

## Generalized Anxiety Disorder and Depression: A Learning Theory Connection

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### Abstract

This paper offers a new learning theory-based conceptualization of worry in Generalized Anxiety Disorder (GAD). The authors suggest that the processes that produce GAD symptoms may vary across GAD sufferers and that treatment effectiveness may be enhanced if the process that likely produced symptoms in a given individual is understood. Specifically, they suggest that a “worry as adjunctive behavior” hypothesis be added to the “worry as anxiety” and “worry as avoidance behavior” hypotheses currently considered. This new hypothesis suggests that for some worriers, worry may function as an adjunctive behavior; that is, a way of accessing quick satisfaction when daily living produces too little response contingent reinforcement. The authors explain that life events that give rise to adjunctive behavior are the same as those that contribute to depression and that this might help explain the high comorbidity between GAD and depression. In cases in which worry appears to serve an adjunctive function, treating GAD symptoms as depression would be treated (e.g., with behavioral activation) may be the most successful course of action.

**Keywords:** Depression; GAD; Response contingent positive reinforcement; Learned helplessness; Behavioral activation; Adjunctive behavior; Schedule-induced behavior

### Depression and Generalized Anxiety Disorder: A Learning Theory Connection

Generalized Anxiety Disorder (GAD) affects a large number of people [1]. While inroads have been made in terms of its treatment, many reviewers of psychotherapeutic treatment for GAD conclude that effectiveness is far from complete and that more about GAD remains to be learned [2,3]. Two features of GAD are prominent. First, GAD is characterized by what can be called a behavioral excess. Sufferers complain of frequent and seemingly uncontrollable worry, so much so that Andrews et al. [4] recommended that the disorder be renamed “generalized worry disorder.” Second, GAD is highly comorbid with depression [5].

The study of GAD has reasonably focused on its prominent symptom; worry. In the clinical and scientific literature, this symptom has been treated according to either a “worry as anxiety” or “worry as avoidance behavior” hypothesis. In the current theoretical paper, the authors make the argument that the addition of a “worry as adjunctive behavior” hypothesis might help complete our understanding of the disorder. The authors summarize the main points of the current hypotheses for worry and direct the reader to representative literature in which those ideas are developed, examined, or applied. The authors next summarize learning theory literature that explains that the experiences that contribute to depression should, in many cases, give rise to small behaviors that produce immediate satisfaction (i.e., adjunctive behaviors). They argue that, in some cases, worry might best be understood as an adjunctive behavior and point to literature that is consistent with this heretofore unexpressed hypothesis.

As mentioned above, two conceptualizations have influenced learning theory-based discussion of worry and its treatment. The first conceptualization is based on classical conditioning and portrays worry as synonymous with anxiety [6]. Worry/anxiety is understood to be a conditioned response (CR) elicited by an aversive conditioned stimulus (CS) [for definitions see 7]. Scholarly interest in this “worry as anxiety” hypothesis appears to have waned in favor of the second learning theory hypothesis, discussed below; however, it may still be relevant in clinical

practice. Individuals vary in the precision with which they use words to label private events [8-11]. Some individuals, who complain of worry, may be using the label to indicate what professionals would call anxiety. In such cases, the “worry as anxiety” conceptualization is appropriate.

Consider the following hypothetical example of “worry as anxiety”: Sally seeks intervention for distressing worry. A functional analysis reveals that worry occurs when Sally encounters stimuli related to her career and workplace. For example, the start of the workday elicits “What if I can’t get that project done properly?” Classical conditioning is typically assumed to be the process through which a neutral stimulus, like workplace, comes to take on its aversive meaning. An investigation of Sally’s history reveals many life experiences in which she encountered humiliating criticism in the workplace, or in situations that have generalized to the workplace. Workplace now elicits anxiety, manifested as worry. Treatment for worry/anxiety that fits this conceptualization requires extinguishing responding to the eliciting CS through exposure (e.g., desensitization, flooding, etc.). Treatment in Sally’s case would involve controlled exposure to workplace cues, in a safe environment.

The second learning-based conceptualization of worry is anchored in both classical and operant conditioning and has been discussed by several authors [12-14]. They see worry, not as an elicited emotional response, but as a deliberate, goal-seeking, operant behavior and call worry a cognitive avoidance behavior. The label of escape/avoidance behavior (as understood in the operant conditioning literature) [for definitions see 7] is appropriate because for worriers, worry appears to serve a real function of reducing unpleasant physiological arousal.

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Several researchers have demonstrated that subjects who are instructed to worry show less [15], or less change in [16], cardiovascular arousal to disturbing images than those who were not instructed to worry. For most worriers, worry also serves a superstitious function of preventing bad events. Thus, despite the fact that worriers find aspects of their behavior distressing and complain about it, it persists because of the benefits it produces. Expressed in operant conditioning's three-term contingency ( $S^D$  -- R --  $S^{NR}$ ), when an event occurs which the individual has learned is aversive ( $S^D$ ), worry (R) is used in an attempt to remove or lessen ( $S^{NR}$ ) the aversive event's impact [13,14].

Mineka et al. [13,14] also offer a hypothesis for the apparent uncontrollability of worry in GAD sufferers. In this population, worry behavior is high on the hierarchy of avoidance responses used to make aversive situations less distressing. However, the act of worrying also produces aversive events. For example, sufferers report that the act of worrying is unpleasant and engaging in worrying necessarily involves the private presentation of aversive events. Worrying is logically chosen as the response with which to cope with these (worry-generated) aversives, and a vicious circle is born [13,14].

Some recent work on the role of perfectionism in GAD may also fit the "worry as avoidance behavior" hypothesis. Perfectionism has been shown to be positively related to worry behavior [17]. For those who have learned to value the abstraction [18] of "being perfect", a threat to perfection is very likely an abstract stimulus to which the individual responds with distress. Worrying may reasonably be chosen as a response to reduce this distress. Similarly, intolerance of uncertainty [19] has been identified as an elicitor of distress in many GAD sufferers. When uncertain situations arise, worrying may be chosen as a coping strategy.

The "worry as avoidance behavior" hypothesis suggests a different analysis in the example of Sally, above. It suggests that we consider Sally's worrying not as something that reflexively emerges (like anxiety) but as something that she has learned to do, to lessen her anxiety. When the anxiety-arousing workday begins ( $S^D$ ), Sally worries (R), and is reinforced by feeling less aroused ( $S^{NR}$ ) for having done so. Treatment for worry that fits the cognitive avoidance behavior conceptualization generally contains two components [3]: Extinguishing responding to anxiety eliciting stimuli (as in the conceptualization of "worry as anxiety") and facilitating the development of new, non-problematic avoidance responses (i.e., coping responses) to replace the worry. Treatment for Sally might still include controlled exposure, in a safe environment, to stimuli that elicit her anxiety but it would also include components that build less problematic avoidance responses to replace worry, such as problem-solving training, relaxation training, or cognitive restructuring.

Cognitive-Behavioral Therapy (CBT) addresses worry in a manner consistent with the learning theory-based conceptualizations of worry discussed above. It is often effective, but not completely so [2,3]. Furthermore, Newman et al. [20] say that while CBT for GAD is effective, it is much less effective than it is for other anxiety disorders. These authors suggest that this may be due to the failure of current treatments to address all facets of the disorder. Relatedly, this paper will suggest that treatments for GAD may not be effective for all GAD sufferers because the conceptualizations of GAD on which they are based do not fit all GAD sufferers. While the label GAD identifies a particular symptom presentation, there may be multiple processes that can produce that presentation.

Forgeard et al. [21] has argued that consideration of the process that gives rise to a particular symptom presentation will enhance our understanding of, communication about, and treatment of psychiatric disorders. They point out that a single process may produce different symptoms across individuals. Furthermore, different individuals may arrive at similar symptom presentations through different processes. Effective treatment for an individual relies on identifying the causal process at work in that case. With respect to GAD, the learning theory literature has considered two process pathways, as discussed above. This paper will propose a third. The reasonableness of considering this third pathway takes its strength from the construal of worry as an active, reinforcement seeking operant behavior [12-14] and the frequently cited fact that GAD is strongly comorbid with depression. The tremendous comorbidity between depression and GAD [5] raises the notion that a common process may explain the two symptom presentations, at least in some cases.

We will next describe a hypothesis elucidated by Dygdon and Dienes [22] and apply it to the conceptualization of worry in GAD. While many argue that depression is secondary to the life restrictions that chronic worrying imposes (and this may well be true for those who use worry as an avoidance response), this hypothesis will raise the possibility of a different connection between depression and GAD.

While there are certainly biologically based predispositions to depression, it is widely recognized that life experiences contribute to the disorder [23,24]. When life experience contributions to depression are understood from a learning theory perspective, some behavioral excesses are expected to co-occur with that depression. We will suggest that the worry of GAD may be a behavioral excess produced by life experience conditions that also give rise to depression. In other words, some cases of GAD may be best thought of as manifestations of a depressogenic process at work. This view will lead to the recommendation that for some GAD sufferers, psychotherapeutic treatment that addresses depressogenic conditions is in order.

## Learning Theory Conceptualization of Depression

Two learning theory models regarding the contribution of life experience to depression are foundational to current, effective psychotherapeutic interventions for depression. The Response Contingent Positive Reinforcement (RCPR) model, offered by Lewinsohn et al., [25-28] and consistent with work by Ferster [29-31], gave rise to Behavioral Activation (BA) treatments that encourage participation in satisfaction/pleasure-producing activities [28,32,33]. The Learned Helplessness (LH) model, offered by Seligman et al. [34-36], underlies the use of problem-solving [37,38] or exposure [39] strategies in the treatment of depression. Considerable data [32,40-42] support the effectiveness of these psychotherapeutic interventions for depression and the RCPR and LH models offer sound, theory-based, explanations for why these interventions should work.

Though often discussed independently, the RCPR and LH models share a common theory basis. They are both anchored in operant conditioning, [for definitions see 7] easily depicted in the following three-term contingency:  $S^D$  -- R --  $S^{PR/NR}$ . Applied to human experience, everyday life can be viewed as a series of situations ( $S^D$  s) that offer opportunities to engage in behaviors (Rs) that produce satisfying outcomes ( $S^{PR/NR}$  s) contingent upon those behaviors. These might come about through the actual production of pleasurable consequences (i.e., positive reinforcement or PR) or the removal or minimization of painful events (i.e., negative reinforcement or NR). Both RCPR and LH

hypothesize that depression is the result, at least in part, of life experience consistent with disruption, or “strain”, in the reinforcement schedules that make up an individual’s life [for discussion see 22]. Put in other words, the RCPR model argues that depression results from disruption in the extent to which one’s behavior succeeds in producing pleasurable outcomes, or positive reinforcement ( $S^D - R - S^{PR}$ ). The LH model sees depression as the result of a breakdown in the extent to which one’s behavior is successful in avoiding or terminating aversive events; that is, securing negative reinforcement ( $S^D - R - S^{NR}$ ). Conditions of “schedule strain”, or disruptions in paths to reinforcement, are known to give rise to low rates of behavior, consistent with the anhedonia typical of depression. Furthermore, Lewinsohn et al. [26-28] compellingly argued that the personal history of prolonged or widespread failure to secure reinforcement through one’s behavior functions as an innate elicitor (i.e., unconditioned stimulus or UCS) of distress for human beings, consistent with the dysphoric mood of depression. This proposal by Lewinsohn et al. is consistent with observations offered by Ferster [29] and together these support the statement that behaving organisms (like human beings) need to impact their environments through their behavior. When they cannot emotional pain results.

The RCPR and LH models apply to the phenomenon of depression across diagnostic categories that identify differences in severity or pervasiveness. Disruptions in response contingent reinforcement in a limited number of situations, or in situations that are of minor importance, may result in less severe depressions like adjustment disorders with depressed mood. Disruptions in many situations, or in situations that are very significant, may contribute to major depressive episodes while disruptions that are long term may contribute to dysthymic disorders.

## Depression and Adjunctive Behavior

Dygdon and Dienes [22] argue that there is value in identifying the reinforcement schedule strain condition common to the RCPR and LH models. It has been demonstrated across species, including human beings [43-45], that when behaviors secure reinforcement only rarely (e.g., a writer crafting the many sentences that will be reinforced when an important paper is completed) the behaving organism will take breaks from engaging in the behavior that the schedule demands (e.g., writing) and instead engage in a simple behavior that provides quick, immediate, reinforcement (e.g., the writer may take breaks to snack). The fact that such behaviors reliably take place under schedule strain conditions has led to their special naming as “schedule-induced”, or “adjunctive”, behaviors [46]. Dygdon and Dienes [22] argued that this phenomenon likely applies to the behavioral excesses that commonly co-occur with the otherwise general behavioral suppression that characterizes depressive disorders. They speculate that behaviors like rumination in depression may be adjunctive responses to the schedule strain conditions that gave rise to those depressions.

Falk and Kupfer [46] contended that the propensity to engage in adjunctive behaviors under certain schedule strain conditions is likely innate and serves an adaptive function. These behaviors are most likely to occur when a reinforcement schedule is maximally ambiguous. When what had been frequent reinforcement just begins to thin, adjunctive behaviors are not likely. Similarly, when no, or close to no, reinforcement is forthcoming, adjunctive behaviors are not observed. However, when reinforcement remains possible, though much behavior is required before reinforcement is delivered, the individual confronts

a “should I stay or should I go” dilemma and in this case adjunctive behaviors are likely. The nature of behaviors chosen to serve adjunctive functions is peculiar. They are often not behaviors in which the individual typically engages and they often have nothing to do with the behavior whose reinforcement schedule was disrupted. They do, however, satisfy two important conditions: (1) they provide immediate satisfaction, protecting the individual from the full depressogenic impact of behavior that rarely produces desirable consequences and (2) they allow the individual to remain in the situation in which the principal schedule operates, ready to enjoy reinforcement when it once again is available. This construal suggests that our innate propensity to engage in adjunctive behavior functions as a sort of behavioral immune response against conditions which would otherwise produce more severe depression. Consistent with this, some research suggests that depressions marked by behavioral excesses might not be as severe as depressions without behavioral excesses [47, for discussion see 22].

## Depression, Adjunctive Behavior and Generalized Anxiety Disorder

We posit that for some GAD sufferers, a “worry as adjunctive behavior” model fits because the following has occurred. A breakdown in access to response contingent reinforcement has transpired and, as would be expected, has given rise to a press for adjunctive behavior. For the GAD individual, worry has been chosen to serve that adjunctive function. Imagine the following as an alternative history in the hypothetical case of Sally, above: Sally seeks intervention for distressing worry, but in this case a functional analysis reveals no clear elicitor. Sally’s worrying may occur in the workplace but it is also occurs in other contexts. Curiously, though Sally does not offer this as causal, investigation reveals that her worrying seemed to begin around the time that a significant romantic relationship ended. Though Sally has other social relationships, the end of the romance likely substantially reduced her opportunities for reinforcement contingent upon her interpersonal behavior and this schedule strain gave rise to the search for a behavior to provide adjunctive satisfaction. In Sally’s case, worry is available in her repertoire of behavior and emerges under these conditions.

The possibility that worrying begins, at least for some GAD sufferers, as an adjunctive response to conditions of schedule strain seems worth considering. But why might worrying be chosen instead of another adjunctive response? Furthermore, why might worrying, given that sufferers report the practice to be unpleasant, be an adjunctive option at all? Though working with the conceptualization that worry functions as a cognitive avoidance response, Mineka et al. [13,14] suggest interesting routes through which worry might become established in one’s behavioral repertoire. They speculate that worry behavior might be learned in childhood through the observation of parents who are worriers. In this case, the individual’s learning history may contain rules about superstitious negative reinforcement for worrying (e.g., “worrying protects you from bad things”). In addition, the individual’s learning history may contain rules about positive reinforcement for worrying (e.g., “worrying means you are a caring person”). Continued contact with this type of rule will build an association between worry and the abstraction [18] of caring person. For individuals who have been taught to value being a caring person, the act of worrying will match this abstraction and produce instant, automatic [18,48], positive reinforcement. Put in other terms, for an individual so trained, engaging in worrying will produce an abstract reinforcer that “identifies” him/her as a caring person. Interestingly, this example is consistent with research that suggests that many worriers see themselves as responsible for others

and report early experiences that taught them to be caretakers [for a review see 49].

Given life experience that teaches that worrying prevents bad things, or that worrying demonstrates a positive quality about the worrier, worry becomes an ideal choice as an adjunctive behavior: Worrying will deliver instantly reinforcing consequences (e.g., “I’ve prevented something bad”, and/or “I’ve taken care of someone”) and the individual will not need to leave the situation in order to worry. Given its private, “portable” nature, worrying can be done anywhere, and at any time. Additional encouragement for considering an adjunctive behavior hypothesis for some worriers comes from a comment made by Mineka [13]. While elaborating on the vicious circle nature of “worry as avoidance behavior”, she observed that worriers’ report of the uncontrollability of their worry is much like the uncontrollability complaints of people addicted to substances. Strikingly, the adjunctive behavior hypothesis has been applied to substance abuse by several authors [50].

The fact that a GAD client complains about his/her worrying may lead many clinicians to question the validity of an adjunctive behavior hypothesis. Adjunctive behaviors, by definition, produce quick reinforcement. Some may ask: “How can worry be construed as reinforcement producing if the worrier complains that the behavior is painful?” The fact that a behavior produces pain does not mean that it does not produce reinforcement as well. According to operant conditioning, if an emitted behavior is present, it is being reinforced. Related to this, Goldiamond [51] offered a cost/benefit view of human operant behavior. He argued that each instance of everyday human emitted behavior is followed by a multitude of consequent stimuli/events. Some of these stimuli serve to motivate and strengthen the behavior and, if they occurred alone, would reasonably be labeled reinforcers. Goldiamond [51] called such consequences, “benefits”. However, aversive events often accompany benefits in the multitude of consequences that follow human behaviors. Goldiamond [51] termed these aversive events “costs” and argued that, if used alone, a cost might well serve to punish a behavior. According to Goldiamond [51], the ultimate function of the consequent stimulus array that follows a behavior is determined by the number and salience of the benefits and the number and salience of the costs. Also critical is the individual’s state of deprivation relative to the benefits. Thus, the consequent array will have a net effect, which will be reinforcing or punishing. He argued that when an individual chooses to engage in a behavior that produces many costs, the benefits are likely so numerous, so important, so rare, or so difficult to attain, that it is logical that the individual endure the costs in order to secure the benefits. Though a person with GAD may claim that her/his worry is painful and distressing, worry provides immediate satisfaction. When life is such that satisfaction is otherwise difficult to attain, the benefit of immediate reinforcement outweighs the cost of the concurrent painful consequences of worry.

## The Adjunctive Behavior Hypothesis and GAD in the Clinic

We propose that when GAD worry is assessed, three conceptual process hypotheses be entertained. If case data suggest that the “worry as anxiety” hypothesis fits, exposure treatment is likely appropriate. If data suggest that the “worry as avoidance behavior” hypothesis fits, exposure treatment with training in alternative coping strategies is likely appropriate. When case data reveal no clear situations that evoke worry, or when worry emerges following a disruption in one of a

client’s routines in living, it is likely prudent to consider the “worry as adjunctive behavior” hypothesis.

For those for whom worry serves an adjunctive function, very important intervention recommendations follow. Treatment that focuses on suppressing worry is not likely to be successful. If worry is adjunctive and is suppressed, another behavior will likely emerge to serve that adjunctive function and that new adjunctive behavior may be as problematic as worry. If adjunctive worry is suppressed and no other behavior is available to serve that adjunctive function, then intervention has done more harm than good. In other words, if adjunctive worry was mitigating the effects of depressogenic schedule strain, but taken away by treatment, depression will likely become apparent (if it was not part of the original clinical picture) or become more severe (if mild depression accompanied the worry). This leads to the recommendation that if a GAD sufferer’s worry is believed to be an adjunctive response to schedule strain, then successful treatment should focus on the identification of paths to reinforcement that have become disturbed and restoring them to richer schedules. This treatment directive is consistent with what is delivered in BA strategies, commonly used in the psychotherapeutic intervention for depression. In other words, the “worry as adjunctive behavior” conceptualization offered here leads to the recommendation that, when this conceptualization fits, GAD should be treated as depression would be treated. BA strategies require an individual’s engagement in behaviors that provide consequential satisfaction, meaning, or pleasure, repairing the disrupted paths to reinforcement that produced the adjunctive worry. Such treatment will not target the worry directly, though worry should disappear when the circumstances that made it necessary are repaired.

Though the “worry as adjunctive behavior” hypothesis has not been tested explicitly, findings exist that are consistent with it. Armento and Hopko report [52] on the successful treatment of a cancer patient’s major depressive disorder and GAD using BA strategies. Though the authors also used exposure exercises to help neutralize the impact of the cancer diagnosis (consistent with the “worry as anxiety” hypothesis), they attribute most of the improvement in her anxiety symptoms to the BA intervention. Also, Chen et al. [53] report good success with a BA treatment of worry. Their treated participants also reported, as would be expected, a decrease in depressive symptoms. The encouraging results from these two small investigations suggest that further empirical testing of the “worry as adjunctive behavior” hypothesis is warranted.

An important clinical note is warranted here. A behavior may arise to address a particular need, but once emitted, additional consequences may be apparent and influence the future of the behavior. In the case of worry, it is known that worrying reduces adverse physiological arousal [15]. This means that an individual who initially uses worry to serve an adjunctive need for quick satisfaction will likely notice worry’s ability to reduce arousal. Worry may thus win a place in his/her repertoire to satisfy arousal management needs when they emerge. In such cases, intervention would need to address the primary (adjunctive) and secondary (arousal reduction) functions of worry.

## Conclusions and Next Steps

We propose that a third hypothesis be added to the current set of learning theory conceptualizations of worry in GAD. In addition to the “worry as anxiety” and “worry as avoidance behavior” models reviewed above, we suggest that a “worry as adjunctive behavior” construal be considered when a client with GAD is being assessed. It is important that the reader recognize that we are not pitting this conceptualization

against the two learning theory conceptualizations already available. Consistent with arguments raised by Forgeard et al. [21] we are suggesting that different experiential processes may lead to worry as seen in GAD. An idiographic assessment of the process through which a particular individual's worry developed should lead to more effective, and more efficient, treatment.

Worry might not always be adjunctive, but in cases where it is, treating the disruption in paths to reinforcement that created it is important. BA that carefully helps a client with adjunctive worry re-engage in behaviors that provide satisfaction should obviate the "need" for worry. Several writers [28,42] have observed that BA strategies seem to play a beneficial role in disorders other than the depression diagnoses for which they were originally designed. Martell et al. [28] have specifically suggested that BA's utility in the treatment of anxiety should be more systematically studied. When anxiety behaviors, such as worry in GAD, have emerged under conditions of disrupted paths to reinforcement, these recommendations make considerable theoretical sense.

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