

Attentional Bias in Obsessive-Compulsive Disorder

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### Abstract

Attentional biases, or the predisposition to favor some specific stimuli, have been studied significantly in psychology as of late, including in relation to anxiety disorders. However, results have been contradictory as to their relevance in obsessive-compulsive disorder, as some studies have found their presence in OCD while others have shown no such evidence. A comprehensive view of the evidence, however, seems to point towards the existence of attentional biases in OCD, as many compelling arguments have been suggested as to why some studies have failed to find them. Still, attentional biases within OCD need to be further explored, as very little research has been done on many different OCD subtypes. One prospective avenue for more research is scrupulosity, an OCD subtype characterized by deep moral guilt. Scrupulosity has yet to be studied, and has a number of qualities that make it a good candidate for future studies. Attentional biases need to continue being investigated, as they may be able to further our understanding of the cognitive processes behind anxiety disorders.

### Attentional Bias in Obsessive-Compulsive Disorder

There has been a great deal of recent interest in attentional bias in anxiety disorders. Attentional bias, or the inclination to favor some dominant stimuli, is frequently thought of as an indicator of anxiety conditions (Summerfeldt & Endler, 1998). While there are many different theories about the cognitive process triggering anxiety, there is an agreement that anxiety in general often includes attentional bias towards threatening stimuli. Attentional bias consist of either attentional facilitation or difficulty in disengaging attention. Attentional facilitation occurs when someone is naturally prone to paying more attention to a threatening stimulus, while difficulty in disengaging represents the degree to which someone has trouble disengaging from a threatening stimulus (da Victoria, Nascimento, and Fontenelle, 2012). Only anxious individuals seem to show these attentional biases, as nonanxious individuals are not naturally inclined towards threatening stimuli (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van Ijzendoorn, 2007). Because of this apparent connection between the predisposition towards threat and anxiety, studying attentional bias has become important as researchers hope to learn more about the cognitive underpinnings of anxiety as a whole.

To study attentional bias, researchers have relied mainly on a couple different methodological approaches: emotional Stroop testing and dot-probe testing. Emotional Stroop testing, which was initially the most widely used procedure, involves recording how long it takes for the participant to name the color of a word as words with different emotional valences are presented. The researcher's aim is to see if it takes longer for the participant to name the color of words with a particular emotional valence. In theory, anxious individuals should have a longer reaction time when naming threat-relevant words than neutral words. The emotional Stroop has been criticized on the basis that the delay in a participant's response is actually a result of the

participant's anxious state having been intensified to the point of impairment from the many threatening words already seen (Bar-Haim et al., 2007). The other common approach, called the dot-probe paradigm, was created to get past this issue. The dot-probe paradigm consists of the participant being briefly shown two words or pictures, one threatening and one neutral, followed quickly by a small probe in the position previously occupied by one of the words. Participants are told to respond to the probe as fast as possible, and the researcher analyzes these times. The underlying idea is that this time shows where participants' attention is located, with faster responses indicating the participant paying more attention to the word presented previously (attentional facilitation) and slower times indicating trouble disengaging attention from that word (difficulty in disengaging) (da Victoria et al., 2012). The dot-probe paradigm circumvents the problem mentioned earlier in emotional Stroop since participants are responding to a neutral stimulus in the probe (Bar-Haim et al., 2007). In addition to the previously mentioned paradigms, there is one other kind of test called the emotional spatial cuing paradigm. However, it is a more recent design and thus has not been used as much as the previous two. Additionally, unlike the dot probe paradigm that consists of one neutral and one threat related stimuli, the emotional spatial cueing paradigm contains only of a single stimuli. As competition among different stimuli may assist in revealing threat-related attentional biases, the dot-probe paradigm may be a more perceptive paradigm. Furthermore, while the dot-probe paradigm uses valenced cue stimuli that are completely task irrelevant, the emotional spatial cueing paradigm has participants attend to the valenced cue. This may reduce the generalizability of the results, such that the results may be dependent on the cue stimulus's being task relevant (Bar-Haim et al., 2007). For these two reasons, the paradigm has not been frequently used. When considering the literature on

attentional bias, it is important to understand the differences between the different kinds of methods, especially the emotional Stroop and dot-probe paradigms.

Many studies have looked at the attentional bias found in specific anxiety disorders. Obsessive-compulsive disorder, often referred to as OCD, is one such anxiety disorder which features intrusive thoughts that create apprehensive emotions as well as repetitive behaviors intended to reduce those anxious emotions. Thus far, findings have been somewhat conflicting as to whether attentional bias are evident in OCD, though most studies have found OCD to be linked to attentional bias. However, there are still many that have not, which creates some ambiguity as to their existence in OCD. This review of the literature will examine evidence from both sides, propose reasons that may account for why some studies may have failed to observe these attentional biases, explore why attentional bias may exist in OCD, and discuss future research possibilities.

### **Methods**

A literature review was conducted using studies found through a search of the database PsycInfo using the keywords attention\* bias and obsess\*. In addition, references for these studies were examined to find any studies that may not have come up with this initial search. Studies were not included if they did any of the following: 1) focused on treatment 2) used a method other than Emotional Stroop or dot-probe paradigm 3) did not study attentional biases in OCD. This included 13 studies total from 1994-2013. It is possible that other studies related to attentional biases in OCD have been conducted outside of the 13 that fit this criteria, however these 13 are the only ones found in the previously mentioned PsycInfo search and fit the 3 criteria.

### **Results**

Multiple studies using an emotional Stroop design have presented findings indicating that attentional bias does not occur within OCD patients. Moritz, Jacobsen, Kloss, Fricke, Rufer, and Hand (2004) conducted an Emotional Stroop test on 35 patients suffering from OCD and 20 healthy controls. The experimental task included using 15 different words from 7 different conditions: Stroop, neutral, responsibility, conscientiousness, depression, anxiety, and positive. The researchers conducted t-tests to compare the two groups, finding no significant difference in reaction times between the OCD and control group. Additionally, Moritz, Fischer, Hottenrot, Kellner, Fricke, Randjbar, and Jelinek (2008) performed a similar emotional Stroop study on 23 patients diagnosed with OCD and 23 controls. Participants were given the Hamburg Obsessional Compulsive Inventory, which specified the particular subtype in the patients diagnosed with OCD. This study however had a particular focus on the washing and checking subtypes of OCD, as the conditions included: washing, checking, neutral, paranoid, positive, depression, anxiety, color naming, and Stroop. ANOVA tests were conducted, yielding no significant results that indicated attentional bias in patients suffering from OCD.

Some dot-probe studies have also yielded results showing no attentional bias in OCD. Harkness, Harris, Jones, and Vaccaro (2008) used a dot-probe design on 18 people who met criteria for diagnosis of OCD with primary OCD symptom of compulsive checking, as well as a control group. The dot-probe consisted of five critical word types: check, wash, social, positive, and neutral. Statistical tests produced no significant results showing attentional bias in the OCD group. Furthermore, Moritz and Von Mühlhelen (2008) conducted their dot-probe design and compared 28 patients with a diagnosis of OCD, 21 of whom had a primary OCD symptom of compulsive checking, against 27 controls. The experiment used words that were neutral or relevant to checking or paranoia, and no significant results were found.

In addition to the studies that did not find attentional biases that used an emotional Stroop design or the dot-probe paradigm, Morein-Zamir et al. (2013) found no attentional biases in both a non-depressed and depressed group of OCD patients. They used a different research design that included a visual search task that measured how long it took participants to find a target image among a number of other images. Additionally, the study included two separate experiments, one in which the participants rated the images used in the visual search task beforehand and another in which the images were rated after the task was completed. While no attentional biases were found in either experiment's visual search task, both experiments found the OCD groups to rate the images slower. The second experiment in which the images were rated after the visual search task also showed the OCD group to rate the images more negatively. The researchers credit these findings to a post-attentional processing abnormality rather than attentional biases, as the visual search task did not yield significant group results.

Though some studies have not found it in OCD, there have been many others whose results do indicate the presence of attentional bias. While these attentional biases have been found in many different subtypes of OCD, many of them have focused on contamination. Armstrong, Sarawgi, and Olatunji (2012) used a novel method for their study, as they first screened a large participant pool to establish high and low contamination fear groups. They then proceeded to bring the participants to a public restroom and have them rate their distress level after performing increasingly distressing acts such as touching the inside of a toilet. This was used as a tool to verify their group assignments, as their results indicated that the high contamination fear group (HCF) reported significantly higher levels of disgust than the low contamination fear group (LCF). Following this, the participants were shown a series of four images at once, one from each category of general threat, pleasant, neutral, and contamination. A

machine monitored the participants' gaze orientation, as it recorded how long each participant looked at each picture. Results showed the HCF group to have significantly shorter fixations on contamination threats compared to the other stimulus types. Cisler and Olatunji (2010) used a dot-probe design to study contamination, as they compared results for a contamination fear (CF) group and a control group. The dot-probe experiment used pictures that were frightening, neutral, or disgusting. Results found the CF group to have slower reaction times to both the frightening and disgusting images, indicating difficulty in disengaging. Though neither of the previous studies involves a clinically diagnosed OCD group, studies have found there to be no difference in attentional bias between clinical samples and analogue clinical samples (Bar-Heim et al., 2007). Both of these studies give evidence for attention bias in OCD, specifically showing difficulty in disengaging from stimulus related to the contamination subtype.

Studies have found evidence for difficulty in disengaging from other subtypes of OCD as well. Rao, Arasappa, Reddy, Venkatasubramanian, and Reddy (2009) conducted an emotional Stroop test on both diagnosed OCD patients and a control group using words that were neutral, positive and OCD relevant (e.g. neat), or negative and OCD relevant (e.g. dirty). Results were rather interesting, as symptomatic OCD patients had significantly higher bias for only the negative words. Similarly, da Victoria et al. (2012) conducted a dot-probe study with a clinically diagnosed OCD group and a control. The picture stimuli for the task were either non-OCD relevant or pertained to checking, ordering, hoarding, and washing. The results revealed a high correlation between 1) increasing severity of obsessions and longer reaction times to checking-related pictures specifically and 2) increasing severity of ordering and longer reaction times toward order orientated pictures specifically. So, while the researchers did not find attentional bias in OCD as a whole, a more in depth analysis showed certain attentional bias specific to



patients with a certain OCD subtype. Finally, Moritz, Von Mühlennen, Randjbar, Fricke, and Jelinek (2009) used a dot-probe experiment and found OCD patients to respond significantly slower to all OCD-relevant material, regardless of the patient's OCD subtype.

### **Discussion**

On the surface, it is very difficult to make any kind of assertion based on the multitude of studies on attentional bias in OCD with absolute certainty. Research findings have seemed conflicting, as one could cite multiple sources when arguing for or against attentional bias in OCD. This makes one wonder what could account for this difference in findings, and more specifically why some studies failed to find attentional bias in OCD patients. While there is no clear-cut, obvious answer, there are some logical points that can be observed in trends in the studies that may help decipher this issue.

One popular explanation for why studies have not found attentional biases in OCD is that OCD is a psychological disorder that encompasses many different symptoms, and by nature it is very symptom specific to each individual. In other words, people diagnosed with OCD could suffer from a variety of different obsessions and compulsions. For example, one person may be terrified of germs, while the next is obsessed with making sure everything is perfectly symmetrical. This makes it difficult for researchers to select the appropriate stimuli to test for attentional bias. Many of the studies that did not find attentional bias did not test beforehand to see if stimuli were personally relevant, and such reported that using more personally relevant stimuli might elicit more attentional bias (Moritz et al., 2004; Moritz et al., 2008). On the other hand, the studies that did test for personal relevant stimuli did mostly seem to find attentional bias. Da Victoria et al. (2012), as previously mentioned, found this to be true with their results, as OCD patients with an ordering subtype showed attentional bias to ordering related pictures.

This problem might be further exacerbated by studies that use stimuli from only one subtype of OCD, as it could be harder to detect attentional bias due to the stimuli potentially relating personally to a smaller number of participants in the OCD sample. However, even if a study does test on multiple subtypes of OCD, it can still be difficult to target personally relevant stimuli. The best approach, then, would be to test stimuli beforehand to assure that they are personally relevant and thus could elicit any potential attentional bias (Harkness et al, 2008).

It is also possible that some OCD subtypes do not show attentional biases as much others. For example, many studies have found attentional biases in those with contamination concerns, while not as many have discovered this bias in the checking subtype of OCD. The reverse also seems to be true; there are more studies that have failed to see attention biases in the checking subtype than in the washing subtype. Because of this, some researchers have gone as far as to suggest that OCD checkers and OCD washers have a completely different cognition process. One popular belief is that, when it comes to threat, OCD checkers are more concerned with the absence of disconfirming stimuli than the existence of threatening stimuli. OCD checkers, then, focus on indicators of safety, rather than directing attention to signs of danger (Harkness et al., 2009). However, as demonstrated by da Victoria et al. (2012), Rao et al. (2009), and Moritz et al. (2009), some studies have found attentional bias in the checking subtype of OCD, demonstrating that OCD checkers may simply display attentional biases less than OCD washers, rather than not display them at all. This theory that OCD checkers and washers have different cognition processes, then, may not be accurate if one takes it to mean discounting the existence of attentional biases in OCD checkers as a whole, but may certainly be relevant in explaining why OCD checkers may not show attentional biases as readily as OCD washers.

Habituation during dot-probe trials has also been suggested as a reason why attentional bias has not been found in some studies. Amir, Najmi, and Morrison (2009) used a dot-probe procedure to see if attentional biases were weakening over the progression of the experiment. Their results confirmed that attentional bias diminished significantly after the first block of trials in subjects showing high obsessive-compulsive qualities. These results are explained in two different ways: either the obsessive-compulsive group gradually moved their attention away from threat after originally being drawn to it or the threat words simply lost their threat significance over time. Both of these imply that the participants became habituated over the course of the experiment. If this habituation occurred and was not accounted for in other studies, it could possibly explain the lack of attentional bias. However, it should be noted that Harkness et al. (2009) used a clinical OCD sample and took this factor into account when they didn't find attentional bias in their study. Therefore, more studies need to be conducted that test for habituation in attentional biases to more accurately determine whether it actually occurs.

The use of words instead of pictures is yet another possible reason for not finding attentional bias in OCD. While emotional Stroop tests rely on words, dot-probe experiments can utilize either words or pictures. It is possible that words simply aren't evocative enough to elicit attentional bias, as the obsessions of OCD patients are usually activated by visual cues or images such as an open door or dirty sink (da Victoria et al., 2012; Harkness et al., 2009; Moritz et al., 2008). Almost all of the dot-probe experiments that do not find attentional bias in the literature seem to use words instead of pictures, giving credence to this hypothesis.

While it is important to understand why some studies may not have found attentional biases in OCD patients, it is equally essential to be able to explain the existence of attentional biases in the studies that have found them. There are at least two theories that can explain why

those diagnosed with OCD have showed trouble disengaging from threatening stimuli. First, it is possible that this inability to disengage is a result of a diminished ability to remove attention from threatening stimuli. Previous studies have shown poor inhibition ability to be a key element of OCD, and this first theory would compliment this assertion. Individuals who show OCD qualities may struggle with not focusing on things that are in line with their obsessions, and thus have little control over this attentional fixation. Alternatively, it may be that the attentional biases reflect an intentional decision. OCD patients may see this as a strategic way to cope with stimuli whose threat they may have exaggerated (Cisler & Olatunji, 2009; da Victoria et al., 2012). If prior research about attentional biases existing in OCD is correct, it is important to determine which theory is accurate for treatment purposes. For example, antidepressants have been used to control inhibitory control abilities, while a modified version of the dot-probe task is frequently used to teach patients to disengage from threatening stimuli (da Victoria et al., 2012). Discerning whether one theory is more accurate, then, could help identify what kind of treatment should be used.

When designing a new study, researchers in the future should take into account some of the previously discussed explanations for why some studies have failed to find attentional bias. This includes: making the stimuli as personally relevant to the participants as possible, using a dot-probe design rather than an emotional Stroop, using pictures instead of words, and accounting for habituation as the trials progress. Considering all of the prior research and explanations for why some studies may have failed to find attentional bias, there are numerous avenues for future research. For one, researchers need to analyze the validity of the most supported argument for why studies fail to find attentional bias: the stimuli aren't personally relevant enough. One way this could be done is by conducting a study that uses personalized

stimuli for each individual participant, in essence a different experiment for every individual, and then comparing their scores with those from a standardized experiment similar to the many already conducted. This would be labor intensive, but it might offer a better research design for evaluating attentional biases in OCD. Furthermore, research thus far has focused mostly on the washing and checking subtypes, with very little attention paid to the other subtypes. One potentially interesting OCD type is scrupulosity. Scrupulosity is characterized by intense religious or moral guilt, so much that it affects one's daily life. Thus far, no study has looked at attentional bias in scrupulosity specifically, making it a good topic for the future. Additionally, unlike most other OCD subtypes, scrupulosity may not be as image focused. As discussed earlier, pictures may work better than words when trying to reveal attention biases; someone who suffers from OCD with a contamination subtype, for example, might need to see a dirty sink rather than just the word "dirt." Scrupulosity, however, is related to expressions such as "sin" or "divine wrath," which are not as easily depicted. This lack of emphasis on images makes it especially interesting to study, as it might make it harder to find attentional biases since images are difficult to use. On the other hand, it may be that attentional biases are more prevalent because images simply aren't necessary. This ambiguity can be resolved with a dot-probe experiment on scrupulosity.

Attentional biases are a popular topic in psychology today, and numerous studies have examined their existence in OCD specifically. Research findings as a whole has been conflicting, with some studies affirming their existence and others failing to find any such evidence. However, when looking at all of the research from a comprehensive view, there seems to be more studies that have successfully shown attentional bias in OCD than there are those that have not. Additionally, researchers have made logical arguments as to why they exist, and there are

also many explanations for why some studies have not encountered them. Still, it seems safe to believe that attentional bias in OCD is more difficult to find than in other anxiety disorders, in part because the nature of the perceived threats in OCD is more difficult to measure than in other forms of anxiety, such as phobias (Moritz et al., 2008). Additionally, while studies have shown evidence for attentional biases in OCD, it is also possible that something other than attentional mechanisms, such as post-attentional processing, are more important to the existence of OCD symptoms (Morein-Zamir et al., 2013). Hopefully future studies will be able to shed more light on attentional biases, as it holds much potential application in explaining the cognitive mechanisms behind many debilitating mental disorders.

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