

EMOTION REACTIONS TO ECONOMIC PREDICTIONS AND ITS EFFECTS ON REASONING AND LOGICAL THINKING

Jerônimo Soro, Mário B. Ferreira, Karen Gouveia, & Joana Reis
Faculdade de Psicologia da Universidade de Lisboa (Portugal)

Abstract

The goal of the present work was to explore the possibility that emotions evoked by a threat of financial difficulties could be enough to affect logical reasoning particularly in problems related to financial issues. For this, we manipulated emotional priming via the presentation of excerpt texts from the Portuguese media news that favor either a pessimistic or an optimistic view about the country's economic future. Afterwards, participants judged the logical validity of several syllogisms that had neutral content ("All flowers need water; Roses are flowers; Roses need water"), negative financial ("All minimum wage workers have financial difficulties; Call-center workers are payed the minimum wage; Call-center workers have financial difficulties"), or negative non-financial content (All cancer treatments are painful; chemotherapy is a cancer treatment; chemotherapy is painful.). Furthermore, participants also expressed in a rating scale how confident they were in their responses to each syllogism. Our hypothesis was that negative emotions triggered by the pessimistic view about the future of the Portuguese economy would lead to more financial preoccupation and attention focus to financial issues, which would be translated in an advantage in logical reasoning in responding to syllogistic problems involving financial content. Preliminary results indicate that participants primed with pessimistic news about the economic future of Portugal (compared to participants primed with optimistic news) performed better in syllogistic problems of financial content but showed lower confidence in their responses. These results, particularly the dissociation between performance and subjective confidence, will be discussed in light of their contribution to the extant literature on the impact on judgment and reasoning of emotional distress caused by financial difficulties.

Keywords: *Reasoning, emotion, syllogism, decision-making, economic crisis.*

1. Introduction

As the result of the bailout loan in 2010, the Portuguese society was besieged by severe austerity (e.g., salary reduction and increased taxation) due to so-called punitive interest rates often justified as the consequence of years of collective overspending. We posit that the effects of such an intimidating social environment is that more and more people are mentally preoccupied with making ends meet, which triggers increased needs of self-regulation and snowballing adverse effects on subsequent self-control

More recently, the Portuguese economy has shown signs of recovery from this economic crisis (e.g., decrease in unemployment rates and loosening of the austerity measures). However, experts and opinion makers are divided as to how solid and stable this recovery really is. This divide is well captured by the media, with commentators presenting conflicting views concerning the country's economic future. There are those who convey the notion that the Portuguese economy is in the path of structural recovery, generating in consumers some relief and hope in the future; whereas other opinion makers find the current signs of recovery illusive (resulting mostly from European conjunctural factors) and argue that the Portuguese economy is on the verge of another crisis, potentially generating stress and preoccupation among consumers.

The present study was intended to explore how the consumer's emotions, reasoning and decision behavior are affected by these opposing views. Emotions were manipulated between-participants by priming participants with news from one of the two aforesaid current views about the future of Portuguese economy. As expected, emotional valence was positive after priming with encouraging news, and negative after priming with deleterious news about the state of the economy (a similar contrast was found when participants were primed with other positive and negative media news which content matter was unrelated to economical or financial issues). Participants then responded to several conditional

reasoning problems (syllogisms) which content matter was neutral or negative (with financial or non-financial contents (see the Method section for examples).

Based on previous research showing that a) negative emotions lead to more systematic processing and positive emotions lead to more heuristic processing (Bless, Bohner, Schwarz & Strack, 1990; Worth & Mackie, 1987; and b) the elicitation of strong emotions that match the content of the reasoning problems enhance performance (Blanchette & Campbell, 2012); we hypothesize that negative emotions that are relevant to the problem content would lead to better performance in that type of problem.

2. Method

2.1. Participants

The study had 118 subjects (66 women), with ages ranging between 18 and 52 years old ($M = 25.6$; $SD = 7.88$). Data was collected via online questionnaire.

2.2. Material

Twelve syllogisms were created with different contents: four with neutral content, 4 with negative non-financial content (e.g., content matter involved diseases) and 4 with negative financial content (content matter involved debts and interest rates). The syllogisms validity and credibility were manipulated orthogonally so that there were 4 configurations corresponding to each of the 4 syllogisms from each content. Syllogisms in which credibility and validity did not match (credible but not logically valid or not credible but logically valid) were considered conflict problems (as they present a conflict between the logical deduction and the credibility of the conclusion) and the remaining were considered non-conflict problems (as the logical validity and credibility of the conclusion converge; see Table 1).

2.3. Design

The study had a $4 \times 3 \times 2 \times 2$ experimental design, with Emotional priming (emotional financial positive, $N = 26$; emotional financial negative, $N = 37$; emotional non-financial positive, $N = 28$; emotional non-financial negative, $N = 28$) as a between-participants factor and syllogism contents (neutral, non-financial, financial), syllogism credibility (credible, not credible), syllogism validity (valid, not valid) as within-participants factor.

2.4. Procedure

Participants were invited to participate in two separate studies. In the first study, they would be asked to respond to a pre-test of items to be included in a questionnaire concerning people's perception of the present state of the national economy (the emotional priming task). In the second study, they would be requested to respond to a series of conditional reasoning problems or syllogisms (the reasoning task).

The priming task was inspired in priming manipulations developed by Salancik (1974; Salancik & Conway, 1975), and consisted in presenting to participants 6 pairs of paragraphs (each accompanied by a related image to reinforce the emotional response) describing the Portuguese economic context; or 6 pairs of paragraphs with brief news unrelated to economic or financial issues (e.g., sports). Additionally, the 6 pairs of descriptions could be either positive or negative in valence. For each pair, participants were asked to choose the one they considered more relevant and striking. After evaluating the six pairs of paragraphs, participants expressed the emotions induced by the priming task indicating in a seven points rating scale ("1-did not feel..." to "7-felt totally") how intensely did they feel each of 19 emotions.

Following the priming task, participants responded to the reasoning task where they were asked to indicate, for each presented syllogism, whether the conclusions followed logically from the premises or not and how confident they were in their answer in a scale from "1-not confident at all" to "7-completely confident"). After responding to the 12 syllogisms, participants were debriefed and thanked for their participation.

Table 1. Examples of the 4 configurations of problems with neutral content

Content		Valid	Not valid
Credible	Neutral	(Non-conflict) All flowers need water. All roses are flowers. Hence, all roses need water.	(Conflict) All fruits have vitamins Oranges have vitamins. Hence, oranges are fruits.
	Negative Non- Financial	All cancer treatments are painful. Chemotherapy is a cancer treatment. Hence, chemotherapy is a painful treatment.	All contagious diseases are serious. AIDS is a serious disease. Hence, AIDS is a contagious disease.
	Financial	All minimum wage workers have financial difficulties. Call-center workers are payed the minimum wage. Hence, call-center workers have financial difficulties.	All financial products have bank fees. Credit cards have fees. Hence, credit cards are financial products.
Not credible	Neutral	(Conflict) All animals have eyes. Viruses are animals. Hence, viruses have eyes.	(Non-conflict) All birds have wings. Dogs have wings. Hence, all dogs are birds.
	Negative Non- Financial	All criminals cause suffering to their victims. Psychotherapists are criminals. Hence, psychotherapists cause suffering to their victims.	All infectious diseases cause many deaths. Gastritis cause many deaths. Hence, gastritis is an infectious disease.
	Financial	All government companies charge fees. NGOs are government companies. Hence, NGOs charge fees.	All motor vehicles are taxed. Bicycles pay taxes. Hence, bicycles are motor vehicles.

3. Results

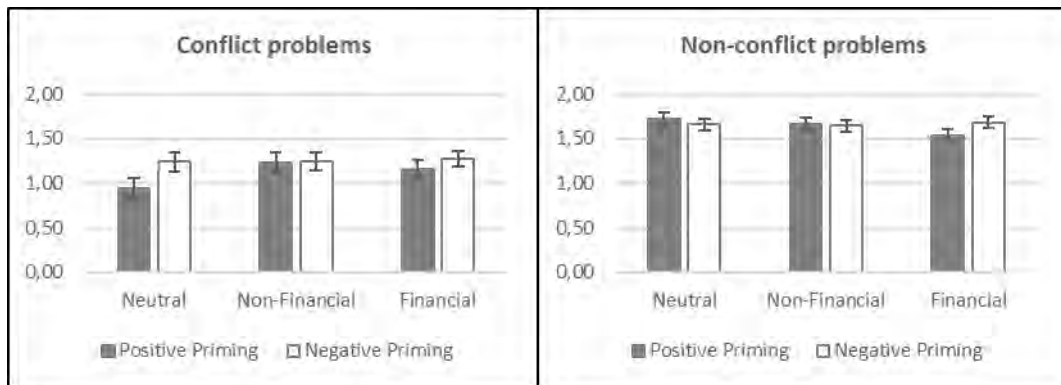
3.1. Manipulation check

Responses to the 19 emotions were aggregated into positive and negative emotions and included in a 2 X 2 X 2 ANOVA with Emotion Valence (positive, negative) as a within-participants factor, Priming Valence (positive, negative) and Content (financial, non-financial) as between-participants factors. There was only a significant interaction between Emotion Valence and Priming Valence $F(2, 228) = 104.54, p < .001, \eta_p^2 = .48$, showing the expected pattern of stronger negative emotions than positive emotions after negative valence priming when compared to positive valence priming. This indicates that the priming manipulation elicited the desired emotions in participants.

3.2. Accuracy in syllogisms

Accuracy was analyzed in a 2 X 2 X 3 X 2 ANOVA with Priming Valence (positive, negative) and Priming Content (financial, non-financial) as between-participants factors and Syllogism Content (neutral, non-financial, financial) and syllogism Type (conflict, non-conflict) as within-participants factors. There was only a significant main effect for syllogism Type, $F(1, 115) = 77.64, p < .001, \eta_p^2 = .40$, indicating, as expected, more correct responses for non-conflict problems than for conflict problems. There was an interaction between Syllogism Content and syllogism Type, $F(2, 230) = 4.07, p = .018, \eta_p^2 = .03$, indicating that conflict problems with neutral content led to lower accuracy ($M = 1.09, SE = 0.08$) than both non-financial ($M = 1.24, SE = 0.07$) and financial content problems ($M = 1.22, SE = 0.07$), $F(1, 115) = 5.22, p = .024, \eta_p^2 = .04$, while in non-conflict problems accuracy for neutral content ($M = 1.69, SE = 0.05$) was not significantly different from accuracy for both non-financial ($M = 1.66, SE = 0.05$) and financial content problems ($M = 1.61, SE = 0.05$), $F(1, 115) = 1.81, p = .181, \eta_p^2 = .01$. This interaction was qualified by a second order interaction between Syllogism Content, Syllogism Type and Priming Valence, $F(2, 230) = 3.58, p = .029, \eta_p^2 = .03$, showing that the previous pattern of lower accuracy for conflict neutral problems is observed only after positive valence priming and not after negative valence priming. This is confirmed by a significant difference in accuracy between problems with neutral content ($M = 0.94, SE = 0.12$) and problems with both financial ($M = 1.16, SE = .10$) and non-financial content ($M = 1.24, SE = .10$), $F(1, 115) = 8.74, p = .004, \eta_p^2 = .07$, after positive priming but not after negative priming, $F < 1$ (Figure 1).

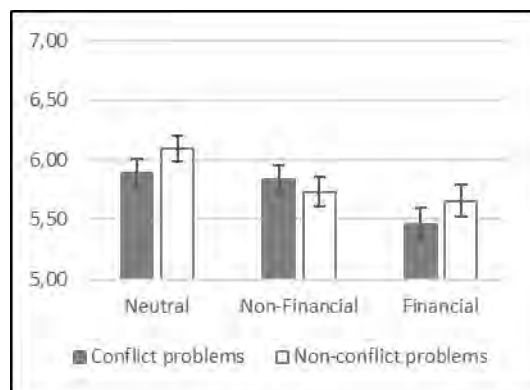
Figure 1. Accuracy means for conflict and non-conflict syllogism problems with different contents under positive and negative priming valences.



3.3. Confidence in responses to syllogisms

The same 2 X 2 X 3 X 2 ANOVA was performed on participants' confidence estimates. There was a significant main effect of syllogism Content, $F(2, 230) = 18.27, p < .001, \eta_p^2 = .14$. Planned comparisons indicated that confidence for problems with neutral content ($M = 5.99, SE = .11$) was higher than for both financial and non-financial contents, $F(1, 115) = 28.15, p < .001, \eta_p^2 = .20$, while confidence for problems with non-financial content ($M = 5.78, SE = .11$) was higher than problems with financial content ($M = 5.56, SE = .13, F(1, 115) = 9.22, p = .003, \eta_p^2 = .07$). There was also a syllogism Content x syllogism Type interaction, $F(2, 230) = 3.45, p = .033, \eta_p^2 = .03$. Confidence between problems with neutral content in a conflict version ($M = 5.89, SE = .12$) and non-conflict version ($M = 6.10, SE = .11$) were significantly different, $F(1, 115) = 5.78, p = .018, \eta_p^2 = .05$, as was confidence between problems with financial content in a conflict version ($M = 5.46, SE = .14$) and in a non-conflict version ($M = 5.66, SE = .14, F(1, 115) = 3.72, p = .056, \eta_p^2 = .03$). However, confidence in problems with non-financial content showed no significant difference between conflict ($M = 5.83, SE = .12$) and non-conflict versions ($M = 5.73, SE = .12, F(1, 115) = 1.30, p = .257, \eta_p^2 = .01$) (Figure 2).

Figure 2. Confidence means for conflict and non-conflict syllogism problems with different contents.



4. Discussion

Taken together these results suggest that positive priming leads to worse performance in neutral problems. In contrast, negative priming (financial or non-financial) and/or responding to negative valence problems (regardless of the financial or non-financial content of these problems) seems to be enough to enhance decision behavior in logic deductive tasks such as syllogism that present a conflict between logic validity and credibility. These results are in line with the argument that negative emotions lead to a more analytical processing whereas positive emotions lead to more heuristic processing (Worth & Mackie, 1987). The effect of emotion appropriateness found in Blanchette and Campbell (2012) was not replicated. That is, negative financial priming (compared with positive financial priming) enhanced accuracy for all conflict problems and not specifically for problems with financial content.

Interestingly, syllogisms content seems to have had somewhat opposite effects on accuracy and confidence in the case of conflict problems. When compared to neutral content, negative (financial and non-financial) content improved performance but led to a decrease in confidence (particularly in the case

of financial content). Such pattern of results suggests that financial related negative content enhanced attention and recruited participants' cognitive resources to more carefully deliberate and respond to logical reasoning problems. However, such content may also have increased subjective uncertainty and hesitation translated into lower confidence levels on participants' own answers.

Such increase in deliberation and decrease in subjective confidence might signal the beginning of a response to a potentially emotionally stressful context of economic difficulties. Had this context been maintained and the mental (and physical) weariness brought about by long-term deliberation efforts and preoccupation could have increased levels of stress and deteriorate performance (Lund et al., 2010). In fact, recent research has shown that cognitive impairment can be the product of long-term financial preoccupations of making ends meet (e.g., Mani, Mullainathan, Shafir & Zhao, 2013). In the short term, however, priming negative scenarios of economic difficulties seems to have boost logical decision-making. An interesting venue for future research would be to show both effects in the same task. In other words, to show that priming participants with scenarios of economic difficulties triggers a stress related response that improves logical reasoning in the short run but impairs it in the long run.

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