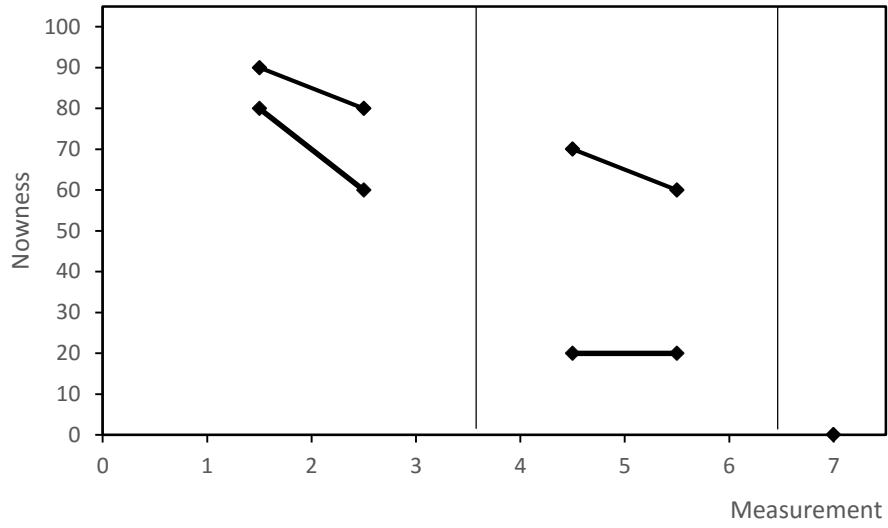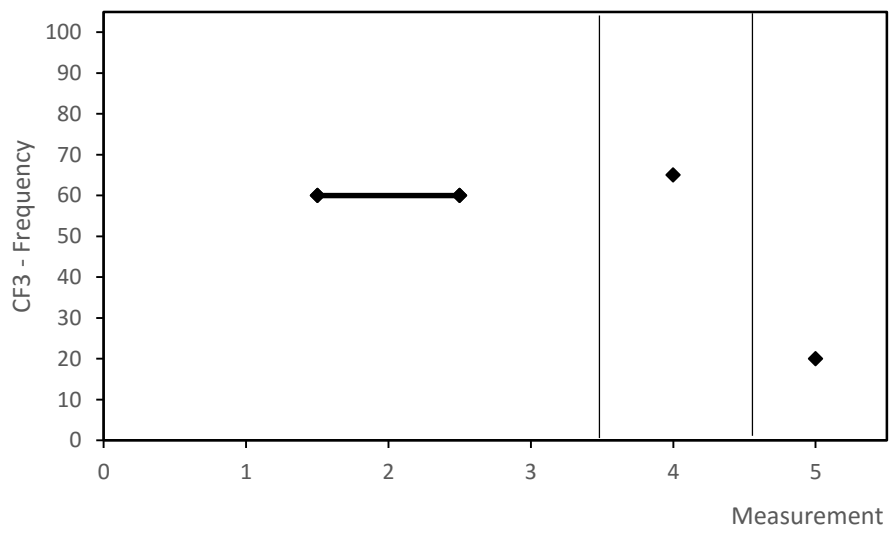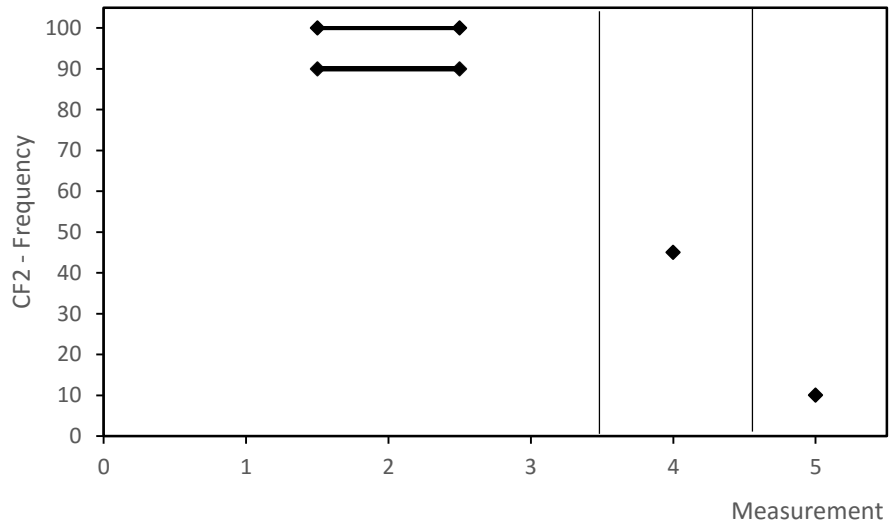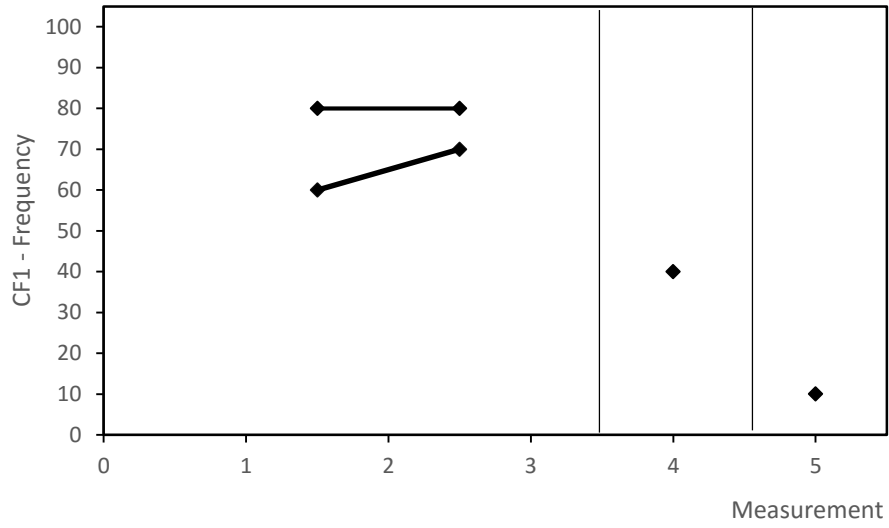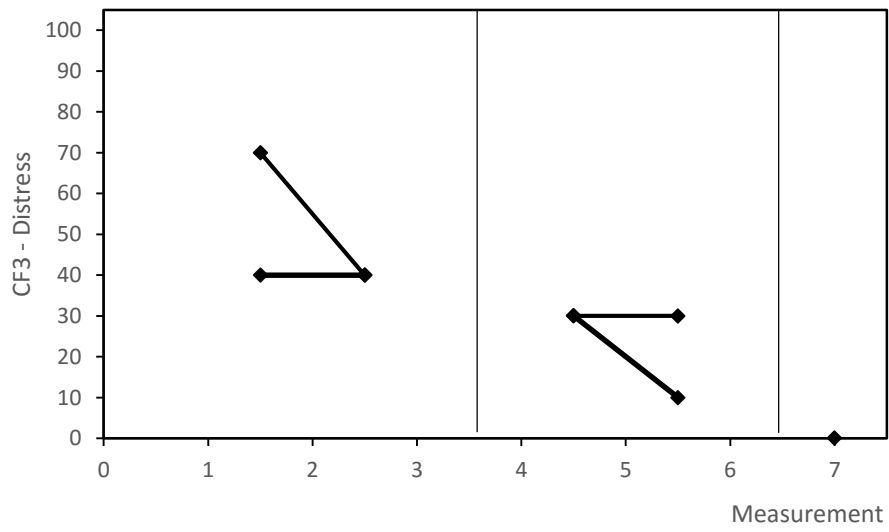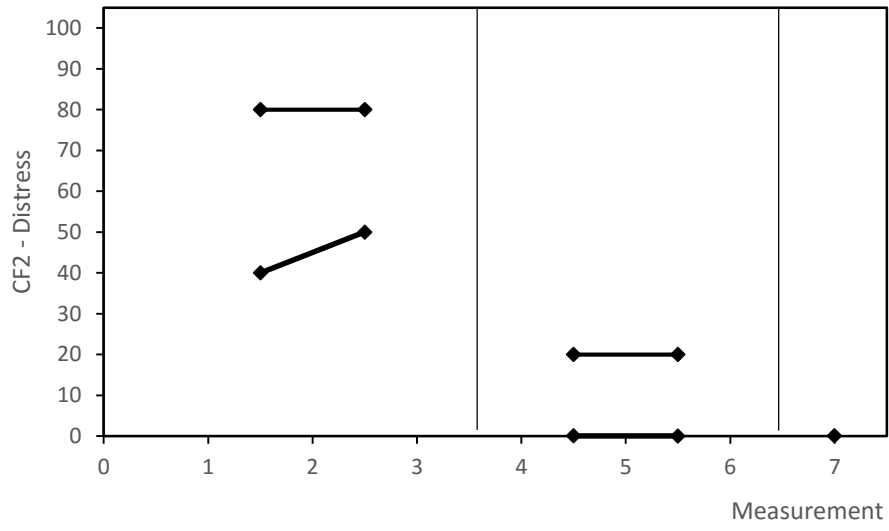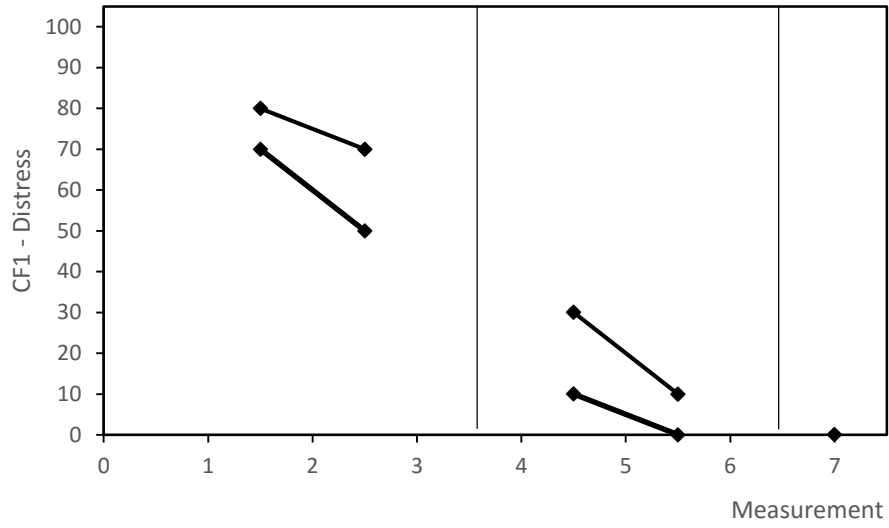
Appendix 24. PF's Variability Analysis (Trended Range) IVAS, EBVAS and CTVAS
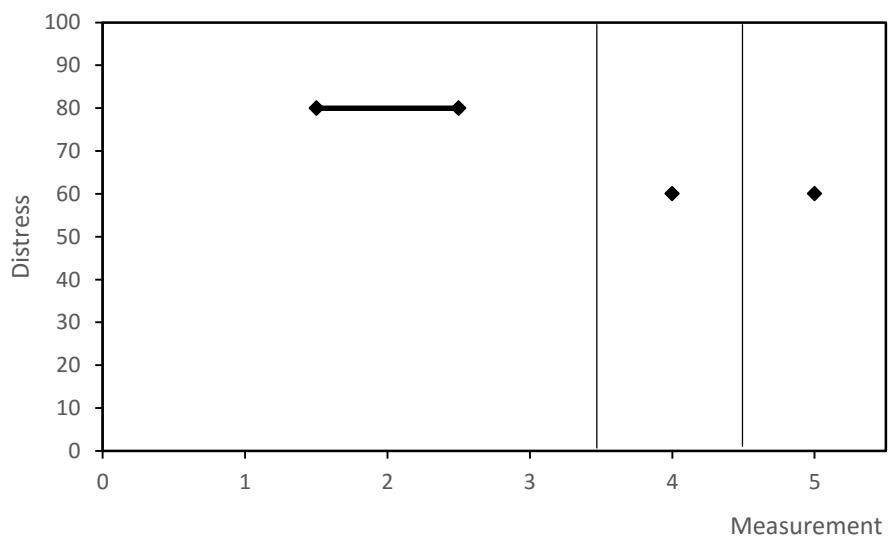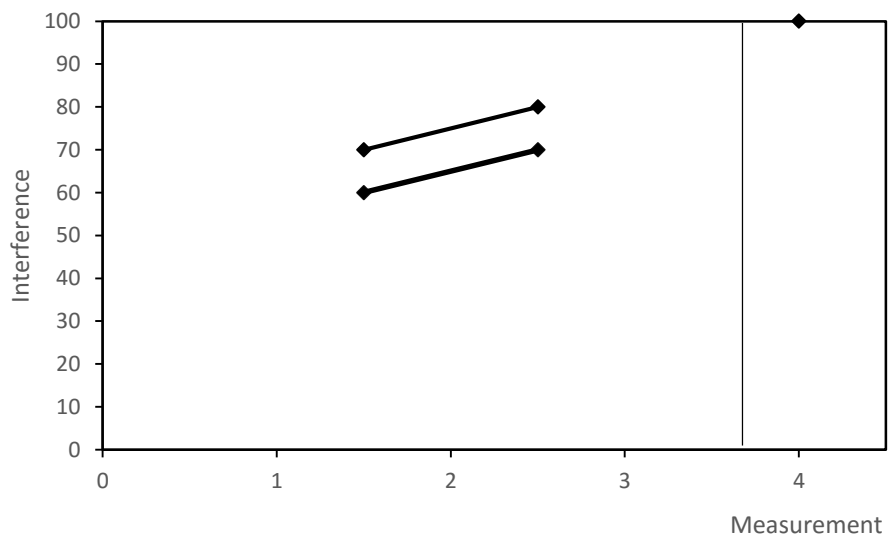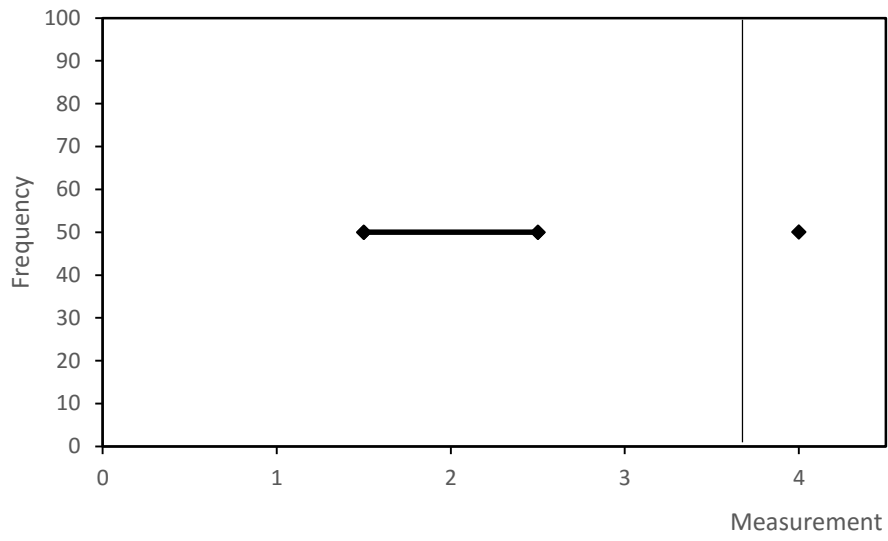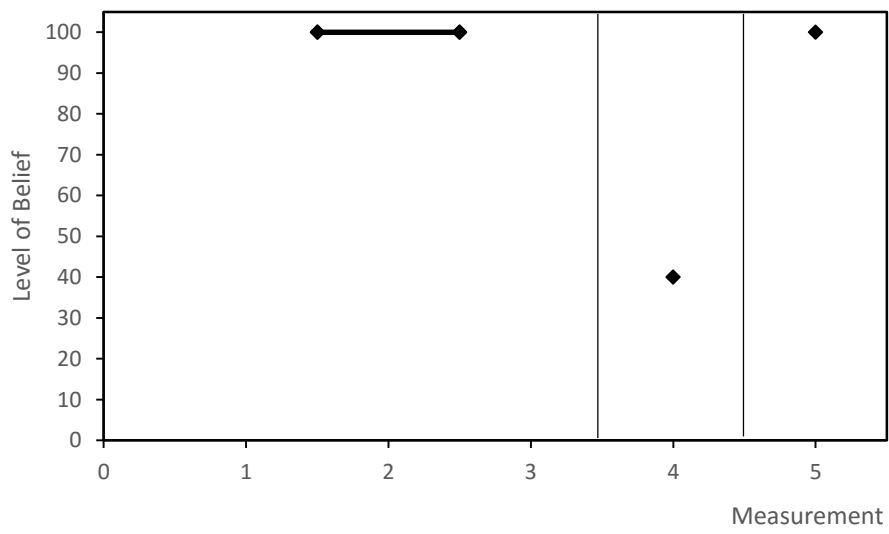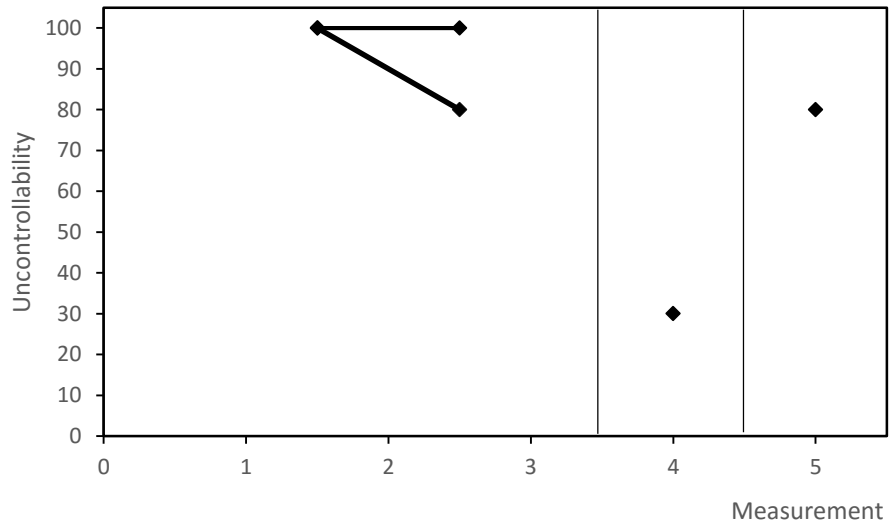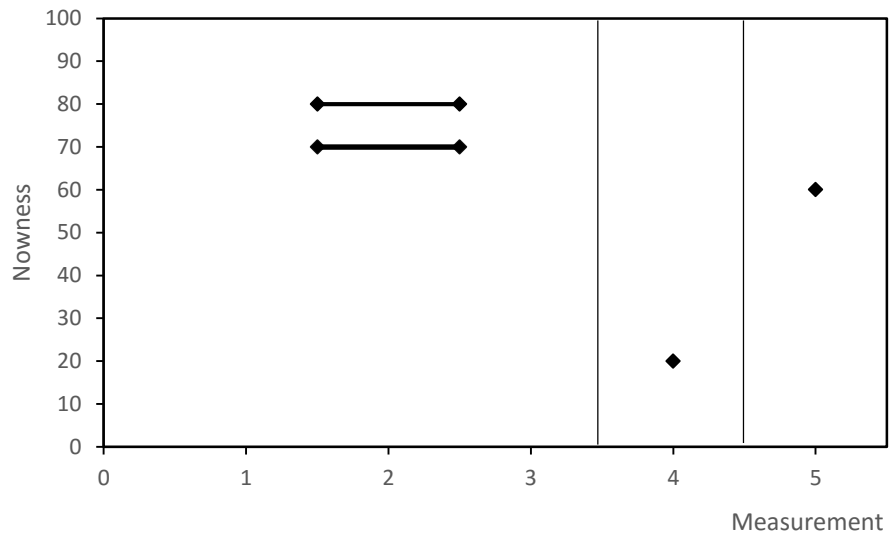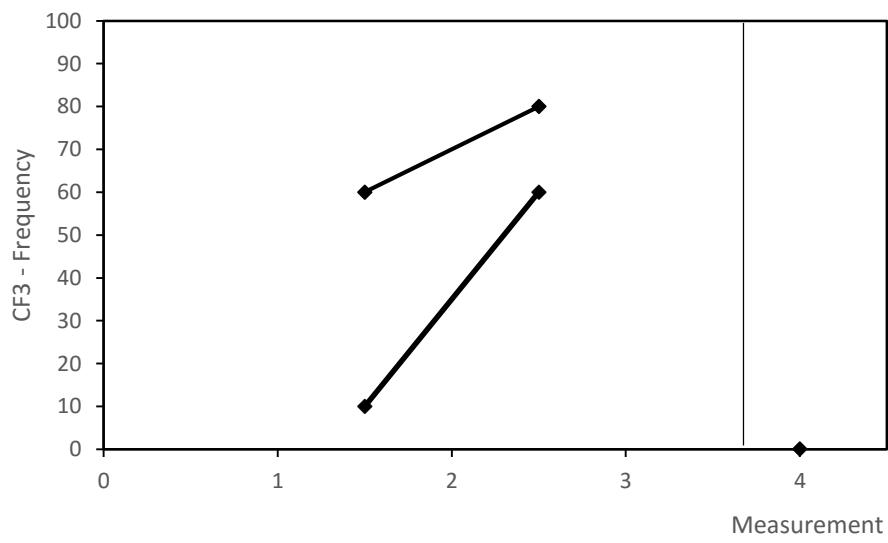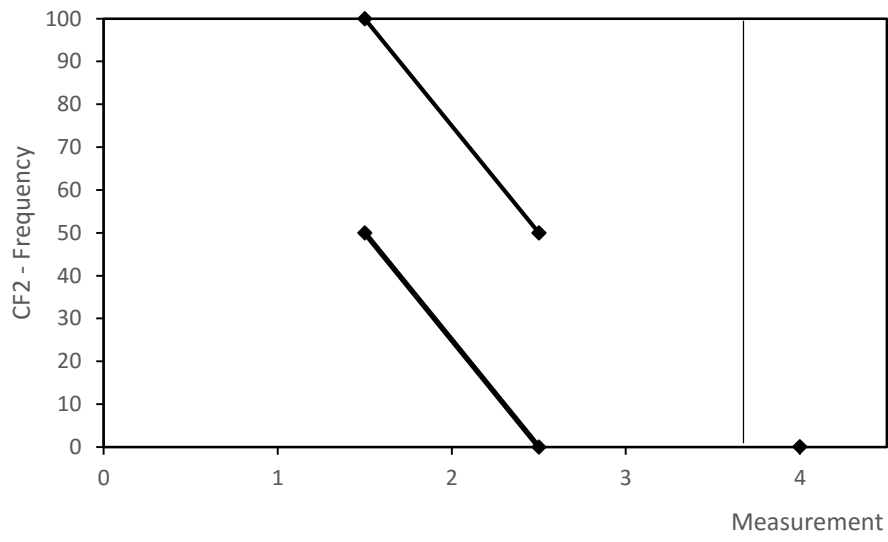
Appendix 25. PX's Variability Analysis (Trended Range) IVAS