

On the relation between irrationality and probability estimates in a game of chance

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Abstract

Based on Rational Emotive Behavior Therapy (REBT) we tested the hitherto unexplored assumption that irrationality as conceptualized by REBT (demandingness, self evaluation, low frustration tolerance), is associated with erroneous statistical reasoning. We assessed trait irrationality of 216 respondents and individual estimates of future winning probabilities in the context of the Wortman (1975) perceived control design. Results indicate that an increased (i.e., unrealistically optimistic) as well as a decreased (i.e., unrealistically pessimistic) estimation of future winnings is associated with irrationality. Findings substantiate an association between erroneous probability estimates and therapeutically relevant cognitions which do not imply any mathematical or statistical contents.

1. Introduction

According to the theory of Rational Emotive Behavior Therapy (REBT) by Albert Ellis (1962), the response to a certain event depends mainly on how this event is perceived and put in relation to an individual's belief system. Rational beliefs are proposed to lead to adaptive emotions while irrational beliefs should lead to maladaptive emotions. Empirical evidence indicates that there is, indeed, a connection between irrationality and maladaptive emotions, such as anxiety and depression (e.g., Spörrle & Försterling, 2007).

Irrationality as defined by REBT includes dimensions of absolutistic and demanding thoughts connecting personal achievements or failure with self-evaluation and low frustration tolerance. Neither in this theoretical definition nor in the scales measuring irrational thinking an association with statistical reasoning can be found even though, sometimes, the term irrationality is used in such fields of research (e.g., Gigerenzer, 2005).

This research aims at investigating a potential association between irrationality (as defined by REBT) and statistical reasoning given the fact that some aspects of irrationality contain illogical thinking which might be associated with erroneous probability estimations.

2. Method

Sample: A total of 216 participants with age ranging from 16 to 81 years ($M = 27.71$, $SD = 10.71$) took part in the study (47.2% men, 52.8% women). Among participants were 118 students, 50 employees, 20 self-employed persons, and 16 pupils, the rest had other forms of employment or did not provide an answer.

Participants were individually approached on the campus of the authors' university or in the authors' private settings. They received a candy bar as reward, student participants additionally received credit points for taking part in this study.

Procedure: Participants took part in an experimental study based on the classical Wortman (1975) paradigm in which they had to draw a marble with a 50% chance of winning. After having won or lost this game respondents should estimate their probability of winning when drawing a marble again. Before taking part in the game respondents filled out the Six Irrational Beliefs (6IRBS; Försterling & Bühner, 2003).

Literature

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- Spörrle, M., & Försterling, F. (2007). Which thoughts can kill a boxer? Naïve theories about cognitive and emotional antecedents of suicide. *Psychology and Psychotherapy: Theory, Research and Practice*, 80, 497-512.
- Spörrle, M., Welpe, I. M., Ringenber, I., & Försterling, F. (2008). Irrationale Kognitionen als Korrelate emotionaler Kompetenzen aus dem Kontext emotionaler Intelligenz und individueller Zufriedenheit am Arbeitsplatz. [Irrational cognitions as correlates of emotional competencies in the context of emotional intelligence and individual work satisfaction]. *Zeitschrift für Personalpsychologie*, 7(3), 113-128.
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Items of the 6IRBS

Figure 2. Item 1: Sometimes, events happen that are not only uncomfortable but that are catastrophic and awful. (including 90% confidence interval)

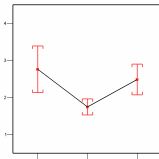


Figure 3. Item 2: I must do things that are important to me – perfectly. (including 90% confidence interval)

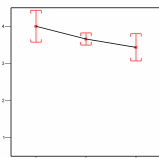


Figure 4. Item 3: I direly need the approval of others. (including 90% confidence interval)

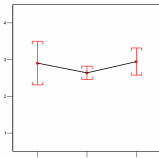


Figure 5. Item 4: I cannot stand frustration. (including 90% confidence interval)

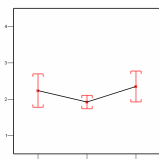


Figure 6. Item 5: After I did something wrong, I frequently think that I am a failure. (including 90% confidence interval)

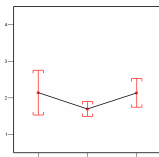
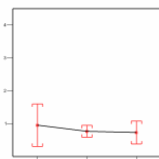


Figure 7. Item 6: There are some humans who are worthwhile and others that are worthless. (including 90% confidence interval)



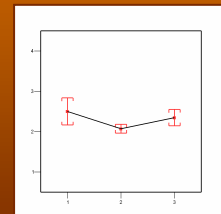
3. Results

As in previous research (e.g., $\alpha = .59$, Försterling & Bühner, 2003; $\alpha = .63$, Spörrle, Welpe, Ringenber, & Försterling, 2008) the 6IRBS did not reach satisfactory reliability (Cronbach's $\alpha = .59$).

Overall, $n = 21$ persons assumed a probability below 50% to win the next game (group 1), the majority of $n = 158$ participants (group 2) exactly gave a value of 50% and $n = 37$ assumed a probability higher than 50% (group 3).

Comparing the mean irrationality values between these groups resulted in a significant overall effect, $F(2, 213) = 3.71$, $p < .05$. Post hoc LSD tests indicated that on average irrationality of group 1 ($M = 2.50$, $SD = 0.89$) was significantly higher than irrationality in group 2 ($M = 2.07$, $SD = 0.83$, $p < .05$). Moreover, irrationality of group 3 ($M = 2.35$, $SD = 0.73$) was, on average, marginally significantly higher than irrationality in group 2, $p < .07$ (see Figure 1 for mean values of these three groups).

Figure 1. 6IRBS total score (including 90% confidence interval)



A visual inspection on single item levels indicates that this trend can be found for the majority of items (see Figure 2 to 7).

4. Discussion

Results provide a first and preliminary evidence that irrationality as conceptualized by REBT might be associated with unrealistic frequency estimates: People who over- or underestimate the probability of winning in a game of chance showed higher levels of irrationality.

Analysis based on single items indicate that this trend can be found for several irrationality dimensions (e.g., low frustration tolerance, self-evaluation), but might not exist for demandingness (see Item 2).

Future studies should replicate this finding by using more reliable scales in order to find out which aspects of irrationality are associated with erroneous probability-based statistical thinking.

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