"What I believe is true": Belief-confirming reasoning bias in social anxiety disorder

Maartje S. Vroling [a, b, c, *, 1], Klaske A. Glashouwer [a, d], Wolf-Gero Lange [b, e], Esther Allart-van Dam [b, f], Peter J. de Jong [a]

[a] Department of Clinical Psychology, University of Groningen, Grote Kruisstraat 2/1, 9712 TS, Groningen, The Netherlands
[b] NijCare: Nijmegen Centre for Anxiety Research and Expertise, Postbus 9104, 6500 HE, Nijmegen, The Netherlands
[c] Amarum, Expertise Centre for Eating Disorders (Part of GGNet), Den Elternweg 75, 7207 AE, Zutphen, The Netherlands
[d] Center for Eating Disorders, Accare, Child and Adolescent Psychiatry, Fazantenlaan 1, 9422 EZ, Smilde, The Netherlands
[e] Department of Clinical Psychology, Radboud University of Nijmegen, Postbus 9104, 6500 HE, Nijmegen, The Netherlands
[f] Overwaal, Centre for Anxiety Disorders, Tarweweg 2, 6534 AM, Nijmegen, The Netherlands

ABSTRACT

Background and objectives: Research shows that people tend to consider believable conclusions as valid and unbelievable conclusions as invalid (belief bias). When applied to anxiogenic beliefs, this belief bias could well hinder the correction of dysfunctional convictions. Previous work has shown that high socially anxious students indeed display such fear-confirming, belief biased, reasoning. A critical next question is whether these findings translate to a clinical population of people with social anxiety disorder (SAD). We test whether (i) patients with SAD show belief bias with regard to SAD-relevant themes, (ii) this belief bias is specific for SAD patients or can also be found in panic disorder (PD) patients, (iii) differential belief bias effects in SAD are restricted to social anxiety concerns or are also evident in the context of reasoning with neutral themes.
Method: 45 SAD patients, 24 PD patients, and 45 non-symptomatic controls (NSCs) completed a syllogistic belief bias task with SAD-relevant and neutral content.
Results: SAD patients displayed belief bias for social anxiety related materials, while the PD group and the NSC group did not. Yet, the difference between SAD and PD was not significant. All groups showed similar belief bias effects for neutral content.
Limitations: Content of the belief bias task was not tailored to idiosyncratic beliefs. The study lacked power to detect medium or small differences.
Conclusions: SAD patients showed concern-congruent belief biased interference effects when judging the logical validity of social anxiety relevant syllogisms. Such concern-relevant belief bias may contribute to the persistence of anxiogenic beliefs.

© 2016 Elsevier Ltd. All rights reserved.

1. Introduction

Encounters with an intensely feared stimulus will activate pre-existing (danger) beliefs. Accordingly, in individuals with social anxiety disorder (SAD), entering a social situation will probably elicit beliefs about being rejected. If one wants to correct such phobic beliefs, one needs to accurately deduce the logical implications of the empirical evidence for these beliefs, and actively search for falsifying information in order to critically evaluate the validity of these beliefs. Basic research on everyday reasoning however suggests that people in fact tend to search for belief-confirming information and that our habitual reasoning pattern is biased in a way to confirm rather than to falsify prior beliefs (Evans, Newstead & Byrne, 1993). In general, people not only tend to consider believable conclusions as valid and unbelievable conclusions as invalid (e.g., Evans, Newstead et al., 1993), but are also inclined to prove believable conclusions as valid, and/or disprove

* Corresponding author. GGNet Amarum, Expertise Centre for Eating Disorders, Oranjesingel 32, 6511 NV, Nijmegen, The Netherlands.
E-mail addresses: m.vroling@ggnet.nl (M.S. Vroling), k.a.glashouwer@rug.nl (K.A. Glashouwer), g.lange@psych.ru.nl (W.-G. Lange), e.allart@propersona.nl (E. Allart-van Dam), p.j.de.jong@rug.nl (P.J. de Jong).
1 Currently working at Amarum, Expertise Centre for Eating Disorders.

unbelievable conclusions as invalid (e.g., Evans, 2003). Clearly, such a distorted reasoning pattern (known as "belief bias") will logically contribute to the further consolidation of prior beliefs. When applied to anxiogenic beliefs, this would be a particularly direct pathway contributing to the persistence of fearful convictions (e.g., de Jong, 2015).

Belief bias has since long been studied in the general population (e.g., Evans, Barston, & Pollard, 1983; Klauer, Musch, & Naumer, 2000; Trippas, Handley, & Verde, 2014), yet little research has focussed on belief bias in psychopathology. Recently, research seems to have picked up on reasoning in psychopathology, as is also evident from a recent edited volume about aberrant beliefs and reasoning (Galbraith, 2015). Although some work has been conducted on reasoning in delusions and obsessive-compulsive disorder (e.g., Aardema, O'Connor, Emmelkamp, Marchand, & Todorov, 2005; Foa et al., 2003; Galbraith & Manktelow, 2015), little is known about belief bias and anxiety disorders.

Belief bias represents a well-established phenomenon in the general population (e.g., Evans et al., 1983; Evans, Over, & Manktelow, 1993; Goel & Dolan, 2003) and has been typically investigated using syllogisms. Syllogisms consist of premises that one needs to accept as being true, and a conclusion that does or does not logically follow from the premises. Most research in this domain employed categorical syllogisms. An example of such syllogism would be: *No ducks have four legs/Some animals have four legs//Therefore, some animals are not ducks* (e.g., Blanchette, Richards, Melnyk, & Lavda, 2007; Eliades, Mansell, Stewart, & Blanchette, 2012). In a belief bias paradigm, the conclusion of the syllogisms are manipulated in terms of both logical validity (valid or invalid) and believability (believable or unbelievable). If a logically valid conclusion is consistent with prior beliefs (in the above-mentioned syllogism: *Some animals are not ducks*), then a logical response is more likely to be drawn. If, on the other hand, a logically valid conclusion is unbelievable (as the conclusion *Some children with leukaemia feel happy* in the syllogism *Some sick children have leukaemia/All sick children feel happy//Therefore, some children with leukaemia feel happy*), then individuals are more likely to erroneously judge it to be logically invalid. The opposite pattern typically emerges for invalid conclusions. This interaction between logical validity and believability reflects the belief bias effect.

Categorical syllogisms are, however, relatively difficult to solve: Error rates are often substantial in spite of the fact that most studies rely on university student participants (e.g., Evans, Newstead et al., 1993). Therefore, this type of reasoning task seems not suitable for the investigation of belief bias in clinical populations that also comprise of individuals with limited educational background. In addition, the structure of categorical syllogisms (e.g., *no A's are B/Some C's are B//Therefore some C's are not A*) seems quite distant from every day reasoning problems, and many people without training in formal reasoning are probably unaware of these problems and their logical implications. Therefore, we decided to use so-called linear syllogisms in most of our studies on anxiety-relevant belief bias. This type of syllogism is relatively simple to solve, and in the absence of a time limit, people generally make only few errors in judging their logical validity (e.g., Smeets & de Jong, 2005). Instead of using the percentage of logical errors to index individuals' reasoning performance, participants' latencies for solving the syllogisms are used. Supporting the validity of this approach, an initial series of studies using linear syllogisms concerning factual beliefs (e.g., *An elephant is larger than a cat/A cat is larger than a fly//Therefore an elephant is larger than a fly*) systematically showed that response latencies were higher when there was a mismatch between the logical validity and believability of the syllogisms' conclusions (e.g., de Jong, Weertman, Horselenberg, & van den Hout, 1997; Smeets & de Jong, 2005; Vroling & de Jong, 2010).

To test the potential role of belief bias in the context of phobic convictions, we presented a series of linear syllogisms concerning social anxiety relevant themes to a group of student participants, and tested the strength of belief bias as a function of their fear of negative evaluation (Vroling & de Jong, 2009). The syllogisms related to social anxiety relevant convictions varied in logical validity and social anxiety congruency (SA-congruency). A SA-congruent conclusion would be '*Others find me less competent than person A*',[2] whereas a SA-incongruent conclusion would be '*Others find person A less competent than me*'. In support of the hypothesis that belief bias may be involved in social anxiety, the results showed that individuals high in fear of negative evaluation were relatively fast when there was a match and relatively slow when there was a mismatch between SA-congruency and logical validity. This belief bias effect was similarly evident for valid and invalid syllogisms. This pattern suggests that high socially anxious individuals took additional time to reconsider both a logically justified *refutation* of a SA-congruent ("threat") conclusion (viz, with a [for socially anxious people] believable yet invalid conclusion, such as *Person A is less competent than person 1/Person 1 is less competent than me//Therefore I am less competent than person A*), and a logically justified *acceptance* of a SA-incongruent ("safe") conclusion (viz, with a [for socially anxious people] unbelievable yet valid conclusion, such as *Person A is less competent than person 1/person 1 is less competent than me//Therefore Person A is less competent than I am*). Such concern-congruent belief biased reasoning pattern likely counteracts the correction of dysfunctional convictions, and may therefore contribute to the maintenance of social anxiety.

Even though the results from Vroling and de Jong (2009) are promising and suggest that belief biased reasoning might indeed be involved in psychopathology, this earlier study relied on an analogue student sample. For evaluating the clinical relevance of these findings, a crucial next step would be to test whether these initial findings also translate to a clinical population of people with a formal diagnosis of SAD. In addition, it would be informative to establish whether belief bias concerning social anxiety relevant themes is specific for people with SAD or can be found in other anxiety disorders as well. This is a crucial way to test for the specificity of a disorder-specific belief bias. If indeed a social anxiety related belief bias can also be found in patients with other anxiety disorders, this would indicate that maybe an anxious state rather than SA-specific concerns elicits these belief bias effects. Finally, we want to examine whether differential belief bias effects in clinical groups would be restricted to the domain of concerns, or would also be evident with regard to disorder-irrelevant contents. Perhaps, people with anxiety disorders, more generally, show an enhanced tendency to rely on their prior beliefs when judging the validity of particular pieces of information. Prior studies on the relationship between generally enhanced belief bias and psychopathology have been conducted in analogue or healthy student samples, and have so far been inconclusive: Whereas correlational studies failed to show evidence for a relationship between symptoms of psychopathology and a generally enhanced belief bias (Smeets & de Jong, 2005; Vroling & de Jong, 2009, 2010), a study using an experimental fear induction paradigm showed that a generally enhanced belief bias was related to delayed extinction of conditioned fear (Vroling & de Jong, 2013).

In short, the present study was designed to test whether (i)

---

[2] Instead of actual names, 'person A' and 'person 1' are used as comparison categories. This was done because we cannot control the comparative value of actual names. Participants may or may not know a 'John' or a 'Jane', or they may know more than one 'John'.