Protected by uncertainty: an experimental investigation of the effects of uncertainty of negative outcomes on regret of actions vs. inactions

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***Abstract*:** The present study focuses on the potential relationships between the uncertainty concerning the negative consequences of past decisions that come to be regretted and the current intensity of regret regarding these decisions, as well as to the perceived personal responsibility in determining those consequences. We also analyzed these relationships in the framework of the dichotomy opposing actions and inactions, which has been indicated by past research as relevant for the experience of regret. We conducted an experiment (N=300) in which participants were required to recall a decision from their past that they regret; the type of decision, i.e., action vs. inaction was manipulated, and we measured the perceived foreseeability or certainty of the negative consequences brought by the respective decision, the personal responsibility for the negative outcomes, and the intensity of regret. We expected uncertainty of consequences to be associated with lower responsibility and regret, which would highlight its role as a potential rationalization of past mistakes, by being invoked as a justification that would diminish one's responsibility for that decision. Past research also suggests that inactions have a higher degree of perceived uncertainty concerning the consequences of one's decisions than actions. Hence, we expected that the inactions recalled by our participants would be characterized by a higher uncertainty than actions, and that difference would further generate a lower personal responsibility and regret in the case of inactions. Results show that the uncertainty of the negative consequences of the regretted decisions is associated to lower personal responsibility for their occurrence, but only in the case of inactions. This suggests a psychological strategy of diminishing personal responsibility and thus rationalizing inactions with less foreseeable effects. No difference between recalled actions and inactions emerged in the uncertainty of their consequences, personal responsibility and regret intensity.

***Keywords*:** Regret, Uncertainty, Personal responsibility, Actions, Inactions

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Introduction

Regret is a negative emotion that appears when an individual realizes that he would have had better results than those he obtained, if only he had acted differently (Zeelenberg & Pieters, 2007). Regret is defined by dint of two elements: a negative emotional state and a counterfactual conclusion drawing on self-blame, surging from certain decisions that, in hindsight, are deemed as bad, complemented by the one's responsibility in the decision-making process. While past research highlighted several factors that influence the intensity of this emotion, such as the degree of one's responsibility, the magnitude of loss, the direction of the counterfactual thoughts about the event, etc., the present study focuses on the potential role of the uncertainty regarding the actual outcome of the choice made by the individual at the time of the decision making in diminishing his later regret.

Several studies highlight the role of responsibility in generating regret, by showing that the more one feels personally responsible for the negative outcome, the more likely they are to experience an intense regret (e.g., Frijda et al., 1989; Gilovich & Medvec, 1994). Responsibility aside, the intensity of regret is also influenced by the magnitude of loss. Studies (Wrosch et al 2005; Tycocinski, 2001) have shown that the dimension of the missed opportunity induce a more intense feeling of regret in the individual. The most regretted situations are the ones involving opportunities, which, having been taken, would have brought the individual great benefits. The result of the study conducted by Tycocinski (2001) indicated that those participants who suffered a greater loss felt regret more intensely, for instance those losing a dinner for two felt more regret than those losing a CD.

Some researchers (Towers et al., 2016; Byrne & McEleney, 2000; Kahneman & Miller 1986; Avni-Babad, 2003) assert that, at least in the short run, people tend to regret more their actions than their inactions. One explanation is that actions draw known-palpable consequences whereas inactions entail an infinite array of possible consequences dependent on one's imagination span. Actions allow us to act differently upon a situation or event, options no longer viable when inactions are involved. Following this line of thought, actions are more likely to breed counterfactual thinking regarding the possible ways of acting upon a situation (Kahneman, 1995), as suggested by studies showing that people are more inclined to envision alternatives for actions rather than for inactions (Kahneman & Tversky, 1982) and events triggered by them (Girotto et all, 1991). In other words, actions are easier to undo (it is easier to dismiss or to reshape presumptive motives) through counterfactual thinking rather than inactions.

Relatedly, the consequences of inactions are more difficult to represent than those of actions. For instance, Beyth-Marom and collegues (1993) showed

that negative results associated with actions are far easier to predict than the same type of results triggered by inactions. The participants were asked to consider a couple of decisions implying high risks and to generate as many possible consequences as they could. The researchers concluded that the participants came up with more consequences related to accepting risk and less consequences in that of dismissing risk. This suggests that people find it more difficult to anticipate the negative results of inactions than those of actions.

Uncertainty and Regret

While the freedom of changing one's decision depends on the permanent or flexible nature of one`s choices, uncertainty represents a property of external events: we frequently face decisions in which we cannot be certain about the outcomes of each of the alternative courses of actions. We hope we make the best decision, but the actual quality of the option we choose depends on external factors, and is to be revealed at a later stage (Sullivan et al., 2007). This uncertainty involved in the decision-making process concerns the outcomes of the chosen alternative. But in the case of irreversible decisions which have generated negative consequences, this initial uncertainty may also be influential in the intensity of regret that the individual feels about his decision.

Past research suggests that certain negative events generate less intense negative emotions than those that are still uncertain. In uncertainty-free circumstances, people seek to change their perspective and focus on the positive side of the situation; conversely, uncertainty undercuts this process. For instance, people who found out that they have a severe genetic defect felt less distress than those who received an inconclusive diagnosis (Wiggins, 1992). Thus, people are only good at handling sealed and irrevocable situations, as these situations trigger the rationalizing psychological mechanisms that make up the so called "emotional immune system" (Wilson & Gilbert, 2005). An important observation is that the effect of uncertainty regarding future events has only been explored with reference to external events determined by factors over which the individual has no influence (such as a medical diagnosis). The influence of uncertainty on emotions triggered by events for which the individual is responsible is a topic open to further research. In this case, taking into account that these events represent the results (more or less certain) of an individual's own decisions, the most common emotion generated is regret.

The main hypothesis of the present study is that the effect of uncertainty in this type of situations, i.e., when dealing with decisions that brought negative consequences, is opposite to that found in situations where the individual confronts external events, where it amplifies one's negative emotions. Specifically, we presume that the choices in which the individual is more uncertain about the actual outcomes of the option that he selected generate less

regret than those involving clearly foreseeable consequences. The reasoning behind this expectation is that when confronted with the negative outcomes of his decision, the individual can invoke the uncertainty at the time of the decision making as a justification that would alleviate his responsibility for his erroneous choice. This, in turn, would diminish the intensity of regret concerning that decision.

We also expect this role of uncertainty in rationalizing past mistakes to be more specific for inactions than actions. As mentioned above, the outcomes of inactions are harder to imagine and anticipate than those of actions. This implies a higher degree of perceived uncertainty concerning the consequences of one's decisions when the chosen alternative is an inaction than when it involves acting. Moreover, inactions with negative effects that were unclear at the time of the decision making are probably more frequent in our lives than similar actions. In this respect, Gilovich and Medvec (1994) suggested that because people are more likely to anticipate the bad consequences of their actions than of their inactions, the wrong actions that might trigger regret are more susceptible to being censored. Conversely, the inactions that come to be regretted later more frequently had involved uncertain consequences. If indeed people use their perceived uncertainty at the time of the decision making to diminish their regrets, this difference in uncertainty between inactions and actions would contribute to the understanding of the aforementioned finding that people feel less regret about their past inactions compared to actions.

The present study entailed the experimental manipulation of the type of regretted decision evoked by participants (i.e., action vs. inaction), followed by the assessment of the factors that might influence the intensity of their regret, namely the degree of uncertainty of the outcomes of their choice at that time, the magnitude of loss that the decision generated, and their perceived responsibility. We expected uncertainty to be associated with lower responsibility and regret, which would highlight its role as a potential justification and rationalization of past mistakes. Moreover, we expected inactions to involve a higher degree of uncertainty than inactions, which would be further associated with a lower personal responsibility in determining the negative outcome, and furthermore with lower regret.

Method

Participants and procedure

Three hundred residents of a city in the north-eastern side of Romania (i.e., Botoșani) aged 16 to 62 (see Table 1), 63% males participated in our research. The convenience sample included both high school students (N=188) aged 16 to 19, and high school graduates (N=112), aged 19 to 62. The second author recruited

participants using the snowball sampling technique. All participants gave their informed consent. At the time of the recruitment, they were informed that they can retire from the study at any time and that all the data they would provide in the research will remain anonymous and confidential. All ethical requirements concerning research of the faculty where the authors are affiliated were respected. The average time for filling in the research questionnaire was 10 minutes.

Design and measures

Regret manipulation. The type of regret (i.e., concerning an action vs. an inaction) was the between-subjects factor of our experiment (N=153 in the action condition and N=147 in the inaction condition). We used an adapted version of the instructions used by Bonnefon and Zhang (2008) and Feldman and collegues (1999) to elicit the two types of regret. Specifically, participants were instructed to "*think for a few moments about a regret that you have regarding a decision you made in the past, which involved (in the action condition) doing something (for instance buying stocks that later lost their value) / (in the inaction condition) not doing something, missing an opportunity when you had the chance (for instance not buying stocks that later increased their value)*".

Next, participants were instructed to focus on the events they recalled, through the following instructions adapted from Sanna and Turley-Ames (2000): "*Now think about that event; try to remember it as clear as possible and imagine that you are placed again in the situation when you made the decision. Please describe the event in a few rows; if the situation is too intimate it's not necessary to go into details*".

After describing the event, participants filled in the following measures concerning its characteristics:

The *magnitude of loss* brought by the regretted decision was measured through an item adapted from Bonnefon and Zhang (2008), i.e., "How severe were the consequences of doing that action?" (for regretted actions) / "How severe were the consequences of missing that opportunity?" (for regretted inactions), on a 7-point scale from 1 (not at all) to 7 (extremely severe).

The *personal responsibility for the loss* brought by the regretted decision was addressed by an item, i.e., "To what degree do you consider yourself responsible for those negative consequences?", on a 7-point scale from 1 (not at all) to 7 (very responsible).

The *temporal distance from the event* was addressed by an item, e.g., "*How much time ago did the event take place? Please write down the approximate number of days, months and/or years*".

Uncertainty concerning the consequences of the regretted decision was measured through an item, e.g., "*How able were you to anticipate the negative effects of the decision at that time? How certain were they at that moment?*".

Participants answered on an 11-point scale from 0 (not at all certain, I had no idea about what would happen as a result) to 11 (perfectly clear, I knew exactly what was going to happen). Higher scores indicate lower uncertainty about the consequences of the regretted decision.

The *intensity of regret* was measured through an item, e.g., "*How much regret do you feel about that decision?*", on a 7-point Likert scale from 1 (weak regret) to 7 (extremely intense regret).

At the end of the questionnaire participants also indicated their age and gender.

Results

The descriptive statistics and the Pearson correlations between the variables of the study are presented in Table 1. All the data provided by participants to the item addressing the temporal distance from the regretted event was transformed into months.

Table 1. Means, standard deviations and correlations between variables

	M*(SD)*	(2)	(3)	(4)	(5)	(6)	(7)[a]
1. Regret intensity	5.18 (1.81)	.35**	.04	.65**	.08	.08	.12*
2. Responsibility	4.45 (1.55)		.12*	.37**	.01	.05	.10
3. Certainty	4.28 (3.15)			.10	-.06	-.03	-.09
4. Magnitude of loss	4.29 (1.81)				.05	.13*	.03
5. Temporal distance	61.72 (86.65)					.66**	.06
6. Age	25.26 (11.76)						.02
7. Gender	37% females						

Note: * $p < 0.05$; ** $p < 0.01$; [a] point biserial correlation was used for estimating the relationship between gender and the other variables

As Table 1 indicates, the intensity of regret about the decision evoked was positively associated to the degree of responsibility that participants attribute to themselves for generating the respective negative consequences, and to the magnitude of loss provoked by the decision. Females emerged as having higher levels of regret compared to males, but the relationship between regret intensity and uncertainty was found to be nonsignificant. Yet, a significant positive association between certainty and responsibility emerged, suggesting that the decisions provoking consequences that were more uncertain at that time are

perceived by the individual as involving less personal responsibility for these negative effects. Moreover, responsibility was found to be positively related to regret intensity. Older participants recalled more temporally distant decisions than their younger counterparts, as well as decisions that generated more severe losses.

Next, we analyzed the effects of our experimental manipulation by comparing the two conditions (e.g., regretted actions vs. inactions) on the degree of perceived uncertainty of these recalled decisions. We performed an analysis of covariance (ANCOVA) to this aim, while controlling for the effects of age, gender and temporal distance on uncertainty. We found no significant difference between the two conditions, $F(1,295) = 2.89$, $p = .09$, suggesting that the uncertainty of the consequences of the regretted decision does not vary between participants who recalled actions ($M = 4.01$, $SD = 3.08$) and inactions ($M = 4.56$, $SD = 3.21$). Thus, our hypothesis that inactions would involve a higher uncertainty of their negative consequences than actions was not supported.

In order to deepen our examination regarding the specificity of the relationships between uncertainty and the other parameters of regret in each of the two types of decisions, we analyzed separately in the action and the inaction condition the partial correlations between certainty, regret intensity, and personal responsibility while controlling for the other factors that we measured, namely temporal distance to the event, magnitude of loss, gender and age.

Table 2. Partial correlations between certainty, regret intensity, and personal responsibility in each of the two experimental conditions

	Regretted actions		Regretted actions	
	(2)	(3)	(2)	(3)
1. Certainty	.03	.02	-.08	.16†
2. Regret intensity		.16†		.15†
3. Personal responsibility				

Note: † $p < .08$; The controlled variables are temporal distance to the event, magnitude of loss, gender and age

As Table 2 indicates, we found that the relationship between certainty and responsibility (previously emerged in the overall sample) is (marginally) significant only in the experimental condition of regretted inactions. Furthermore, the positive association between personal responsibility and regret intensity was found, albeit marginally significant, in both experimental conditions, while no significant correlation between certainty and regret intensity emerged.

The pattern of results relevant for our main hypothesis mainly disconfirm our expectations, in that uncertainty was not found to differ according to our experimental manipulation, and the only relationship of uncertainty to regret that emerged as significant was its association to personal responsibility, but only in the case of regretted inactions. In order to deepen our analyses, we explored the

effects of our manipulation separating actions from inactions on the other parameters of regret that we measured, specifically magnitude of loss, personal responsibility and regret intensity.

First, the analysis of covariance comparing the two experimental conditions while controlling personal responsibility, certainty, temporal distance to the event, age and gender showed no difference between actions and inactions in what concerns the severity of losses that these decisions had provoked, $F(1,293) = 2.01$, $p = .16$ (intensity of regret was not included in the set of controlled variables as this emotional reaction emerges further on the causal chain of regret, as a consequence of the magnitude of loss). Similarly, the comparison on personal responsibility controlling for the variability in the magnitude of loss the regretted decisions generated, personal responsibility, certainty, temporal distance to the event, age and gender also revealed no significant difference between actions and inactions, $F(1,293) = 1.23$, $p = .27$. Finally, the two types of regretted decisions did not emerge as significantly different in the intensity of regret that they provoke, $F(1,292) = .23$, $p = .63$ when controlling for personal responsibility, magnitude of loss, certainty, temporal distance to the event, age and gender.

Discussions

Our study focused on regret determined by past decisions, and explored a possible influence of uncertainty at the moment of decision-making on the intensity of regret that they generate in the present. Theoretical arguments and past empirical findings suggest that the intensity of certain negative emotions varies according to the certain or uncertain character of the events that instill them (Wiggins, 1992; Wilson & Gilbert, 2005). Our assumption was that uncertainty has a similar effect on the intensity of regret, in that past decisions with consequences unclear at that time would provoke less regret that those with more foreseeable consequences. Furthermore, we presumed that this difference would be due to the lower personal responsibility that the individual perceives regarding his decisions with uncertain negative effects.

The pattern of results provides only partial support for these hypotheses, as uncertainty of the consequences of the regretted decisions emerged as significantly associated only to personal responsibility, but not to regret intensity, and only when the decision involved an inaction. This suggests that uncertainty may allow a way to rationalize one's past omissions to act, which does not appear in the case of actions. While for inactions people may blame the unforeseeable nature of the negative effects of their decision and thus attribute less responsibility onto themselves, they are less inclined to use this uncertainty as a justification for their regretted actions.

This difference in the role of uncertainty between the two types of decisions might stem, on the one side, from the fact that it's easier for people to imagine other decisions that they could have taken at that moment, i.e., counterfactual alternatives, in the case of regretted actions in comparison to inactions (Beyth-Marom et al., 1993). Counterfactual thinking entails the mental projection of the alternatives inferable from a situation, described through the patterns such as "only if", "at least I could have…" or "if X then Y". As wrong actions are clearly situated in time, they are more prone to generate ascending counterfactual thoughts, which represent better alternatives to the present situation and consequently intensify one's negative emotions, including regret (Smallman & Roese, 2005; Sanna & Ames, 2000). Moreover, this difference between actions and inactions in terms of counterfactual thinking propensity also implies that it's more likely that the individual would imagine ways in which he would anticipate the consequences of the regretted action, for instance by searching for relevant information on that matter or delaying his decisions for a moment where they could be more foreseeable. Consequently, the uncertainty at the time of the decision becomes less suitable as a justification that would diminish his responsibility for that mistake.

A complementary explanation for the different associations between uncertainty and personal responsibility between the two types of decision might be the one that wrong actions are frequently rationalized through specific cognitive mechanisms, such as denial of responsibility, second thoughts, reassessment of the quality of alternatives (Festinger, 1964; Zeelenberg & Pieters, 2007; Gilovich & Medvec, 1994). Most of these strategies are more applicable to actions than inactions, which suggests that people are more accustomed to use them for this type of decisions, while the unforeseeable nature of negative consequences might represent an alternative strategy more specific, and thus more psychologically effective, for suppressing personal responsibility in the case of inactions.

Yet, the effect of uncertainty on personal responsibility in the case of inactions was not followed in our results by a similar influence of the former on the intensity of regret. This may indicate that the relationships of uncertainty to the psychological dynamics of regret is too weak to determine noticeable variations in the actual experience of this emotion. Alternatively, there may have been other factors that our study did not account for that may have generated significant differences between participants in their intensity of regret, which may have suppressed the size of the effect of uncertainty on this emotional measure.

Our expectation about the differences in the uncertainty of the negative consequences between regretted actions and inactions was not supported. The inactions recalled by our participants were not perceived as having less foreseeable negative consequences than the regretted actions. This suggests that

although uncertainty may serve as a justification for diminishing one's personal responsibility for regretted inactions, people do not spontaneously recall inactions with less foreseeable effects than actions, at least when required to freely select a regretted decision from their past.

Furthermore, no significant variations between the two types of decisions emerged in what regards the other parameters of regret, i.e., the magnitude of loss that they provoked, the degree of personal responsibility for this loss or the intensity of regret, contrarily to past findings that indicate inactions to trigger a more intense regret that actions, at least in the long run (Gilovich & Medvec, 1994). Conversely, the relationships indicated by our results between these parameters were in line with previous investigations, as they suggested that decisions that generated more severe losses and for which the individual holds himself more responsible instill more intense regrets (Frijda et al., 1989; Wrosch et al., 2005; Tycocinski, 2001).

There are several limits of this study that should be noted, besides the one mentioned above, concerning the lack of control of other factors that may have influenced participants' experience of regret. The experimental manipulation only directed participants towards recalling actions or inactions, with no supplementary control over the content, existential domain or other characteristic of the event to be recalled, which may have been significant parameters of uncertainty and regret. For instance, past research indicated specificities in people's strategy of rationalization according to the existential domain in which they are applied (e.g., Holman & Popușoi, 2018). Also, the role of uncertainty of the negative consequences of the regretted decision in rationalizing inactions by diminishing personal responsibility was not attested by an experimental manipulation of uncertainty. Further investigations should provide such an experimental test of this potential role of uncertainty, by instructing participants to focus on past decisions with specific degrees of foreseeability of their negative effects. Moreover, we did not measure other negative emotions that the recalled decisions may have instilled, such as guilt, disappointment or shame, and which could have influenced the pattern of relationships between the variables in our study. Future studies could delineate the specific associations of uncertainty to each of these distinct negative emotions.

To conclude, we found that in the case of regretted inactions the uncertainty of the negative consequences of these decisions is associated to lower personal responsibility for their occurrence, which suggests a psychological strategy of diminishing personal responsibility and thus rationalizing inactions with less foreseeable effects. This strategy of self-justification emerged as specific to inactions, complementing past findings concerning the differences between actions and inactions in terms of the various facets of regret.

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