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Synchrony–desynchrony in the tripartite model of fear: Predicting treatment outcome in clinically phobic children

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ABSTRACT

The tripartite model of fear posits that the fear response entails three loosely coupled components: subjective distress, behavioral avoidance, and physiological arousal. The concept of synchrony vs. desynchrony describes the degree to which changes in the activation of these components vary together (synchrony), independently, or inversely (both forms of desynchrony) over time. The present study assessed synchrony–desynchrony and its relationship to treatment outcome in a sample of 98 children with specific phobias both prior to and 1 week after receiving one-session treatment, a 3 h cognitive-behavioral intervention. The results suggest an overall pattern of desynchronous change whereby youth improved on behavioral avoidance and subjective distress following treatment, but their level of cardiovascular reactivity remained stable. However, we found evidence that synchronous change on the behavioral avoidance and subjective distress components was related to better treatment outcome, whereas desynchronous change on these components was related to poorer treatment outcome. These findings suggest that a fuller understanding of the three response systems and their interrelations in phobic youth may assist us in the assessment and treatment of these disorders, potentially leading to a more person-centered approach and eventually to enhanced treatment outcomes.

1. Introduction

Lang (1967) describes three components of the fear response: subjective distress, behavioral avoidance, and physiological arousal. Synchronous change on these components following treatment of phobic disorders is hypothesized to predict positive outcomes (Hodgson & Rachman, 1974). Desynchrony occurs when the components fail to change in concert, and is thought to predict poorer treatment outcomes. Research in adults is generally consistent with these hypotheses, although it is uncommon for all three components to be assessed simultaneously (Barlow, Mavissakalian, & Schofield, 1980; Mavissakalian, 1987; Michelson & Mavissakalian, 1985; Michelson, Mavissakalian, & Marchione, 1985; Michelson et al., 1990; Vermilyea, Boice, & Barlow, 1984). Despite its potential clinical utility, it is unclear how synchrony–desynchrony might apply to anxious children, and how it relates to treatment outcome in this population. The current study assesses synchrony–desynchrony across all three components, as well as its relationship to treatment outcome, in a sample of youth with specific phobias treated with a cognitive-behavioral intervention.

1.1. Synchrony–desynchrony of the tripartite model of fear

According to Lang's tripartite model (Lang, 1967, 1979; Lang, Cuthbert, & Bradley, 1998; Lang, Levin, Miller, & Kozak, 1983), fear is comprised of a neural network of three loosely coupled components: subjective distress, behavioral avoidance, and physiological arousal. Although activity in one of these components can activate the remaining components, the extent of "diffusion" is dependent upon the strength of the initiation and the level of fear (Hodgson & Rachman, 1974). In some instances the three components co-vary with one another, and in other instances the components do not respond in concert. In fact, it is possible for any one of the components to be in ascendance while the others lay relatively dormant. An intuitive pattern in the tripartite model is heightened subjective distress, elevated physiological arousal, and avoidance of a feared object or situation; however, others may

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approach a feared object or situation, even though they experience subjective distress and elevated physiological arousal. All eight combinations of activation of the three components are possible (see Fig. 1).

Forty years ago, Hodgson and Rachman (1974) described a high correlation among all three components as concordance, and a small correlation among the three components as discordance. Lang and Cuthbert (1984) suggested that concordance among the three response components should be greater in individuals with specific phobias versus other anxiety disorders, since the fear response would likely be heightened in these disorders. While concordance vs. discordance refers to activation patterns in the three components at a single time point, the notion of synchrony vs. desynchrony describes the degree to which *changes* in the activation of these components vary together (synchrony), independently, or inversely (both forms of desynchrony) over time (Rachman & Hodgson, 1974). For example, treatment of a specific phobia may lead to subsequent changes in all three of the response modalities, or only some of the components while others remain unaffected (Davis & Ollendick, 2005).

The vast majority of research on synchrony–desynchrony has occurred in adults with specific phobias, with more studies showing evidence of desynchrony following treatment (Alpers, Wilhelm, & Roth, 2005; Grey, Sartory, & Rachman, 1979; Hellstrom, Fellenius, & Öst, 1996; Öst, Stridh, & Wolf, 1998; Thomas & Rapp, 1977) than synchrony (Girodo & Henry, 1976; Rentz, Powers, Smits, Cougle, & Telch, 2003). Of note, these studies vary in whether they operationalize synchrony–desynchrony according to changes in only two response systems or all three of the response systems. Studies that incorporate all three components of the fear response consistently demonstrate desynchrony, with the predominant pattern being change in behavioral avoidance and subjective distress, while heart rate remains stable and largely unaffected by treatment (Hellstrom et al., 1996; Öst et al., 1998).

In the child specific phobia literature, the results are more limited. In spider phobic children receiving back-to-back 1.5 h sessions of in vivo exposure and eye movement desensitization and reprocessing, both distress and avoidance were found to decrease following treatment (Muris, Merckelbach, Van Haaften, & Mayer, 1997). Similar synchronous changes in distress and avoidance were found in a large treatment outcome study of children with a range of specific phobias receiving either one-session treatment (OST) or an education support treatment (Ollendick et al., 2009). Unfortunately, changes in physiological arousal were not explored in either of these studies. In the only child phobia study to incorporate physiological measures, children with a heterogeneous array of specific phobias were found to decrease from pre-to post-treatment (after receiving either OST alone or OST with a parent present) on avoidance, distress, blood pressure, and heart rate (Öst, Svensson, Hellstrom, & Lindwall, 2001). However, this study did not account for baseline physiological measures, making it impossible to determine if participants responded differently to the phobic stimulus from pre-treatment to-post-treatment, or if their baseline levels of blood pressure and heart rate changed from pre-treatment to post-treatment.

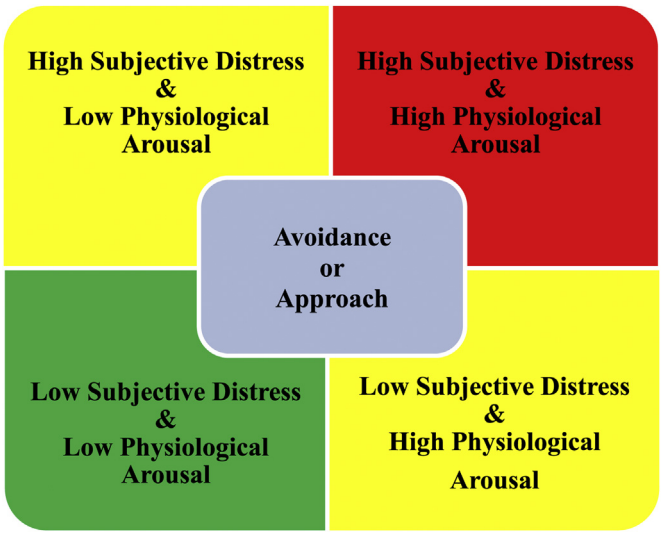

Fig. 1. Possible combinations of activation in the tripartite model of fear.

1.2. Synchrony–desynchrony and treatment outcome

Hodgson and Rachman (1974) proposed a number of hypotheses with regard to the concept of synchrony–desynchrony, not the least of which was that successful treatment of disorders of fear should involve amelioration, or synchronous change, across all three domains of the tripartite response system. Individuals demonstrating desynchronous change from pre-to post-treatment were proposed to evince inferior treatment outcomes. In the decades following Hodgson and Rachman (1974), researchers have advocated for the collection of data across all three domains of the fear response with the goal of clarifying the link between synchrony–desynchrony and treatment outcome (Davis & Ollendick, 2005; Himadi, Boice & Barlow, 1985; Michelson, 1984; Silverman & Ollendick, 2005).

Unfortunately, there are no studies to date of synchrony–desynchrony predicting treatment outcome in child phobia samples. In adults, the evidence for and against Hodgson and Rachman's (1974) hypothesis largely comes from patients with agoraphobia. "Synchronizers" have been found to be less symptomatic than "desynchronizers" at post-treatment, 1 month follow-up, and 3 month follow-up (Michelson & Mavissakalian, 1985; Michelson et al., 1985). Vermilyea et al. (1984) reported a trend for treatment non-response in relation to desynchronous change; however, at 6 month follow-up, the trend disappeared (Craske, Sanderson, & Barlow, 1987). Further, some studies suggest that it is not desynchrony per se, but rather the pattern of desynchrony, that may predict sub-optimal therapeutic outcomes. For example, desynchronous clients with high behavioral avoidance but low heart rate were more likely to be treatment non-responders, whereas subjects with low behavioral avoidance and high heart rate were more likely to be treatment-responders (Mavissakalian, 1987). Finally, the few studies that operationalized synchrony–desynchrony according to all three fear components found evidence that desynchrony was related to poorer outcomes (Michelson et al., 1985, 1990).

Thus, the adult agoraphobia literature suggests a general relationship between desynchronous change and inferior treatment outcomes (although when only two response systems are assessed, certain patterns of desynchrony might be more pertinent than other patterns). This finding has been replicated in adults with claustrophobia (Alpers & Sell, 2008) and a phobia of flying (Beckham, Vrana, May, Gustafson, & Smith, 1990), with both studies assessing only two indices of the fear response. However, in a case study of two adults with a phobia of heights, Abelson and Curtis (1989) showed continued positive response at 6- and 8-month follow-up, despite both patients showing more change on subjective distress and behavioral avoidance than physiological arousal (measured via heart rate, cortisol, epinephrine and norepinephrine). Given the similar time scale in this and the Craske et al. (1987)