COGNITIVE REFLECTION AND SOCIALLY BIASED DECISIONS

Pier Luigi BALDI[2], Paola IANNELLO[2], Silvia RIVA[1,2], Alessandro ANTONIETTI[2]

[1] Institute of Communication and Health (ICH)
University of Italian Switzerland, Lugano, Switzerland

[2] Department of Psychology, Catholic University of the Sacred Heart
Largo Gemelli 1 - 20123 Milano, Italy
E-mail: paola.iannello@unicatt.it

Abstract: In some circumstances, the social visibility of a person we interact with can distort our evaluations and predictions by inducing people to overestimate the value of choices that included renowned individuals. Individuals who show a propensity for cognitive reflection have been shown to be less susceptible to biases in reasoning and decision-making, and therefore they should be less influenced by overestimation of choices that include renowned individuals. To test such a hypothesis, the Cognitive Reflection Test and a decision task that included a choice to interact with a renowned individual were administered. Results demonstrated that participants who had a greater ability to implement cognitive reflection were less influenced by celebrity status. Findings support the idea that cognitive reflection is associated with a reduction of decision-making bias associated with social status.

Key words: decision making, decision biases, social influence, cognitive reflection

INTRODUCTION

Dualistic models of decision making (Evans, 2008; Stanovich, West, 2000) propose a distinction between intuitive and analytical-rational systems. For the intuitive system, choices are made quickly, based on impressions and without the use of relevant cognitive resources. In contrast, the analytical-rational system involves systematic evaluation of available information. According to the so-called 'heuristics and biases programme' (Tversky, Kahneman, 1974), the intuitive system induces people to remain victims of biases unless their impressions are critically analysed using the analytical-rational system.

Although decision-making biases have generally been considered common errors that are likely to be equally distributed among the population, individual differences have been reported (Oreg, Bayazit, 2009). In economics, cognitive reflection, or the capacity to inhibit impulse responding and reflect, has been linked with improved performance in Bayesian reasoning and a lowering of decision-making biases (Sirota, Juanchich, 2011). A test that has particular resonance for the identification of individual differences in cognitive ability is the Cognitive Reflection Test (CRT) (Frederick, 2005), which assesses

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whether respondents activate an analysis process that leads them to correct their first, impulsive answer. CRT performance has been correlated with a preference for delayed rather than immediate rewards in inter-temporal-choice tasks (Frederick, 2005; Campitelli, Labollita, 2010). Relationships between low CRT scores and classic decision biases (e.g., conjunction, base-rate, and gambler's fallacies; framing, endowment, sunk cost, and anchoring effects; conservatism) have been reported (Bergman et al., 2010; Hoppe, Kusterer, 2011; Liberali et al., 2012; Oechssler, Roider, Schmitz, 2009; Stanovich, West, 2008; Toplak, West, Stanovich, 2011).

The study presented in this paper investigates whether cognitive reflection is associated with decision biases that depend on the influence of social status, a type of bias that has never previously been tested in terms of its relationship with the CRT. It is well known that referencing to elements of notoriety lead people to develop a positive attitude toward the options related to popular individuals (MacLeod, Campbell, 1992). Even though reasoning and decision making, when biased by social dynamics (such as conformity or obedience) and social judgment (such as misattribution, in-group vs. out-group distinction, false consensus or self-enhancement), are not always dysfunctional (Krueger, Funder, 2004), it is true that in some circumstances social visibility distorts evaluations and predictions by inducing people to overestimate the value of choices associated with renowned individuals. In some cases, trusting renowned individuals in matters where their talent is involved is adaptive, since renowned individuals might yield better outcomes than unknown individuals (Gigerenzer, Brighton, 2009). However, in matters where fame is not linked to expertise, trusting renowned individuals is unjustified since there is no reason to assume that they can achieve better results than common people do. The overestimation coming from notoriety does not conflict, as other biases do, with strict normative principles, since there are no logical laws according to which relying on renowned individuals outside the context of their professional experience is irrational. Rather, it is unwarranted that renowned individuals can be better in fields that have nothing to do with the grounds of their success. In this sense choices based on such an overestimation can be labelled as biased, since they derive from an a-critical attitude which leads individuals to extend the value of a renowned people to a broad range of situations and prevents them from considering what can actually be expected of them in a given field. According to dualistic models, decisions made by those who have a greater cognitive reflection ability should be less influenced by this bias since they should be less sensitive to the generalised reputation halo produced by fame.

METHODS

Materials

The Cognitive Reflection Test: The CRT consists of three problems where the first-impression answer is erroneous. Indeed, the correct answer can be found through a process of analysis that reconsiders one's first-impressions. Answers for the CRT were coded as '1' for a correct answer and '0' for an incorrect answer and a total score was calculated for the three problems. A higher value signals the subject's greater ability to resist impulsive responding. The CRT showed a moderate level of internal reliabil-

ity across the sample (Cronbach's Alpha = .68).

Decision-making task: Respondents read one of two stories where they had to decide whether they would take a trip in a sailboat. In the control version participants read the following story: *"You are at the beach under your umbrella and the person next to you has a sail boat. On a windy day he offers you a trip. Do you accept?"* while in the biased version participants read this story: *"You are at the beach under your umbrella and the person next to you has a sail boat. He is a well-known personality from a TV show. On a windy day, he offers you a trip. Do you accept?"* The introduction of the TV show personality as the captain in the biased version was designed to induce willingness to take the sailing trip (Jackson, Sullivan, Hodge, 1993).

Participants

168 undergraduate students (84 men, M age = 22.3; SD = 2.1) participated in the study. Participants from Arts, Humanities, Sociology and Philosophy courses were included, while students from Economics and Psychology were not included in the study to avoid the possibility that even basic knowledge of the topic could affect responding.

Procedure

All testing took place on a university campus. Students were asked if they would like to participate in an experiment. Students who agreed were randomly given one of two booklets with the decision-making task and then the CRT. There was no time limit, but most participants completed the two tasks in under 7 minutes.

RESULTS

Decision Bias

Response frequencies for the control and biased decision-making task were compared (Table 1). The biased version showed an increase in the frequency of the response "accept" compared with the control version.

Psychometric Properties of the Cognitive Reflection Test

Table 2 shows the mean and standard deviation of correct responses for each of the three items of the CRT and the total for the three items. Table 2 also includes both Pearson's r correlations between the three items as well correlations between the items and the total score.

Table 1. Frequency distribution of the responses given to the decision problem

Response	Version	
	Control	Biased
Not accept	35 (41.7 %)	27 (32.1%)
Accept	49 (58.3 %)	57 (67.9%)
Binomial test	p = .156	p < .001

Table 2. CRT: Means, standard deviations, inter-item and item-total score correlations

	M	SD	CRT-2	CRT-3	CRT-total
CRT-1	0.34	0.47	.313**	.335**	.631**
CRT-2	0.46	0.50		.580**	.746**
CRT-3	0.49	0.50			.757**
CRT-total	1.29	1.15			

* $p < .05$; ** $p < .01$

Relationships between the Cognitive Reflection Test and the Decision Task

Based on the total score to the CRT, participants were divided into two groups: those who achieved a high score (2 or 3 correct answers: high-CRT) and those who achieved a low score (0 or 1 correct answer: low-CRT). One participant was excluded from the analysis due to the impossibility to understand his response.

The frequency distributions of responses to the decision task in high-CRT and low-CRT participants are reported in Table 3. In the control version, the percentages of low- and high-CRT respondents who accepted the trip were not significantly different (test of comparison of proportions: $z = 0.30$). In the biased version, a lower percentage of high-CRT respondents than low-CRT respondents accepted the trip ($z = 4.01$, $p < .001$).

A logistic regression was completed to test both the main effects of a version (control vs. biased) and the CRT level and the interaction effect between these two variables. The model, whose results are reported in Table 4, includes, as predictors, CRT level (the total score, ranging between 0 and 3) and the type of version (dummy variable: control vs. biased). Results highlighted a significant association between CRT level and the responses in the decision task and be-

Table 3. Frequency distribution of the responses given to decision task (control and biased versions) according to the CRT level

Control version	Response	
	Not accept	Accept
Low-CRT	25 (56.8%)	19 (43.2%)
High-CRT	24 (60.0%)	16 (40.0%)
χ^2 (1; N = 84) = 0.09, p = .768		
Biased version	Response	
	Not accept	Accept
Low-CRT	5 (11.6%)	38 (88.4%)
High-CRT	21 (52.5%)	19 (47.5%)
χ^2 (1; N = 83) = 16.09, p < .001		

Table 4. Logistic regression of type of version (control vs. biased) and CRT level on the responses given to the decision task

Measure	B	Odds Ratio
Type of version	-1.605**	0.201
CRT score	-0.614*	0.541
Type of version*CRT score	0.428*	1.535

* $p < .05$; ** $p < .01$
Nagelkerke R2 .130
Chi-Square 17.2, df = 3, $p < .01$

tween control and biased versions and responses to the decision task. The CRT level by version type interaction was significant, suggesting that participants with a low score on CRT were more influenced by the well-known personality TV show person than participants reporting a high score on CRT.

DISCUSSION AND CONCLUSIONS

Results showed that responses to the decision task were affected by social connotation. In particular, the percentage of individuals who accepted the proposal to make a boat trip was higher for the biased version, in which the proponent was a renowned individual, than in the control version, in which the proponent was an anonymous neighbour. In both cases, careful assessment should prompt questions about the actual ability of the proponent to captain a sailboat (and possible negative consequences); however, such an approach was hindered if the proponent had high social visibility (Manis, Nelson, Shedler, 1988).

It is worth noting that neither the explicit meaning of the decision-making task nor its pragmatic implications – as well the wording of the phrases, which has been shown to be influential in the perception of the outcomes of choices (Jaunchich, Sirota, Butler, 2012) – suggested that the boat trip with the renowned guy might produce any benefit, that it will actually be better than a trip with a common neighbour. In addition, people usually develop both strong positive and negative affects toward TV personalities, so that there is no reason to expect that the trip with that popular person should be necessarily nice, since he might be found to be an unpleasant individual. Furthermore, if a renowned individual invites you to do a trip with him, this means that a sufficient level of familiarity has been established between you and him. Hence, making the trip would fail to add something more to the possible advantages (in terms of recommendations, job opportunities and so on) you can obtain from him, as well as to the envy or admiration that you can produce in your friends. Moreover, the story did not imply that other people might be involved in the trip, thus preventing participants to think that, by taking part in the trip, they might meet other famous persons. As a consequence, it is unlikely that the trip with the famous neighbour could produce any immediate or future advantage. The choice to do the trip should only depend on the overall impression produced by celebrity, which inhibit a critical approach towards possible negative aspects of that decision.

The Italian version of the CRT appeared to be adequate for the purposes of this study. In fact, the proportions of correct responses recorded for each problem, as well as the value of the total score, were within the range of those reported with non-Italian populations (Frederick, 2005; Oechssler, Roider, Schmitz, 2009). The problems correlated with each other significantly and in the expected direction, and the performance for each problem was highly correlated with the total CRT score.

Regarding the relationships between the tendency to respond impulsively and the susceptibility to socially biased decision making, it appears that participants who demonstrated the ability to implement cognitive reflection were less likely to be influenced by the notoriety bias. This study highlighted the fact that even decision-making biases with a social component can be connected to impulsivity. The overvaluation of the attractiveness of a trip in a sailboat offered by a renowned individual was markedly higher (by almost five times) among respondents who demonstrated low cognitive reflection. Cognitive reflection presumably allows individuals to overcome the constraints imposed by the mechanisms of social influence (such as those related to fame) by leading them to analyse deeply the features of the situation and making them aware of what it actually involves in terms of opportunities, benefits and risks independently of the halo associated with notoriety. As Kahneman (2011) suggested, decision biases, produced by the intuitive system, depend on the substitution of an objective attribute of the situation with a not-relevant attribute that comes to mind more quickly, with the analytical system failing to check the substitution. It is likely that in the case of the boat trip the renowned individual elicits positive attributes that are checked by reflective individuals, who become aware that fame does not imply any particular competence in captaining a sailboat.

The results confirmed and extended the argument that a lack of reflection plays a considerable role in individuals being more likely to experience biases in decision-making and supported the proposal of using the CRT to highlight individual cognitive differences in decision processes. Further research should be done to better understand the specific mechanisms underlying the influence of the link between celebrity status and cognitive reflection.

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KOGNITÍVNA REFLEXIA A SOCIÁLNE SKRESLENÉ ROZHODNUTIA

P. L. Baldi, P. Iannello, S. Riva, A. Antonietti

Súhrn: V niektorých prípadoch môže sociálna viditeľnosť osoby, s ktorou interagujeme, skresliť naše hodnotenia a predpovede tým, že ľudia preceňujú názory známych osobností. Jednotlivci, ktorí majú sklon ku kognitívnej reflexii boli menej náchylní k tendenčnému uvažovaniu a rozhodovaniu, a preto by ich malo preceňovanie názorov známych osobností menej ovplyvňovať. Túto hypotézu sme overovali pomocou Cognitive Reflection Test a rozhodovacej úlohy, v ktorej sa participanti o.i. rozhodovali, či budú interagovať so známou osobnosťou. Výsledky ukázali, že participant, ktorí vedeli lepšie využiť kognitívnu reflexiu, boli statusom známej osobnosti menej ovplyvnení. Výsledky podporujú názor, že kognitívna reflexia sa spája so znížením zaujatosti v rozhodovaní, ktorá sa spája so sociálnym statusom.