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Expectancy biases in fear and anxiety and their link to biases in attention

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HIGHLIGHTS

- We summarize evidence for attention bias and expectancy bias in health and anxiety.
- Possible causal relations between these processing biases were rarely investigated.
- New research venues are proposed.
- This review aims at stimulating future research in order to provide effective therapy.

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ABSTRACT

Healthy individuals often exhibit prioritized processing of aversive information, as manifested in enhanced orientation of attention to threatening stimuli compared with neutral items. In contrast to this adaptive behavior, anxious, fearful, and phobic individuals show exaggerated attention biases to threat. In addition, they overestimate the likelihood of encountering their feared stimulus and the severity of the consequences; both are examples of expectancy biases. The co-occurrence of attention and expectancy biases in fear and anxiety raises the question about causal influences. Herein, we summarize findings related to expectancy biases in fear and anxiety, and their association with attention biases. We suggest that evidence calls for more comprehensive research strategies in the investigation of mutual influences between expectancy and attention biases, as well as their combined effects on fear and anxiety. Moreover, both types of bias need to be related to other types of distorted information processing commonly observed in fear and anxiety (e.g., memory and interpretation biases). Finally, we propose new research directions that may be worth considering in developing more effective treatments for anxiety disorders.

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Fear is an essential emotion for survival because it ensures adaptive reactions in dangerous situations (e.g., Bradley & Lang, 2007; Öhman & Mineka, 2001). Yet, despite the existential importance of sensitivity to threat, for some people, fear (and its more chronic and less stimulus-oriented form, anxiety) can lead to overprotective responses such as the complete avoidance of situations associated with the feared threat. Such maladaptive behavior may originate in deviated information processing, making those individuals experience the situation as more dangerous than it actually is (for examples of cognitive theories elaborating such ideas, see Beck, Emery, & Greenberg, 1985; Mathews & MacLeod, 1994; Williams, Watts, MacLeod, & Mathews, 1997).

Fear and phobia are characterized by robust and consistent expectancy biases. Highly fearful and phobic individuals exhibit higher expectancies of encountering threat (Aue & Hoeppli, 2012; de Jong & Muris, 2002), as well as higher expectancies that such encounters will have aversive consequences (Amrhein, Pauli, Dengler, & Wiedemann, 2005; Kennedy, Rapee, & Mazurski, 1997; Mühlberger, Wiedemann, Herrmann, & Pauli, 2006). Whereas other kinds of cognitive distortions in anxiety have been more extensively studied, biases in expectancies, to date, have rarely been systematically examined and are therefore in the focus of the present article.

In addition to distorted expectations, anxious and phobic individuals exhibit other cognitive biases. For instance, there is evidence of diverse attention biases toward threat, especially among anxious and fearful or phobic individuals (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van IJzendorn, 2007). Of note, recent work postulates a causal role for attention biases in the development of anxiety, similarly to its proposed role in depression (e.g., Harmer, Goodwin, & Cowen, 2009; Watters & Williams, 2011), a psychopathology that is simultaneously characterized by dysfunctional expectations.

Investigating potential links between the less investigated expectancy biases and the more prominent attention biases is compelling. Yet, to date, research focusing on both healthy and pathological forms of fear has overlooked possible relations between expectancy and attention biases (and other types of cognitive biases, including biases in memory and interpretation). Considering the comorbid appearance of these biases in fear and anxiety, it is plausible to hypothesize common underlying mechanisms (for related ideas, c.f. Mathews, Mackintosh, & Fulcher, 1997; Williams et al., 1997). Notably, most cognitive models of psychopathology postulate that information-processing biases exert influences on one another (e.g., Ingram, 1984; Williams et al., 1997).

Revealing causal relations between maladaptive cognitive processes in anxiety may have significant theoretical and clinical implications: From a basic scientific point of view, understanding the causal relations of different cognitive biases may shed light on the underlying mechanisms in health and disease states. Moreover, therapeutic approaches targeting (the) causal mechanism(s) in anxiety may be more effective than current treatments. The present review paper, therefore, focuses on deviations in expectancies and their causal interplay with altered attentional processes.

Focusing our review on links of expectancy bias with other biases on those in attention has two reasons. First, attention biases have been extensively investigated in fear and phobia but also in healthy controls. Research has shown that attention biases are important building blocks of fear and anxiety. Therefore, the investigation of links between expectancy and attention distortions can revert to an important knowledge base. Second, as we will outline later, to date, empirical data regarding causal relations between expectancy bias and other cognitive distortions exist exclusively with respect to attentional phenomena.

We first consider the characteristics of expectancy and attention biases and how these can be conceptually distinguished from other types of bias that have additionally been observed in fear and phobia. Next, we provide short summaries[1] of research conducted on expectancy and attention biases to fear-evoking stimuli among (a) healthy, (b) anxious,[2] and (c) fearful[3] or phobic[4] adults (see Salum et al., 2013; Shechner et al., 2012, for biases in children and adolescents). We differentiate these populations to examine possible similarities and differences between healthy and pathological reactivity to threat. We then describe theoretical considerations and recent work investigating the relation between expectancy and attention biases to threat. Finally, we discuss the need to add other types of bias (such as memory and interpretation bias) to the investigation of expectancy–attention links in fear and phobia. Supplemental consideration of these complementary distortions in information processing may help to shed light on the concrete mechanisms underlying expectancy–attention links. Our reflections ought to inspire future research in the field, thereby helping to uncover mechanisms that establish and strengthen nonadaptive symptoms in anxiety disorders.

1. Definitions of expectancy bias, attention bias, and other forms of distorted information processing

1.1. Expectancy bias

It is important to distinguish two types of biased expectations (Aue & Hoeppli, 2012; Foa & Kozak, 1986). Catastrophic thinking in exaggerated fear, phobia, and anxiety may result both from overestimating the likelihood of *facing* an anticipated threat source (*encounter expectancy bias*; referred to as *probability* by Foa & Kozak, 1986) and from overestimating the likelihood that such a confrontation with the threat source will have *severe consequences* (*consequences expectancy bias*; referred to as *cost* by Foa & Kozak, 1986). Although such a distinction may seem trivial, it is critical because these two types of expectancy bias should influence different aspects of subjective fear. Encounter expectancy bias should refer to the likelihood of the occurrence of fear episodes (i.e., the *frequency* of occurrence). Conversely, consequences expectancy bias should refer to fear *intensity* (see McNally & Heatherton, 1993, Experiment 1, for supportive evidence).

[1] This summary is partial, particularly with respect to attention biases that have already been investigated in numerous studies (see Yiend, 2010, for a more detailed review).

[2] If not otherwise indicated, the terms "anxious" and "anxiety" in this paper refer to individuals who display mostly subclinical fear and apprehension across a variety of situations (generally assessed via questionnaires; e.g., the State-trait Anxiety Inventory; Spielberger, Gorsuch, & Lushene, 1970).

[3] In this paper, the term "fearful" refers to individuals who exhibit extreme fear toward a specific category of threat, but who were not clinically diagnosed as phobic.

[4] In contrast, in the context of the present paper, the term "phobic" refers to individuals who were clinically diagnosed (e.g., using the *Diagnostic and Statistical Manual of Mental Disorders* [5th ed., American Psychiatric Association, 2013] or the *International Classification of Diseases and Related Health Problems* [10th rev., World Health Organization, 1992] diagnostic criteria).