Does analytical thinking protect people against unfounded beliefs? Cognitive reflection, proneness to paranormal explanation and astrology.

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Abstract

Analytic thinking style and willingness to engage in more effortful thinking overriding one´s intuition has been linked with diverse outcomes in everyday life, such as higher skepticism toward paranormal beliefs. In this paper, we attempt to verify and extend findings that less analytical thinkers, as well as more depressive people, are more likely to attribute supernatural causation to anomalous experiences. In an online survey, adult non-student participants (N =79) first read their individual personality profile allegedly based on their date of birth (in fact Barnum profile with the same vague description same for everyone) and then they rated how accurate it is and completed measures of cognitive reflection, proneness to anomalous experiences and depression scale from the Big5. We found that non-reflective thinkers were more likely than reflective thinkers to accept fake astrological profile as accurate, but contrary to our expectations it was not connected to their proneness to a paranormal explanation of anomalous experiences.

1 Introduction

The various unfounded beliefs are widespread in society and do not show any tendency to disappear. One such instance of popular belief is astrology – every fourth American (Newport & Strausberg, 2001) and 12.9 % of Slovak population (Čavojová & Jurkovič, 2017) indicates a strong belief in the ability of astrology to predict one´s future and personality.

Analytic cognitive style is one of the most established negative predictors of proneness to various epistemically suspect beliefs is (Pennycook, Fugelsang, & Koehler, 2015). People who rely less on analytical thinking and use more intuitive strategies for reasoning usually have more epistemically suspect beliefs, such as belief in paranormal phenomena, pseudoscience and conspiracy explanations, are more religious and more susceptible to various kind of bullshit (Čavojová, Secară, Jurkovič, & Šrol, 2018; Pennycook, Cheyne, Barr, Koehler, & Fugelsang, 2015). Analytic thinking is so important in rejecting unfounded beliefs because we are intuitive believers. Research has shown that believing is primary and automatically comes with understanding any statement; thus unbelieving something represents an effortful and deliberative process of rejecting some claim (Shermer, 2011).

Analytic cognitive style is also critical when one experiences an uncanny event that seemingly invites a supernatural explanation, as it is more intuitively compelling. In a controlled experimental study, Bouvet and Bonnefon (2015) showed that irrespective of their prior beliefs in the supernatural, non-reflective thinkers were more likely than reflective thinkers to accept supernatural causation after an uncanny encounter with astrology and extra-sensory perception (ESP). However, although they induced experience with two uncanny events, they did not control for general proneness to anomalous events and paranormal attribution or self-deceptive enhancement. It is necessary to establish, whether cognitive style explains paranormal attribution better than general proneness to anomalous experiences and paranormal attributions. Also, it has been shown that mildly depressed people have a more realistic view on themselves and are less prone to self-serving biases (Moore & Fresco, 2012) and that depression is associated with tendencies to paranormal beliefs (Sharps, Matthews, & Asten, 2006). Because Barnum profile used in Bouvet and Bonnefon´s (2015) is vague and self-flattering, it is possible that depression can moderate the willingness to accept this description as unique and precise. Therefore, in this paper, we attempt to verify and extend their finding by addressing these issues. We expect that higher cognitive reflection will be related to lower perceived accuracy of fake astrological profile rating and that the perceived accuracy will be also connected with proneness to a paranormal explanation of anomalous events. We controlled for self-deceptive enhancement by measuring participants´ level of depression.

2 Methods

2.1 Participants

The final sample consisted of 79 participants (12 men and 67 women, M_{age} = 31.75, SD = 8.5). Our target sample size was 70 (based on a power of .80 to detect a correlation of .30 at the .05 level). Participants were recruited online on social networks. No financial compensation was offered to participate, and sessions lasted between 10 and 15 min. At the end of the survey participants were asked what the purpose of the study was, and they were then thoroughly debriefed about the objectives and the methods.

2.2 Procedure and materials

We asked participants to indicate their age, gender and their experience with astrology (from 1 = "Sometimes I see a horoscope." to 4 = "I can make myself and others develop an astrological profile", 0= no experience; *M*=.67, *SD*=.59). Then they filled in their precise date of birth to calculate their unique personal astrology profile, which appeared together with their Zodiac sign. The personality profile was, in fact, *Barnum description of personality* used by Forer (1949), which consists of 12 vague and ambiguous descriptions. Participants were then asked to rate how precise this astrological profile was and indicate the reasons for their perceptions. Mean rating of perceived accuracy of the astrological profile (Barnum index) was 5.05 (*SD* = 1.32). Next, participants were asked to rate their agreement with three explanations of what just happened (1=strongly disagree – 7 = strongly agree): "it was coincidence, luck," "these statements may characterize many people, regardless of their date of birth," and "the result is proof that astrology works, that the position of stars and planets at the time of our birth affects how we are." The ratings of the first two explanations formed an index of randomness as an explanation (*M* = 5.13, *SD* = 1.35), and the rating of the third explanation served as an index of ESP as an explanation (*M*=3.41, *SD*=1.98). Finally, participants were asked whether what happened could be qualified as mysterious or understandable, strange or mundane, and troubling or ordinary (7-point scale, index of uncanniness, *M* = 5.19, *SD* = 1.49).

Cognitive reflection Task (CRT)

We used a modified version of the CRT (Frederick, 2005), which consisted of 7 problems, in which participants have to override their initial intuitive (and incorrect) response to come to the correct solution. Mean score for our sample was 4.38 (*SD* = 2.28).

The Survey of Anomalous Experience (SAE)

The SAE (Irwin, Dagnall, & Drinkwater, 2013) comprises of 20 items addressing anomalous experiences and participants have to indicate whether it has already happened to them and further clarify their position by stating whether they attributed this experience to paranormal process or to a specified non-paranormal process. Based on the answers, two scores were computed: proneness to anomalous experiences was the percentage of the "yes" answers (PAE, *M* = 42 %, *SD* = 16 %) and proneness to anomalous attribution was the percentage of supernatural attribution to these anomalous experiences (PAA, *M* = 10 %, *SD* = 16 %).

Big Five 2 (BFI2) – Slovak version – depression items

We used 4 items from BFI2 – Slovak version (Soto & John, 2017, Slovak translation by Halama, Kohút) measuring tendency to depression. Mean score for our sample was 2.66 (*SD* = 0.85).

After completing all measures, participants were thoroughly debriefed and informed about the actual aim of the study and thanked for participation.

3 Results

The results of the correlation are presented in Table 1.

	1.	2.	3.	4.	5.	6.	7.	8.
1. Barnum index								
2. experience with astrology	.240*							
3. index of randomness	-.234*	-.403**						
4. index of ESP	.149	.382**	-.558**					
5. index of uncanniness	-.151	-.116	.200	-.325**				
6. CRT	-.245*	-.238*	.211	-.383**	.103			
7. depression	.139	-.007	-.181	.101	.014	-.144		
8. PAE	.134	.051	-.030	.273*	-.082	-.072	.130	
9. PAA	.148	.181	-.238*	.464**	-.365**	-.080	.040	.516***

Tab. 1: Correlation between Barnum index, cognitive reflection (CRT) and proneness to anomalous experience (PAE) and to anomalous attribution (PAA)

We also performed hierarchical regression with Barnum index as the dependent variable, CRT was entered in the first step, depression in the second step and proneness to anomalous experiences and anomalous attribution in the third step. Only CRT emerged as significant predictor (β = -0.245, p = .029), explaining 4.8 % of all variance.

However, proneness to anomalous experiences and anomalous attribution or depression did not correlate with Barnum index and cognitive reflection.

4 Discussion and conclusion

The main finding of this study was that cognitive reflection predicted perceived accuracy of the fake astrological profile (Barnum index). This is consistent with results of Bouvet and Bonnefon (2015) and corroborates the hypothesis that reflective thinkers were able to override the temporary intuition that astrology might result in an accurate personality profile. Our participants viewed the fake astrological profile as pretty accurate (mean rating 5 out of a maximum of 7), but the more cognitively reflective the participant was, the less accurate he or she rated the profile. In other words, the high mean of Barnum index suggests that although people generally considered the Barnum statements as correct descriptors of their personality, only the reflective thinkers appeared to suppress that belief (probably because of their mistrust of astrology as a source). However, in contrast with Bouvet and Bonnefon´s study we did not measure participants´ prior beliefs about astrology, but prior experiences with astrology and proneness to anomalous experiences. Surprisingly, participants with more experience with astrology perceived the astrology profile as more accurate (Barnum index). On the other side, the experience of participants in astrology was not very intensive (87% admitted to the occasional reading

of the horoscope), which could explain why participants did not detect simplified fake astrology profile. Contrary to our expectations, neither proneness to anomalous experiences nor their attribution to supernatural phenomena correlated with perceived accuracy of the fake astrological profile (moreover, the more participants attributed the explanation to randomness, the less accurate they rated the profile). Similarly, depression was not connected to the perceived accuracy, probably because there were not many depressive participants in our sample.

Another possible explanation of our results could be that more cognitively reflective participants refuse astrology as a valid method of personality assessment, because they are less prone to have many unfounded beliefs (Pennycook, Cheyne, Seli, Koehler, & Fugelsang, 2012), thus they could be more suspicious toward the Barnum profile. We plan to address this possibility in future research by manipulating the way how the profile is "produced" to examine, whether cognitive reflection helps to suppress initial intuition about the accuracy of the profile or whether the mentioning of astrology serves as a cue for some people to reject a profile produced in this way and they would perceive the same profile as more accurate if produced by less "suspicious" method.

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