

Conceptualizing Intrusive Thinking at the Level of Psychological Mechanisms

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Abstract

Intrusive thinking, the sudden occurrence of unwanted thoughts, images, or impulses, is a frequent and natural occurrence within our stream of consciousness (Clark and Purdon 1995). Present in both clinical and nonclinical samples, the high incidence of intrusive thoughts across the population renders challenging the task to identify meaning behind their occurrence. Their presence, frequency, and content do not appear, however, to be random. Intrusive thinking manifests differently in clinical versus nonclinical populations. They may be associated with certain emotions, thus offering a glimpse into their potential adaptive nature. This chapter examines what intrusive thoughts are and what they are not. It explores how they manifest differently in clinical versus nonclinical populations and asks whether these different presentations can provide insights into their origin. It evaluates intrusions as possible manifestations of adaptations and examines intrusions linked to evolved emotions (e.g., fear, rage, jealousy, and love). Identifying the possible reasons behind intrusive thinking may help guide future treatment.

Introduction

A commuter experiences a sudden urge to jump off the subway platform as the train arrives at the station. An individual engaged in cleaning up after dinner suddenly has a vivid image of throwing a plate against the wall, as a fit of rage intrudes their thoughts. Someone looking through their wardrobe to find something to wear that day suddenly hears a voice in their head saying, “You’re such a loser.” As another person walks their dog, a sudden image of repeatedly stabbing a passerby jarringly interrupts their train of thought. Another is driving to work when a voice interrupts their thoughts and suddenly proclaims: “You need to get on stage with a guitar! You’re a rock star!”

Intrusive thinking, the sudden occurrence of unwanted thoughts, images, or impulses, is a frequent and natural occurrence within our stream of consciousness (Clark and Purdon 1995). Intrusions occur in both clinical and nonclinical samples, and their high incidence (80–90%) across the population renders challenging the task to identify a meaning behind their occurrence (Clark 2005). It does appear, however, that their presence might not simply be random. The manifestation of intrusions differs in clinical versus nonclinical populations, and they may be associated with the presence of certain emotions that offer glimpses into their potential adaptive nature.

Here, we examine what intrusive thoughts are and what they are not. We explore *how* intrusive thoughts manifest differently in clinical versus nonclinical populations. We ask whether the different presentations in clinical and nonclinical populations might provide insights into their *origin*, and evaluate intrusions as adaptations.

What Are Intrusions?

According to Clark (2005:4), an intrusive thought is “any distinct, identifiable cognitive event that is unwanted, unintended, and recurrent. It interrupts the flow of thought, interferes in task performance, is associated with negative affect, and is difficult to control.” This definition is generally consistent with others used to describe the phenomenon (Beck 1967; Horowitz 1975; Klinger 1978; Rachman 1981) and appears to include the following characteristics (Clark 2005):

- It is a distinct thought, image, or impulse that enters conscious awareness.
- It is attributed to an internal origin.
- It is considered unacceptable or unwanted.
- It interferes with ongoing activity.
- It is unintended.
- It tends to be recurrent.
- It easily captures attentional resources.
- It is difficult to control.

Clark also suggests that intrusive thoughts are negative, although it is unclear whether this criterion is universally accepted, a point to which we return below (e.g., Gregory et al. 2010).

Images versus Thoughts

Intrusive thoughts are acknowledged to manifest in different ways. Sometimes they present as images or scenarios, and other times as an internal voice devoid of imagery.

Memories versus Nonmemories

Though there is evidence that intrusive thoughts may be born from the recall of previous experiences, this is not always the case. Intrusions can sometimes consist of memories and other times not. There are instances in which the intrusion is autobiographical, but it is uncertain if that is always the case.

Spontaneous versus Triggered

Some intrusive thoughts are triggered by a cue. For example, an individual may experience an intrusive thought compelling them to stab themselves in the chest upon seeing a kitchen knife on the table. Seeing the knife might have served as a cue that prompted the intrusion. In other cases, the intrusion may seem to appear out of nowhere, without an obvious cue having acted as a trigger. The fact that a triggering cue is not identified does not necessarily mean that it was not present. Rather, it could be that the cue was subtler and not explicitly observed.

Valence of Intrusive Thoughts

Many definitions of intrusive thoughts imply that they are negative in valence (Clark 2005); however, Gregory et al. (2010) propose that intrusions may actually present as highly positive in individuals experiencing a hypomanic state. These could be similar in content to thoughts related to delusions of grandeur. Other situations suggest that positive intrusions exist, including in nonclinical samples. One example is that of infatuation in which an individual experiences intrusive thoughts about a loved one, and many such intrusions carry a positive valence (e.g., fantasies of union or sexual consummation). Even situations that appear to have a negative connotation on the surface could carry positive valence for the individual experiencing the intrusion. For example, imagining the suffering of an enemy could be quite positive in a scenario of homicidal ideation.

What Predicts Intrusive Thoughts?

Intrusive memories can be triggered by rumination, a phenomenon that is often present in individuals suffering from anxiety, depression, or both (Birrer et al. 2007). A number of mental health disorders are associated with the presence of intrusive thoughts (discussed further below); however, they also manifest in nonclinical samples. The overall incidence appears quite high: 80–90% of individuals in nonclinical samples report experiencing intrusions (Clark 2005). Below, we discuss possible origins of intrusions. There is evidence suggesting that attaching meaning or importance to intrusions can impact their frequency and controllability (Freeston et al. 1991).

What Intrusive Thoughts Predict

Intrusive thoughts are quite prevalent following trauma, although findings suggest that their frequency and severity is not predictive of posttraumatic stress disorder (PTSD) symptomatology (McFarlane 1988; Shalev 1992). Interestingly, Brewin et al. (1998) found that while the presence of intrusive memories either at baseline or prior to follow-up made an additional significant contribution to anxiety, it did not affect depression at follow-up (Brewin et al. 1998). Having high-frequency involuntary intrusive memories at baseline, however, significantly predicted later depression, even when controlling for the severity of symptoms at baseline (Brewin et al. 1999).

One interesting feature of intrusive thoughts is that they are a common feature across multiple psychiatric disorders.

Intrusions in Clinical Populations

The incidence of intrusions is quite high across multiple mental health disorders, where they are known to occur in individuals with obsessive-compulsive disorder (OCD), generalized anxiety disorder (GAD), PTSD, body dysmorphic disorder, eating disorders, depression, bipolar disorder, and others. The manifestation of intrusions appears to be partly affected by specific diagnoses. For example, an individual with OCD who engages in extreme handwashing might experience germ intrusions, whereas an individual with body dysmorphic disorder might get intrusions related to food items. For a more extensive discussion of intrusions in clinical populations, see Schlagenhaut et al. and Visser et al. (this volume).

Interestingly, intrusions appear to be dissociable from other characteristics that might be more specific to only one or two disorders. Whereas obsessions are thought to be characteristic of OCD, worry is a central feature of GAD (although not exclusive to it), and negative thoughts and rumination may typically be present in individuals with depression; intrusions are often present in all of these conditions. Let us now compare and contrast intrusions with worry, rumination, obsessions, and negative thoughts.

Intrusions versus Worry

Defined as “a chain of thoughts and images, negatively affect laden and relatively uncontrollable” (Borkovec et al. 1983), *worry* is a central feature in GAD, but it also occurs with high incidence in nonclinical individuals. In definition and in practice, worry and intrusive thinking are quite similar: They both interrupt ongoing thoughts and activities, and they can both present as thoughts or images, although worry occurs more frequently as verbal and intrusions more frequently as images (Clark 2005). Intrusions are thought to be less voluntary

than worry; that is, worry can be brought on volitionally, whereas intrusions are by definition involuntary and disruptive. Another distinctive feature that disambiguates intrusions from worry is that intrusions are generally discrete and brief, whereas worry need not be.

Intrusions versus Rumination

Defined by Nolen-Hoeksema and Morrow (1991) as repetitive and passive thinking about one's symptoms of depression, *rumination* is to depression what worry is to GAD (Borkovec et al. 1998). To our knowledge, no study has directly compared the differences between intrusions and rumination; however, respective reports for each provide clues as to what disambiguates the two. Whereas intrusions are thought to be brief, sudden, and to involve generally unwanted thoughts or images, rumination involves a train of thought that is longer, repetitive, and recurrent (Clark 2005). It is possible that intrusions may trigger rumination, which in turn may precipitate a depressive or anxious episode. As such, the same content may be at the source of intrusions and rumination. In thinking about the distinction between intrusions and rumination, one might imagine that an intrusion could occur during rumination.

Intrusions versus Obsessions

Obsessions and intrusive thoughts are very similar, where the former appears to be an extreme version of the latter. Another characteristic that helps dissociate the two is that intrusions may sometimes be irrelevant to the self, whereas obsessions are relevant. Obsessions may often prompt behaviors such as compulsions that are intended to diminish the associated thoughts and manifest as OCD.

Intrusions versus Negative Thoughts

Intrusions can be dissociated from general negative thoughts in that the former is more likely to be irrational, whereas negative thoughts are more likely to be rational. In this context, rational refers to thoughts that are not at odds with the present context. An individual might be experiencing negative thoughts about their promotion prospect during a recession, for example. If, during a positive economy and after receiving a positive evaluation, they jarringly internally hear the words "you're about to get fired" just prior to giving an important presentation, their experience was an intrusion. Intrusive thoughts are more disruptive of day-to-day activity than general negative thoughts. Negative thoughts are a core characteristic of individuals with depression, and generally manifest as "thoughts" or in a verbal way rather than images. Intrusions may present either as verbal or as images, most commonly the latter. Unlike other forms of negative "processing," intrusions seem to be relatively common in nonclinical populations.

Manifestation of Intrusions in Nonclinical Populations and the Origins of Intrusive Thoughts

Little is known about the etiology of intrusive thoughts. Different theories have been proposed, but as yet we do not have a practical understanding of intrusions' origins. Here, we briefly review various theories on intrusions, examine their manifestation in nonclinical samples, and discuss the parallels between intrusions and memory retrieval.

Theories on the Etiology of Intrusions

Salkovskis (1988) suggests that intrusive thoughts might be an inherent aspect of problem solving. He proposes that despite being disruptive to thinking in the moment, intrusions may be useful, and that the very reason they appear suddenly and are intrusive and compelling could be that they are meant to be noticed. In other words, if intrusions appeared as a simply nondisturbing thought, we might not pay attention to them.

Rachman's view on intrusive thoughts is predominantly based on the etiology of obsessions (Rachman 1981). He also believes that an important contributing factor to intrusions is the development of a mood state that sets the tone for intrusions to occur. Rachman proposes, for instance, that individuals who are stressed and in a dysphoric mood state are more likely to experience intrusions. In such cases, individuals are also thought to have greater difficulty ignoring or suppressing the intrusive thoughts. He also suggests that certain personality characteristics (e.g., neuroticism, heightened anxiety) may make individuals more susceptible to experiencing intrusions.

Klinger (1978) proposes that intrusive thoughts are associated with "current concerns." In other words, intrusions occur when thinking is interrupted and the thought process shifts toward addressing what was brought about by the intrusion (the current concern). The intrusions, then, can be external cues or nonverbal events (Klinger 1999).

Horowitz proposed a reformulation of intrusive thoughts based on psychoanalysis. In his account of intrusive thoughts, Horowitz posits that active memory storage is characterized by an intrinsic tendency to repeat its represented contents, which continues until the storage of contents in active memory is terminated. Appropriate cognitive processing of the memory content terminates the process. Horowitz proposes that stressful events may yield intrusions that stimulate an active memory of an experience. This memory activation occurs repeatedly until there is integration of old and new information, perhaps to reconcile representations of a memory with a person's inner view of the world (Horowitz and Wolfe 2003). Horowitz's formulation appears particularly relevant to traumatic memories.

The general overarching theme across the views held by Salkovskis, Rachman, Klinger, and Horowitz is that, disruptive and disturbing as they are,

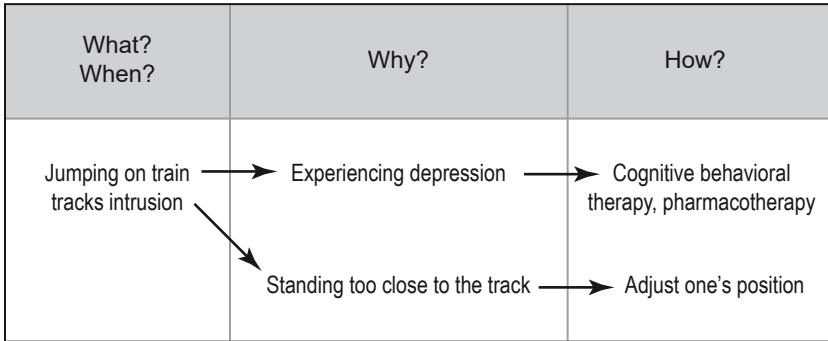


Figure 7.1 Identifying why intrusions arise may help guide how we can best treat them.

intrusions might actually serve an adaptive purpose. One difficulty in these interpretations of intrusive thoughts is that they are not exactly practical. That is, it is difficult to conceive how such theories might guide the development of future treatment. We believe there is value in examining the manifestation of intrusive thoughts in nonclinical populations and to extract the possible underlying adaptive basis for their presence. In short, if we are poised to identify *why* the brain produces intrusive thoughts, we should be better equipped to determine *how* to address them (Figure 7.1). What problem is the brain trying to solve? Are intrusive thoughts inherently harmful? Do they represent a beneficial mechanism gone awry?

Informed by these theories, we present an adaptationist perspective on intrusive thoughts. Thereafter, we examine the manifestation of intrusions in nonclinical samples through specific examples and extract two elements (content and process) that might provide useful insight into treatment avenues for mental health disorders in which intrusions are often present.

An Adaptationist Perspective on Intrusive Thoughts

From the perspective of modern evolutionary biology, adaptations are characteristics that evolved because they contributed in a specific way to solving a problem or challenge tributary to successful survival or reproduction (Williams 1966). Propensities to become fearful of snakes and spiders, for example, evolved because they led their bearers to avoid these dangers to survival (Öhman and Mineka 2001). Evidentiary criteria for invoking adaptation include economy, efficiency, and, importantly, improbable precision of functional design.

From this perspective, we ask: Do intrusive thoughts in nonclinical populations show evidence of functional design? Any sensible answer is reliant on further conceptual and empirical work. Guided by an adaptationist perspective, we offer a few preliminary suggestions or heuristics which rely on the following metatheoretical premises:

1. Organisms have finite time and resource budgets.
2. Organisms have evolved decision rules to prioritize effort allocated to some adaptive problems at the expense of others in temporal sequences: when faced simultaneously with tasty-looking ripe fruit, an attractive mate, and a dangerous snake, for example, humans prioritize effort allocated to avoiding a lethal snake bite, postponing effort devoted to the other adaptive problems.
3. Emotions such as fear, rage, disgust, and jealousy mobilize attention and effort to specific threats or challenges, orchestrating an organism's cognition, physiology, and behavior to address those challenges (Tooby and Cosmides 2008; Al-Shawaf et al. 2016).

One novel hypothesis that we are proposing here is that intrusive thinking may be one important design feature of evolved emotions that have this prioritization function, directing attention and allocating effort to solving some adaptive challenges at the expense of others.

An important feature of these adaptations is their probabilistic nature, guided by error management logic. Probabilistic nature simply means that adaptations only succeed in solving adaptive challenges with some likelihood, not invariantly. Although there is compelling evidence for evolved fears of snakes and spiders (e.g., Öhman and Mineka 2001), and these adaptations have undoubtedly saved many lives of their bearers, these adaptations do not invariably prevent life-threatening bites: more than 81,000 people worldwide die each year from snake bites. Evolved fears function probabilistically.

Error management theory is a metatheory of decision rules, combining signal detection theory with evolutionary theory (Haselton and Buss 2000). At an abstract level, when confronted with uncertain environments, there are two possible ways to err inferentially: making false positives and making false negatives. When recurrent cost asymmetries of making these two types of errors exist over evolutionary time, selection will favor decision rules to avoid the costlier error, even if they result statistically in more frequent errors. When perceiving a rustle afoot in a thick grassy wooded area, for example, one can err by inferring that a snake is absent when it actually is present (false negative) or by inferring that a snake is present when it is not (false alarm). In this example, failing to detect an actual dangerous snake in the grass is a costlier error than falsely inferring a snake's existence when there is, in fact, no real threat. Error management theory, in this case, predicts that fears of this sort have evolved to avoid the costlier error, generating avoidance of probabilistic threats, some or many of which will turn out to be false alarms. Although these evolved systems are biased, they are adaptively biased. Error management theory has garnered much empirical support, leading to the discovery of phenomena ranging from the auditory looming bias and the vertical descent illusion in the perceptual domain to the sexual overperception bias and infidelity overinference bias in the social domain (Haselton and Nettle 2006).

A final element in this framework, as applied to intrusive thoughts, is the *mismatch principle*, which states that evolved traits that were adaptive in the ancestral environments in which they evolved may misfire and become maladaptive in modern evolutionarily novel contexts (e.g., Spinella 2003; Li et al. 2018a). A prime example is eating disorders. Humans evolved in food-scarce environments and have evolved feeding adaptations to consume calorie-rich substances—those high in fat and sugar—when encountered and to easily store metabolic surpluses in the form of fat deposition. In modern environments that contain an abundance of these resources, easily obtainable with minimal effort in concentrated forms (e.g., fast-food restaurants or grocery stores), humans tend to overeat. Obesity and type 2 diabetes, absent in traditional hunter-gatherer cultures, are largely the result of these evolutionary mismatches, along with other factors, such as more sedentary living.

The elements of these principles lead to the hypothesis that intrusive thoughts are functional parts of evolved emotion systems. They are designed (in part) to mobilize attention and effort toward specific adaptive challenges. They are often adaptively biased, designed to avoid costly errors at the expense of more frequent errors. Some are maladaptive in modern mismatched environments that are widely discrepant from the ancestral environments in which they evolved.

Possible Adaptive Purpose of Intrusions in Nonclinical Samples

Individuals must constantly make decisions over choices and prioritize task importance. It is conceivable that intrusions act as a means to emphasize what should be worked through as soon as possible, in line with Salkovskis, Rachman, and Klinger. The fact that intrusions appear suddenly, are brief, and are often disturbing may emphasize the urgency of solving a potential problem. It is also conceivable that intrusions themselves present as a mechanism to *process* information, in line with Horowitz. Here, we begin by examining, in nonclinical populations, possible feelings that may be associated with intrusive thoughts, and we address their potential adaptive mechanism (intrusion content). Thereafter, we approach the possibility that intrusive thoughts in and of themselves are a mechanism that enables working through unaddressed but identifiable problems by viewing intrusions through the lens of memory (intrusion process).

Intrusion Content: Conducive Nonclinical Instances

Though they are not necessarily centered around a disorder, intrusions in nonclinical samples appear to occur along common themes across individuals. We contend that these themes may provide insight into the potential adaptive nature of intrusions, in line with the adaptationist framework proposed above. The following list is not exhaustive, but provides a starting point to examine

different forms of emotions that can be at the source of intrusions. Their common characteristic is that they might serve an adaptive purpose; however, depending on the context during which they occur, intrusions can also reflect an adaptation gone awry.

Anger, Rage, and Revenge. Anger has been hypothesized to be an evolved emotion, the expression of which functions (in part) to recalibrate someone else's welfare trade-off ratio with respect to you (Sell 2011). When a behavior affects two or more individuals, it can be selfishly skewed or altruistically skewed. Consider a roommate who has left dirty dishes strewn about the shared kitchen, expecting you to clean them. Expressions of anger to the roommate communicate that they have insufficiently taken your welfare into account and should adjust it in the future. In this simple example, intrusive thoughts and prolonged rumination function to stoke the emotion of anger until the roommate arrives back home and the rage can be expressed, ideally causing the roommate to recalibrate their welfare trade-off ratio with respect to you.

Now consider road rage: When someone cuts you off in traffic, it sometimes activates intense anger. In the modern environment, road rage sometimes produces violent car accidents when ramming the violator. The underlying emotion evolved presumably in small-group contexts in which its expression would cause the violator to recalibrate, taking your welfare more into consideration in the future. In a modern environment marked by dense urban living patterns, in which the handling of severe social violations has been outsourced to professional police, expressions of road rage can lead to disastrous and maladaptive outcomes (e.g., car crashes, personal injury, and death). The design feature of intrusive thinking that prolongs rumination about the violator was presumably adaptive in small-group contexts of the past, where social reputations mattered greatly and the failure to respond to violations could lead to a catastrophic loss of status. In the modern mismatched environment containing lethal 4,000-pound vehicles, traffic congestion, and swarms of anonymous strangers, intrusive rumination about someone who cut you off can lead to road rage and a maladaptive misfiring of this ancient emotion.

Jealousy and Infidelity. Jealousy is an emotion that evolved to combat threats to a valued social relationship. If the relationship is a mateship, jealousy can be activated by cues to sexual or emotional infidelity, to signs of a partner's defection, or to threats posed by potential mate poachers or even by mate value discrepancies (Buss 2000; Buss and Haselton 2005). Infidelity is typically cloaked in secrecy, creating a signal detection problem for the partner. Once jealousy is activated, it can produce intrusive thoughts, prolonged rumination, and motivate vigilance to discern the nature and magnitude of the relationship threat. Intrusive thinking in this context can be functional, leading a person to gather relevant information and to allocate effort to warding off the threat,

devoting resources to mate retention or to repelling the genuine threat posed by a potential mate poacher.

Intrusive thinking is a design feature of the jealousy adaptation; it leads its bearers to uncover and attempt to solve real threats to romantic relationships. Nonetheless, it can also misfire, leading to maladaptive outcomes. If the psychological detection of infidelity cues is set too sensitively, it can produce false accusations of infidelity, undermining the very relationship that jealousy was designed to protect. It can produce delusions of a partner's infidelity and pathological jealousy, leading to extreme violence toward a partner (Buss 2000). Because infidelities are typically concealed, cues to infidelity are inherently probabilistic. Based on error management theory, there is evidence that people overinfer infidelity to avoid the costly error of losing a partner to a romantic rival, even at the cost of making more frequent errors of inference (Goetz and Causey 2009). Moreover, many individuals who have been diagnosed by psychiatrists as having delusional or pathological jealousy turn out to have partners who, upon deeper investigation, have actually been unfaithful (Buss 2000). In short, it is difficult in any particular case to determine unambiguously whether jealous intrusive thinking is functioning as it was designed to function, or if it is misfiring and causing pathological outcomes.

Love and Romantic Infatuation. Intrusive thinking is a common feature of the infatuation stage of love, markedly present when separated from a loved one (Fisher 2016). It can interfere with work, cause other relationships to lapse, and even create a metabolic deficit when someone forgets to eat. Intrusive thinking often creates an idealization of the loved one, imputing maximal values to desirable qualities that have not yet been observed. Preoccupation presumably leads to efforts to woo a loved one or to become reunited with them after separation. After the infatuation stage fades and is replaced by a more subdued warmth and attachment, intrusive thinking subsides, allowing a reallocation of effort to other adaptive challenges, such as obtaining food, negotiating status hierarchies, or solidifying coalitional alliances. Intrusive thinking in the context of the infatuation stage of love is temporally delimited.

Like all adaptations, this one can go awry, misfiring in the modern environment. People develop romantic infatuations with movie stars, for example, when there is no possibility of meeting them, much less successful consummation. In the extreme, these can lead to criminal stalking, as in the case of John Hinckley Jr. who developed an intense infatuation with the actress Jodie Foster. He sent her numerous love letters, stalked her, and when his efforts failed to produce reciprocation, he attempted to assassinate President Ronald Reagan in a last-ditch desperate attempt to get her attention and demonstrate the intensity of his love and commitment to her. He now resides in a prison cell. In short, intrusive thinking can lead to disastrous outcomes, both for the individual and for others who become victims. When properly functioning, however, intrusive thinking leads to successful consummation of love.

This illustrates that intrusive thinking is not solely a design feature of the so-called “negative emotions.” It is likely an evolved design feature of many emotions, including fear, rage, jealousy, shame, and guilt, as well as more positively valenced emotions such as love and sexual arousal. Nor is it always dysfunctional. Intrusive thinking is often a key design feature, motivating attention to pressing adaptive problems while postponing effort allocated to less important ones. Error management analysis highlights the difficulty of distinguishing functional from dysfunctional outcomes in any specific case, rendering the theoretical analysis of intrusive thinking more complicated than previously considered. Another example that generally involves positive intrusions pertains to the pursuit of goals or aspirations. It is important to note that while some emotional contexts are conducive to either positive or negative intrusions, others are likely to be more complex, as in the case of grief. Intrusions can often be autobiographical, that is, they relate to an individual’s firsthand experience. Cast in this light, intrusions can actually be interpreted as a memory retrieval in some instances. We briefly consider intrusions occurring in the context of goals or aspirations and grief, and then further examine intrusions as memory retrieval to extract their potential adaptive process.

Goals or Aspirations. Intrusions can occur in scenario building of means to achieve. In such a case, the intrusions would likely be positive and inspire someone to pursue achievements. Much like the cases described above, the adaptive nature of goal and aspiration intrusions can go awry. For instance, an individual may experience fantasy-like intrusions that reach far beyond their abilities. In this case, the originally positive intrusions could grow to be a reminder of one’s failures and hinder one’s potential to succeed in a more achievable realm.

Grief. Grief is almost always triggered by the loss of a key social partner—a close friend, a romantic partner, or a family member. Research on intrusions during grief is limited but suggests the presence of both positive and negative intrusions in individuals experiencing the loss of a loved one (Boelen and Huntjens 2008). In the positive realm, mourners may experience intrusive memories of the loved one that died or fantasy reenactment. Through the lens of memory (discussed below), the purpose of grief intrusions could be that of strengthening a neurobiological trace, to keep the memory alive. Negative intrusions of grief can include memories of the death event or negative images or thoughts about the future. Early during grief, the intrusions, both positive and negative, may be helpful to the individual who experienced a loss. However, if persistent and enduring, they could interfere with a person’s ability to move forward.

Evolutionary scholars have advanced two competing explanations of grief. One is that grief is an unfortunate nonadaptive by-product of love and attachment (Archer 2003), both of which are profoundly important adaptations in the evolved social suite of humans (Christakis 2019). The second is that grief serves several adaptive functions, such as identifying actions that might have

led to the loss, motivating actions to prevent future losses and signaling to significant others (friends, family, mates) the need for help due to the loss (Nesse 2005). Other possible functions include signaling to others that you are a loyal coalitional ally and ruminating about the implications of the loss for replacing the lost one with an alternative mate or coalitional ally. Which of these competing hypotheses, or which combination, will bear fruit rests with future empirical research on individuals who experience loss and grief.

Intrusion Process: Intrusions as Memory Retrieval

There are useful parallels to be drawn between intrusions and other forms of memory retrieval. Memory retrieval can be broadly defined as recalling a prior experience, either following the presentation of an external or internal cue or through volitional control. Conceptualizing intrusions as memory retrieval appears very much in line with Horowitz's definition of intrusive thoughts and enables approaching the concept with an adaptive mechanistic view.

From this perspective, we can think of intrusions as potentially serving the adaptive functions described below. We can also conceive of intrusions as providing an opportunistic window or intervention. The latter can best be understood through the process of reconsolidation and memory updating.

Reminder That Certain Information Needs to Be Further Processed. By virtue of being interruptive and often irrational, intrusions are noticed. In this case, intrusions would likely reflect an event that has passed, which an individual may need to prioritize or address.

Warning to Allow Preparedness. Intrusions draw attention. Their purpose here is to enable an individual to react in the presence of a looming situation. As such, the intrusions could include content related to an individual's past experiences, but would certainly pertain to an individual's future.

Mechanism to Initiate Extinguishing or Exerting Another Form of Inhibitory Control over a Negative Memory. Retrieval of a previously consolidated memory (i.e., a memory that has been stored into long-term storage for longer than ~six hours) engages two seemingly opposing mechanisms: reconsolidation and extinction. Reconsolidation refers to a putative process which proposes that after retrieval, previously consolidated memories become destabilized and require renewed protein synthesis for long-term storage. Reconsolidation also offers an opportunistic window during which memories can be updated. In extinction, the repeated presentation of the conditioned stimulus in the absence of the unconditioned stimulus leads to a progressive decrease in the behavioral expression to the stimulus. Extinction can refer to both a process (the progressive decrease in fear throughout a session) and an outcome (e.g., resultant decrease in fear responding).

The concepts of reconsolidation and extinction have been extensively studied, and each provides an important avenue of improving psychotherapeutic outcome, particularly in anxiety-related disorders and addiction (Monfils and Holmes 2018). The two approaches have also been successfully combined to improve upon long-term therapeutic outcomes in the retrieval-extinction paradigm (Monfils et al. 2009). Approaching intrusions as memory retrieval could potentially enable the optimization of therapeutic approaches. If an intrusion is mechanistically akin to memory retrieval, it could provide an opportunistic window to intervene and attenuate their potency. Effectively, research suggests that behavioral or pharmacological interventions shortly after memory retrieval improves outcome above and beyond standard extinction-based approaches (Monfils et al. 2009; Schiller et al. 2010; James et al. 2016b; Telch et al. 2017).

Another way to handle upsetting memories, once recalled, is to exert a form of inhibitory control over them (other than extinction). A number of such approaches are discussed in detail by Visser et al. (this volume).

Memory Strengthening or Maintenance. Once they are retrieved, memories generally strengthen if left untargeted (Inda et al. 2011). As such, while an intrusion may present a window of opportunity for treatment of a traumatic memory, if untreated, the intrusion could actually lead to memory strengthening as well. Such a mechanism could provide an adaptive explanation for certain intrusions (e.g., those that manifest during grief, or during goals and aspirations). In other cases (e.g., following trauma), intrusions could exacerbate a negative memory and render treatment more challenging.

Means of Escaping Boredom. While there are often specific circumstances or conditions that appear to prime the presence of an intrusion, others may be more random. In such a case, an intrusion could conceivably serve the adaptive purpose of escaping boredom or monotony in a safe way by engaging in a daydream experience. In this context, intrusions could, for example, promote an individual to engage in mind wandering. An extensive discussion of mind wandering can be found in Visser et al. (this volume).

Summary

Intrusions are what we make of them. Although sometimes acutely distressing when they occur, intrusions can, in and of themselves, actually be innocuous or even positively valenced. What appears to be at the source of most of the distress experienced by intrusions is often the thought process that follows. Consider the following scenario:

A person is standing on the subway platform listening to their favorite song with headphones. Suddenly, a vivid intrusion appears in their mind: they see themselves jumping on the tracks, just as a train passes through. Thus far, the

intrusion has not per se caused any harm. The person's reaction to the intrusion, however, can vary. One individual could simply think: "Whoa! That was crazy! Of course, I would never do that." At the same time, this person might experience a sense of comical relief: "Boy, if I had jumped, I wouldn't have to sit through all of those blankety-blank-blank meetings scheduled today." Another person might process the intrusion differently. For instance, they might think: "Why am I having these images? Should I jump? I am worthless. I don't want to die. Or maybe I do want to die. I don't know what to do. I'm worried about what I might do."

In the first response scenario, the person may not be bothered further (or at all) by the intrusion. In the second case, a person might perseverate on the experience or engage in behaviors to try to minimize the impact of the intrusion. This could potentially result in worry, rumination, and/or obsessions and associated compulsions.

In a sense, intrusions themselves may not be as distressing as what we make of them, and what we make of them is likely to be largely influenced by our state of mind (including, in clinical manifestations, the underlying pathology). In approaching treatment for individuals who experience intrusions, it is important to consider their possible adaptive nature. In doing so, it may be helpful to identify the intrusions' possible underlying content as well as the psychological process that a person's brain has determined should be engaged via the intrusive thought. Ultimately, identifying the possible "why" of intrusions may help guide "how" we can best treat them (Figure 7.1).

