

# Regret, Choice, and Outcome

Olimpia Matarazzo, and Lucia Abbamonte

**Abstract**—In two studies we challenged the well consolidated position in regret literature according to which the necessary condition for the emergence of regret is a bad outcome ensuing from free decisions. Without free choice, and, consequently, personal responsibility, other emotions, such as disappointment, but not regret, are supposed to be elicited. In our opinion, a main source of regret is being obliged by circumstance out of our control to chose an undesired option. We tested the hypothesis that regret resulting from a forced choice is more intense than regret derived from a free choice and that the outcome affects the latter, not the former. Besides, we investigated whether two other variables – the perception of the level of freedom of the choice and the choice justifiability – mediated the relationships between choice and regret, as well as the other four emotions we examined: satisfaction, anger toward oneself, disappointment, anger towards circumstances. The two studies were based on the scenario methodology and implied a 2 x 2 (choice x outcome) between design. In the first study the foreseen short-term effects of the choice were assessed; in the second study the experienced long-term effects of the choice were assessed. In each study 160 students of the Second University of Naples participated. Results largely corroborated our hypotheses. They were discussed in the light of the main theories on regret and decision making.

**Keywords**—Choice, outcome, regret.

## I. INTRODUCTION

REGRET has been widely investigated in the last three decades. Numerous experimental and correlational studies have specified structural features, antecedents, phenomenology and behavioural consequences of this emotion and, thus, its difference from similar emotions such as disappointment, sadness, sorrow, guilty etc. (for review, see [1],[2]). Most scholars agree in regarding regret as “a negative, cognitively determined emotion that we experience when realizing or imagining that our present situation would have been better, had we acted differently” [3]. This definition, drawing from the regret theory formulated by the economic decision theorists [4], [5] and from research in counterfactual thinking [6]-[9], posits that regret stems from a comparison process between the actual outcome deriving from a choice and factual or counterfactual better outcomes deriving from a different choice. It links regret to decision-making and highlights what is considered by most authors a necessary condition of regret, namely free choice and, consequently, personal responsibility, implying the presence of personal agency and causal control of the action.

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Responsibility for a bad outcome, in its turn, involves self-blame or self-recrimination for the wrong decision, which are both considered specific characteristics of the phenomenology of regret, [10]-[12], [3].

The requirement of free choice, and consequent responsibility, has been judged as one of the major differences between regret and the related emotion of disappointment. The theory of disappointment formulated by decision theorists [12],[13] asserts that disappointment springs from an outcome worse than the one we expected and that would have been better in a different state of the world. As some decision theorists [14],[15] have pointed out, regret and disappointment, and their opposites – rejoicing and elation - have two different reference points. The reference point for disappointment/elation is internal and is represented by the expectation regarding the performance of the chosen option, whereas for regret / rejoicing it is external and is represented by the performance of the non-chosen option. Summing up, regret is considered as related to choice, while disappointment is considered as related to the outcome.

These claims have been substantiated by numerous studies [16]-[21]. In particular, Zeelenberg and colleagues have found, among other distinctive elements, that regret increases as a function of personal responsibility, whereas disappointment shows a negative relation with responsibility and that regret focuses on the foregone option while disappointment focuses on the chosen option. Besides, they [2], [22] posit that the choice is a discriminating element between regret and the other negative emotions, since regret is the only one which cannot be experienced without choice.

Studies based on recollecting life regrets (for review, see [1]) also seem to show that the actions or failures to act people most regret concern events considered under their control. Roese and Summerville, in describing their model of regret based on the claim that it increases as a function of the growth of perceived opportunity, maintain that the necessary condition for the emergence of regret is a bad outcome following from freely chosen actions and decisions. “If actions have been constrained by outside forces, the individual seizes on these external attributions and hence feels no dissonance, no regret, and no self-blame” [1].

According to all these scholars, choice implies the freedom to choose, and a precondition of regret is free choice.

Compared to the large number of authors who link regret, free choice, and responsibility, those separating regret and responsibility are clearly a minority. Among them, we find philosophers such as Solomon [23], Rorty [24] and Taylor [25], who have hypothesized that one can be regretful also for events partially or totally beyond one’s own control or for choices for which no alternative was available. In

psychological literature, this position is entailed in Landman definition of regret [26], which assumes that the antecedents of his emotion may range from misfortunes to mistakes and may be either voluntary actions and omissions or uncontrollable and accidental events. Choice comparison and involved responsibility are not unavoidable requisites for regret. This position has received some empirical support from a set of experiments performed by Connolly and colleagues [27],[28], where the *locus* of choice agency was manipulated, varying from internal to external.

On the whole, their findings revealed that regret increased with responsibility but mainly with the negativity of the outcome compared to the *status quo*. Disappointment and happiness – the other emotions investigated – were affected only by the outcome. Ordóñez and Connolly [28] argue that responsibility can be considered an amplifier of regret but not a necessary precondition for it. On the contrary, Zeelenberg and colleagues [3], [21], who replicated with slight differences the experimental design by Connolly *et al.* [27], obtained different results: regret was primarily affected by the decision agent manipulation and secondly by the outcome; happiness depended only on the outcome; disappointment was affected by the outcome and, at least in one study, by decision agency. Nevertheless, in presence of negative outcome, regret increased when the source of decision was the individual, whereas disappointment increased when it was external to individual. Zeelenberg and colleagues [3], [21], [29] reaffirmed that personal responsibility distinguishes regret from the two other emotions.

Successively, Connolly and Zeelenberg [30] have reinterpreted their respective findings in the light of their decision justification theory. Partly based on Sugden's regret conception [11] – that distinguishes two components in this emotional experience: (1) the comparison between the actual poor outcome and the one that might have been obtained by a different choice, and (2) the feelings of self-blame stemming from the evaluation of the decision as inadequate or non-reasonable – this theory envisages two major sources of regret, not necessarily connected: outcome evaluation and decision evaluation, i.e. the process that leads up to the outcome. Regret is thought to be provoked by the awareness that the outcome is poorer than a reference point or by the awareness that decision is, in retrospect, unjustified and criticisable. Self-blame is associated to the latter component: it is judged to increase with bad decision and to diminish with its justifiability. The distinction between the two components of regret, outcome and process, led the authors to suppose that in their previous studies the forced choosers were supposed to experience only outcome-evaluation regret, whereas the free choosers were supposed to experience also self-blame associated to decision-evaluation regret.

The decision justification theory has been corroborated by some studies showing that decision process and decision outcomes affect regret separately and that regret following a bad outcome diminishes or vanishes when decision-makers perceive the decision process as careful and cautious [31]-[35].

More specifically, Pieters and Zeelenberg [33] assumed that looking for consistency and avoiding inconsistency is a

powerful motivational principle, as many authors showed (e.g. [34]-[35]), and that failure to conform to it generates negative feelings, among which regret has a special place. Their results demonstrated that intention-behavior inconsistency induces *per se* regret, irrespective of the quality of the outcome, but that decision process regret diminishes when this inconsistency is strongly justifiable, whereas it increases when the intention-behavior consistency is scarcely justifiable. This means that the perceived quality of the decision process is the mediating variable between inconsistency and regret. Besides, their results showed that intention-behavior inconsistency affects only regret and not the similar emotion of disappointment. In their studies it was assumed that, irrespective of the quality of the decisional process, decision makers freely choose whether to conform or not to the principle of inconsistency-avoidance.

## II. OVERVIEW OF THE PRESENT STUDIES

To our knowledge, there are no studies that have considered as possible antecedents of regret the decision making situations in which one is forced to choose an option inconsistent with his/her intentions. Although the illusion of control [36] can lead us to believe that one is always free to choose, in everyday life our choices are often more constrained than what we would like them to be. For example, the desired options can become unavailable: an incident can prevent us from pursuing a goal, or can force us to take a different direction, and so on. In our opinion, these intention-behavior inconsistent choices induce regret *per se*, irrespective of the outcome they lead to and of the justifiability of the decision. We assume that even though a person considers his/her choice as justifiable – given the conditions in which s/he had to decide – and even if the outcome of the choice is good, nevertheless s/he feels regret for giving up his/her initial option. The second option appears less intrinsically attractive than the first because it is a substitute solution, even though it led to a good result. In its turn, being unrealized, the first option tends, in conformity with the “Zeigarnik effect” [37], to stay alive in one's mind, owing to of the psychological state of tension that it has generated and that has not been resolved by behaviour. The persistence of unaccomplished tasks is susceptible to elicit regret [38].

For the above mentioned reasons, the impossibility of choosing the desired option is, in our opinion, a preliminary main source of regret. In our assumption, this component is structurally involved in the forced choice process and is supposed to be found over and above the type of the outcome. It is absent from the free choice process, given the lack of constraints in this case. Consequently, regret resulting from forced-choice situations is more intense than free-choice linked regret. Additionally, we assume that in a self-relevant decision making domain, which is the focus of the present studies, regret stemming from a forced choice is particularly intense and is not affected by the quality of the outcome, whereas regret deriving from a free choice is affected by the outcome evaluation, as a variety of studies have shown [1],[2]. The first aim of these two studies was to test the hypothesis that regret following a forced choice is more intense than

regret derived from a free choice and that the outcome affects the latter, not the former.

A second goal of these studies was to investigate other emotions supposed to be elicited by the decision making in order to examine whether and in what way they are affected by the type of choice and by outcome. Several studies have shown that decision making involves a composite emotional reaction [39]-[41], [15] encompassing emotions such as regret, disappointment, satisfaction, rejoicing, anger, self-blame, elation, each of them grasping some aspects of the emotional situation, either in an overlapping or in mutually independent way. In particular, Connolly and Butler [38] found that regret and disappointment revealed more reciprocal similarities than those posited by economic decision theories [4], [12], [5], [13] and confirmed by the above mentioned psychological studies. More generally, they found that emotional reactions could be better understood as organized in emotional clusters of negative (regret, disappointment and sadness) and positive (happiness, elation and rejoicing) emotions.

In the present studies, in addition to regret, four other emotions have been investigated: satisfaction, disappointment, anger toward oneself, anger toward the circumstances. They have been chosen on the basis of the following criteria. Satisfaction, the only positive emotion, has been selected in order to ascertain whether the outcome manipulation has been effective, since previous studies have shown its dependence on the obtained outcome compared to one's own expectations [40],[15]. According to these studies based on decision theories, satisfaction is not affected by the type of choice; nevertheless, since one of the sources of this emotion is to succeed in doing something right or in achieving a goal, we suppose that satisfaction increases in the free-choice condition.

Anger has been included as an emotion that can be elicited by restraint, frustration, and wrong or stupid actions [42], which are aspects entailed in forced choice, negative outcome, and bad choice respectively. Two types of anger have been distinguished as a function of the internal or external direction of this emotion, depending on the nature of its antecedents [42]. Anger towards oneself ensues from the self-attribution of a poor result and involves a self-blame component for having taken the wrong decision: it is supposed to increase with the co-occurrence of free choice and bad outcome. Anger toward circumstances stems from the perception of an obstacle preventing the achievement of one's goal and from bad result: it is thought to increase with forced choice and bad outcome.

The third aim of these studies was to test whether the choice justifiability mediates the relationship between decision and regret, as well as the relationship between choice and the other emotions examined. According to the decision justification theory, the choice justifiability lessens the intensity of regret, whereas does not affect disappointment. On the contrary, in our opinion, the intensity of regret deriving from a forced choice should not be affected by its justifiability, so we did not expect that this variable mediated the relationship between choice and regret. As to the other emotions, we did not advance specific hypotheses.

Finally, we tested whether the variable utilized as choice manipulation check – i.e. the perception of the level of freedom of choice – also mediated the relationship between choice and regret, and choice and the other emotions. We expected that this variable would act as mediator: more specifically we assumed that regret and anger towards circumstances would diminish, whereas satisfaction and anger towards oneself would increase, with the increase of the perception of the level of freedom in making a choice. As regards disappointment, we did not advance any specific hypothesis.

The two studies were based on the scenario methodology. In the first study participants were asked to imagine and assess thoughts and feelings of a decision maker when, shortly after his choice, he was informed of the forecast about the outcome deriving from his decision. In the second study, cognitive and emotional reactions were assessed in the long term, when the outcome originated from the choice had actually been experienced by the decision maker.

### III. EXPERIMENT 1

#### *Method*

##### *A. Participants and Design*

One hundred sixty undergraduates (50% male, 50% female) of the Second University of Naples participated in this study as unpaid volunteers. The age of the participants ranged from 18 to 34 years ( $M = 24.24$ ;  $SD = 3.08$ ). The  $2 \times 2$  research design involved the manipulation of two between-subjects variables: choice (free vs. forced) and outcome (negative vs. positive).

##### *B. Materials and Procedure*

Four scenarios were built with the same structure and two sources of variation: type of choice and outcome. The protagonist of the scenarios is a male undergraduate enrolled at an excellent faculty, considerably focussed on his future professional career, who changes faculty: in the free choice condition, he prefers a less demanding course of studies with similar job opportunities; in the forced choice condition, an illness prevents him from continuing his previous, challenging course of studies and he must choose a less exacting course of studies. In both the conditions, the protagonist chooses the new course of studies after careful research and the chosen new course is the same for both the conditions. A few days after he has changed and after the deadline for enrolment has expired, he reads the results of an enquiry about the job opportunities offered by the different degree courses. In the negative outcome condition, he learns that the previous course of studies ensures full employment immediately after the degree, whereas the new course of studies has produced an elevated percentage of unemployment in recent years. In the positive outcome condition, he learns the same information about the previous faculty, but also that the new course of studies has ensured an elevated percentage of employment in recent years.

Each scenario was included in a paper-and-pencil questionnaire. Participants were given written instructions

saying that the goal of the study was to investigate how people react to life events. They were asked to carefully read the scenario and try to imagine the protagonist's thoughts and feelings. Then, they were asked to evaluate on 9-points scales, ranging from 1 (not at all) to 9 (extremely):

- to what extent, in their opinion, the protagonist valued his option for changing faculty as a free choice;
- to what extent, in their opinion, he assessed his grounds for the change as valid reasons;
- how much, in their opinion, he felt five emotions: satisfaction, regret, anger towards himself, disappointment, anger towards circumstances.

The level of freedom attributed to the choice was assessed in order to check whether the manipulation of the choice had been effective; besides, this variable and the perception of the choice justifiability were included in the study in order to test whether they acted as mediational variables between choice and emotions.

The order of the two former questions was counterbalanced; the order of emotions was randomised across subjects. Participants were randomly assigned to the four conditions, except for the gender which was paired across conditions. They executed the task individually. Participants were randomly assigned to the four conditions, except for the gender which was paired across conditions. They executed the task individually.

## Results

### A. Manipulation Check and Mediational Variables

The mean ratings of the level of freedom attributed to the choice and of the choice justifiability as function of choice and outcome are shown in Table I.

A 2 (choice: free vs. forced) x 2 (outcome: negative vs. positive) ANOVA was performed on each variable. Results revealed a main effect due to choice on the perception of the choice level of freedom,  $F(1,156) = 366.05$ ,  $p < 0.001$ ,  $\eta^2 = 0.701$ , and on the choice justifiability  $F(1,156) = 35.20$ ,  $p < 0.001$ ,  $\eta^2 = 0.184$ : participants judged that the student in free choice condition perceived his choice as much freer than the student in forced choice condition did; on the contrary, they judged that the forced choice was evaluated as more justifiable than the free choice.

### B. Emotions

The mean ratings of the five emotions are depicted in Table I. Five 2 (choice: free vs. forced) x 2 (outcome: negative vs. positive) ANOVAs were carried out on the intensity of the emotions, one for each emotion. The interaction effects were interpreted by means of the simple effects analyses. Results showed that satisfaction was influenced by choice,  $F(1,156) = 30.25$ ,  $p < 0.001$ ,  $\eta^2 = 0.162$ , and by outcome,  $F(1,156) = 8.30$ ,  $p < 0.01$ ,  $\eta^2 = 0.051$ : ratings increased in free choice and in positive outcome conditions.

Regret was affected by choice,  $F(1,156) = 70.60$ ,  $p < 0.001$ ,  $\eta^2 = 0.312$ , by outcome,  $F(1,156) = 5.43$ ,  $p < 0.05$ ,  $\eta^2 = 0.034$ , and by the interaction between choice and outcome,  $F(1,156) = 9.65$ ,  $p < 0.01$ ,  $\eta^2 = 0.058$ : in forced choice and in negative

outcome conditions, ratings were higher than those in free choice and in positive outcome conditions; nevertheless, as the simple effect analysis showed, they varied as a function of the outcome only in the free choice condition,  $F(1,156) = 14.78$ ,  $p < 0.001$ , whereas in forced condition they remained always high,  $F(1,156) = 0.30$ ,  $p = 0.584$ .

The same pattern was found also for disappointment and anger towards circumstances. As regards disappointment, the effect of choice was:  $F(1,156) = 109.19$ ,  $p < 0.001$ ,  $\eta^2 = 0.412$ ; the effect of outcome was:  $F(1,156) = 9.01$ ,  $p < 0.01$ ,  $\eta^2 = 0.055$ ; the interaction effect was:  $F(1,156) = 7.75$ ,  $p < 0.01$ ,  $\eta^2 = 0.047$ ; the simple effect of outcome in free choice condition was:  $F(1,156) = 16.73$ ,  $p < 0.001$ , whereas in forced choice condition it was:  $F(1,156) = 0.24$ ,  $p = 0.878$ . As regards anger towards circumstances, the choice effect was:  $F(1,156) = 176.04$ ,  $p < 0.001$ ,  $\eta^2 = 0.530$ ; the effect of outcome was:  $F(1,156) = 7.04$ ,  $p < 0.01$ ,  $\eta^2 = 0.043$ ; the interaction effect was:  $F(1,156) = 4.16$ ,  $p < 0.05$ ,  $\eta^2 = 0.026$ ; the simple effect of outcome in free choice condition was:  $F(1,156) = 11.01$ ,  $p < 0.01$ , whereas in forced choice condition it was:  $F(1,156) = 0.19$ ,  $p = 0.664$ . Finally, only outcome affected anger towards oneself,  $F(1,156) = 5.32$ ,  $p < 0.05$ ,  $\eta^2 = 0.033$ , whose ratings increased in negative outcome condition.

### C. Mediational Analyses

In order to test whether the level of freedom attributed to the choice and the choice justifiability mediated the effect of choice on the four emotions where it had been found – satisfaction, regret, disappointment and anger towards circumstances – four regression analyses were run, in each of them the criterion variable was the emotion and the predictors were choice, coded as dummy variable (1 = free choice, 0 = forced choice), and the two above mentioned mediational variables. In the Baron and Kenny [43] mediational model, these analyses correspond to step 3 and 4, aimed at testing whether and to what extent the mediator affects the dependent variable, after controlling the independent one. Note that the first two steps envisaged by the model – aimed at testing the effect of the independent variable on the dependent one (step 1) and on the mediator (step 2) – were accomplished by means of the ANOVAs and found the requested conditions for carrying out the last two steps: choice affected both the dependent variables and the supposed mediators. According to the assumptions of mediational model [43] [44], if the mediator affects the dependent variable after controlling the independent one, the mediation is indicated, that is the total effect of the independent variable on the dependent one is partially or completely due to the intervening variable, i.e. the mediator. If, in the same equation, the independent variable no longer affects the dependent one, there is a complete mediation; if the direct effect of the independent variable drops but still remains significant, there is a partial mediation.

As regards regret and disappointment, no mediational effect was found. As to satisfaction, the tested model,  $R^2 = 0.18$ ,  $F(3,156) = 11.27$ ,  $p < 0.001$ , showed a partial mediation effect of the choice justifiability ( $\beta = 0.16$ ,  $p < 0.05$ ) - whose augmentation enhanced this emotion - but the direct effect of

TABLE I  
MEAN RATINGS OF THE LEVEL OF FREEDOM ATTRIBUTED TO THE CHOICE, THE CHOICE JUSTIFIABILITY, AND EMOTIONS AS A FUNCTION OF CHOICE AND OUTCOME - EXPERIMENT 1

		Free choice		Forced choice		Total (N= 160)
		Positive outcome	Negative outcome	Positive outcome	Negative outcome	
Level of choice	M	7.38	7.48	2.63	1.90	4.84
freedom	SD	1.76	1.50	2.06	1.43	3.10
Choice	M	6.50	6.55	8.20	7.72	7.24
justifiability	SD	1.66	1.87	0.99	1.47	1.69
Satisfaction	M	5.90	4.37	3.50	3.10	4.22
	SD	2.15	1.97	2.29	2.04	2.35
Regret	M	2.83	4.75	6.90	6.62	5.28
	SD	2.24	2.42	2.04	2.25	2.76
Anger towards oneself	M	3.10	4.60	3.73	4.10	3.88
	SD	2.61	2.73	2.69	2.23	2.61
Disappointment	M	2.67	4.68	7.25	7.32	5.48
	SD	2.24	2.54	2.02	1.90	2.91
Anger towards circumstances	M	2.85	4.37	8.03	7.82	5.77
	SD	1.90	2.78	1.72	1.62	3.02

TABLE II  
MEAN RATINGS OF THE LEVEL OF FREEDOM ATTRIBUTED TO THE CHOICE, THE CHOICE JUSTIFIABILITY, AND EMOTIONS AS A FUNCTION OF CHOICE AND OUTCOME – EXPERIMENT 2

		Free choice		Forced choice		Total (N= 160)
		Positive outcome	Negative outcome	Positive outcome	Negative outcome	
Level of choice	M	7.93	7.78	2.08	1.90	4.92
freedom	SD	1.35	1.27	1.21	1.26	3.20
Choice	M	6.95	6.65	7.60	8.15	7.34
justifiability	SD	1.71	1.69	1.30	0.83	1.53
Satisfaction	M	6.75	3.25	4.58	3.18	4.44
	SD	1.78	2.07	2.32	2.12	2.52
Regret	M	2.93	6.15	6.98	7.00	5.76
	SD	2.12	2.51	1.66	1.90	2.65
Anger towards oneself	M	2.53	5.80	3.38	3.10	3.70
	SD	2.13	2.59	2.35	2.33	2.65
Disappointment	M	2.38	6.07	6.10	6.90	5.36
	SD	1.90	2.53	2.42	2.33	2.89
Anger towards circumstances	M	2.58	4.20	7.10	8.28	5.54
	SD	2.17	2.63	2.30	1.13	3.10

choice remained still significant ( $\beta = 0.54$ ,  $p < 0.001$ ). With regard to anger towards circumstances, the tested model,  $R^2 = 0.54$ ,  $F(3,156) = 60.22$ ,  $p < 0.001$ , showed a partial mediation effect of the level of freedom attributed to the choice ( $\beta = -0.21$ ,  $p < 0.05$ ), whose diminution increased this emotion, whereas the direct effect of choice remained still significant ( $\beta = -0.50$ ,  $p < 0.001$ ).

#### IV. EXPERIMENT 2

Study 1 investigated the short-term emotional reactions to positive or negative outcomes following a free or a forced choice. Study 2 was in some way a replication of the previous experiment but the temporal perspective was changed: the consequences of the choice have been evaluated in the long

term. Besides, whereas in the first experiment the scenario protagonist read a forecast about the outcome of his choice, in this study he experienced its real outcome.

#### Method

##### A. Participants and Design

Also in this study 160 undergraduates (50% male, 50% female) of the Second University of Naples participated as unpaid volunteers. The age of participants ranged from 19 to 40 years ( $M = 24.40$ ;  $SD = 3.77$ ). The 2 (choice: free vs. forced)  $\times$  2 (outcome: negative vs. positive) between design was equal to that of study 1.

### B. Materials and Procedure

The materials and the procedure were identical to those used in experiment 1, apart from the following modifications of the scenarios. In the negative outcome condition, the student who had changed faculty, freely or forcedly, is still unemployed two years after the degree, whereas all his colleagues of the previous faculty have already undertaken brilliant careers. In the positive outcome condition, the achievements of the past colleagues are the same but the student has succeeded to find an adequate job.

### Results

#### A. Manipulation Check and Mediatonal Variables

The mean ratings of the level of freedom attributed to the choice and of the choice justifiability as function of choice and outcome are shown in Table II. As in the first experiment, a 2 (choice: free vs. forced) x 2 (outcome: negative vs. positive) ANOVA was performed on each variable. Results showed the same pattern as that of the previous study: a main effect due to choice was found on the first variable,  $F(1,156) = 850.62$ ,  $p < 0.001$ ,  $\eta^2 = 0.845$ , and on the choice justifiability,  $F(1,156) = 22.70$ ,  $p < 0.001$ ,  $\eta^2 = 0.127$ : the student in free choice condition was judged as perceiving his choice as much freer than the student in forced choice condition; instead, the latter was considered as perceiving his choice as more justifiable than the student in free choice condition did.

#### B. Emotions

The mean ratings of the five emotions intensity are illustrated in Table II. Again, five 2 x 2 (choice x outcome) ANOVAs were performed on the intensity of the emotions, one for each emotion. The interaction effects were interpreted by means of the simple effects analyses.

Results showed that satisfaction was affected by choice,  $F(1,156) = 11.67$ ,  $p < 0.01$ ,  $\eta^2 = 0.070$ , by outcome,  $F(1,156) = 55.36$ ,  $p < 0.001$ ,  $\eta^2 = 0.262$ , and by the choice x outcome interaction,  $F(1,156) = 10.17$ ,  $p < 0.01$ ,  $\eta^2 = 0.061$ : rating increased in free choice and in positive outcome conditions; nevertheless, as the simple effect analysis showed, only in the positive outcome condition, ratings varied as a function of choice,  $F(1,156) = 21.82$ ,  $p < 0.001$ , whereas in the negative outcome they remained stable,  $F(1,156) = 0.26$ ,  $p = 0.872$ .

Both regret and disappointment were affected in the same way by choice, outcome, and choice x outcome interaction. As regards regret, the numeric values of main effect of choice and outcome were, respectively,  $F(1,156) = 56.17$ ,  $p < 0.001$ ,  $\eta^2 = 0.265$ , and  $F(1,156) = 24.71$ ,  $p < 0.001$ ,  $\eta^2 = 0.137$ ; the values of interaction were:  $F(1,156) = 23.96$ ,  $p < 0.001$ ,  $\eta^2 = 0.133$ . With regard to disappointment, the effect of choice was:  $F(1,156) = 38.94$ ,  $p < 0.01$ ,  $\eta^2 = 0.200$ , the effect of outcome was:  $F(1,156) = 38.09$ ,  $p < 0.01$ ,  $\eta^2 = 0.196$ , and the effect of the choice x outcome interaction was:  $F(1,156) = 15.82$ ,  $p < 0.01$ ,  $\eta^2 = 0.092$ .

Ratings of both the emotions increased both in the forced choice and in the negative outcome conditions, but only in the free choice condition they varied as a function of the outcome (the simple effects for regret and disappointment were, respectively,  $F(1,156) = 48.66$ ,  $p < 0.001$ , and  $F(1,156) =$

51.50,  $p < 0.001$ ), whereas in the forced choice condition they remained always high, as the simple effect analyses showed (the simple effects for regret and disappointment were, respectively,  $F(1,156) = 0.003$ ,  $p = 0.957$ , and  $F(1,156) = 2.41$ ,  $p = 0.123$ ).

Also, on anger towards oneself ANOVA showed two main effects, due, respectively, to choice,  $F(1,156) = 6.16$ ,  $p < 0.05$ ,  $\eta^2 = 0.038$ , and to outcome,  $F(1,156) = 16.19$ ,  $p < 0.001$ ,  $\eta^2 = 0.094$ , and an interaction effect between these two variables,  $F(1,156) = 22.67$ ,  $p < 0.001$ ,  $\eta^2 = 0.127$ : the intensity of this emotion increased in the free choice and in the negative outcome conditions, but in the free choice condition ratings augmented with the negative outcome,  $F(1,156) = 38.58$ ,  $p < 0.001$ , whereas in the forced choice condition they did not vary as a function of the outcome,  $F(1,156) = 0.27$ ,  $p = 0.603$ .

Finally, on anger towards circumstance the ANOVA revealed a main effect of choice,  $F(1,156) = 162.56$ ,  $p < 0.001$ ,  $\eta^2 = 0.510$ , and a main effect of outcome,  $F(1,156) = 17.23$ ,  $p < 0.001$ ,  $\eta^2 = 0.099$ : in the forced choice and in the negative outcome conditions, ratings were higher than those in the free choice and in the negative outcome conditions.

#### C. Mediatonal Analyses

In order to test whether the level of freedom attributed to the choice and the choice justifiability mediated the effect of choice on the five emotions, the same procedure illustrated in the previous study was followed. We remember that choice was coded as dummy variable (1 = free choice, 0 = forced choice).

As far as satisfaction was concerned, the tested model,  $R^2 = 0.095$ ,  $F(3,156) = 5.48$ ,  $p < 0.01$ , showed a full mediation effect of the freedom level attributed to the choice ( $\beta = 0.43$ ,  $p < 0.05$ ) and of the choice justifiability ( $\beta = 0.17$ ,  $p < 0.05$ ), whose increase augmented the emotion intensity. The direct effect of choice was no longer significant ( $\beta = -0.11$ ,  $p = 0.581$ ).

As to anger towards oneself, results,  $R^2 = 0.59$ ,  $F(3,156) = 3.28$ ,  $p < 0.05$ , showed a full mediation effect due to the choice justifiability ( $\beta = -0.18$ ,  $p < 0.05$ ), whose diminution increased the emotion intensity. The direct effect of choice was no longer significant ( $\beta = 0.29$ ,  $p = 0.146$ ).

Results concerning regret, disappointment, and anger towards circumstances showed the same pattern: a full mediation effect of the level of freedom attributed to the choice, whose diminution increased the intensity of each emotion. No mediational effect was found for the choice justifiability. More specifically, as to regret, the values of the model were  $R^2 = 0.24$ ,  $F(3,156) = 16.25$ ,  $p < 0.001$ , the standardized regression weights of the mediational variable and of the independent one were, respectively,  $-0.38$  ( $p < 0.05$ ), and  $-0.14$  ( $p = 0.445$ ); as to disappointment, the model values were  $R^2 = 0.19$ ,  $F(3,156) = 12.00$ ,  $p < 0.001$ , the standardized regression weights of the mediational variable and of the independent one were, respectively,  $-0.45$  ( $p < 0.05$ ), and  $0.02$  ( $p = 0.937$ ); with regard to anger towards circumstances, the model values were  $R^2 = 0.53$ ,  $F(3,156) = 59.04$ ,  $p < 0.001$ , the standardized regression weights of the

mediational variable and of the independent one were, respectively, -0.56 ( $p < 0.001$ ), and -0.18 ( $p = 0.188$ ).

## V. DISCUSSION

The results of these two studies strongly supported the hypothesis that regret elicited by a forced choice is more intense than regret elicited by a free choice. Besides, as we expected, outcome affects regret only in free choice condition, whereas it is not-relevant in forced choice condition. The choice manipulation has been effective: in both studies, the student in free choice condition has been perceived as choosing to change faculty much more freely than the student in forced choice condition. However, the level of freedom attributed to the choice – i.e. the participants' perception of the level of freedom in choosing by the scenario protagonist -- mediated the relationships between choice and regret in long-term study but not in short-term study, as we expected: our hypothesis has been only partially corroborated. In conformity with our assumption, the choice justifiability did not mediate the relationships between choice and regret, even though in both studies the forced choice was evaluated as more justifiable than the free choice.

It is worth noting that in both experiments the structural conditions of the decision making were the same for the two choice conditions: both students did an action - rather than an omission - and both changed the *status quo*, i.e. their previous option. In accordance with the conceptual framework of Pieters and Zeelenberg [33], each of them, by changing an earlier option, experienced an intention-behavior inconsistency but they differed on the motivation to change the *status quo* and on its consequences. The free chooser student selected a new option which was more consistent with his aspiration: the wish to find a good job in future without studying too hard at present. The previous option was more conflicting than the second one with his intention to study less. His decision of switching away from the *status quo* is thus justifiable, at least at the time of the choice, though the hazardous nature of the choice makes it possible to fully evaluate it only *post hoc*, i.e. after the outcome has been realized. On the contrary, the student in forced choice condition had to select a new option, more congruent with his reduced possibilities of engaging in studies. Thus, he is supposed to experience a high level of intention-behavior inconsistency, because his intention was unmodified, whereas his actual health condition made his original goal unattainable. His decision appears nevertheless highly justifiable, irrespective of the outcome to which it will lead. Our results are congruent with this manipulation: the choices of both students were judged largely justifiable even though the forced choice was judged even more justifiable than the free choice. The finding that the choice justifiability does not mediate the relationship between choice and regret – i.e. the choice justifiability did not diminish regret intensity - seems to disconfirm the assumptions of the decision justification theory [44], which had been supported by previous studies [33]. Our findings rather indicate that the forced inconsistency between intention and behavior overcomes the choice justifiability in the prediction of regret.

As far as the outcome is concerned, it is worth noting that scenario actors knew the outcome of the other option, even if in the short-term condition it was only foreseen: in this way the comparison process occurred at the factual level and not at the counterfactual one. The missed outcome was always terrific: the actual outcome was or rather similar to it or very worse. In this manner, the situations respected the requirements of the strictest conception of regret [4], [12] which demands that the chooser knows the consequences of both the selected and the non-selected option and judges the former less attractive than the latter. Note that also the theories of disappointment [4] imply that the actual outcome has to be compared to expected outcome to generate this emotional experience. As we have already pointed out, the outcome affected the regret intensity only when the scenario protagonist chose freely.

On the whole, our results challenge the well consolidated position in regret literature according to which the necessary condition for the genesis of this emotion is the co-occurrence of the free choice and of the awareness that the outcome would have been better if one had chosen differently. They highlight a major source of regret - that is being obliged to choose differently from one's intentions - which has not been considered in literature, even though this contingency is rather frequent in everyday life. It is noteworthy that in both studies regret showed an analogous pattern to disappointment and a quite similar pattern to anger towards circumstances. The only differences regarding the second emotion were the absence of the interaction effect between choice and outcome in the long-term study and the finding that the level of freedom attributed to the choice partially mediated the relationship between choice and anger towards circumstances in short-term study: the intensity of this emotion increased with the increase of the perception of the choice constraints.

These findings suggest that the three emotions represent quite similar aspects or some different tones of the complex emotional reaction deriving from the manipulation of the two components of the decision making considered in these studies: choice and outcome. From this point of view our results seem quite similar to the findings of Connolly and Butler [38], which highlighted the organization of the affective response to the decision making in the two different clusters of negative and positive emotions. More specifically, our results bring into doubt the consolidated position in the decision making literature (cfr. the above mentioned references) according to which the difference between regret and disappointment lays in their different reference points: choice for regret and outcome for disappointment. In our studies both regret and disappointment seem to be mainly related to choice rather than to outcome, and this finding can be extended also to anger towards circumstances, at least as regards the short-term study. If our findings will be further supported by other studies, the differences between regret, disappointment, and anger towards circumstances, as emotional responses to decision making, should be reconsidered: perhaps they would be more properly situated in other aspects of the emotional process – such as its phenomenology – rather than in emotion antecedents.

Note that the other negative emotion examined in these studies, anger towards oneself, showed a different pattern: in the short-term study it was affected only by outcome, whereas in the long-term study it was affected by choice, outcome and their interaction but, differently from the three previous emotions, it increased in free choice condition. Besides, in the long-term study the choice effect was completely mediated by the choice justifiability, in the direction presumed by the decision justification theory: the less justifiable the choice, the more intense the anger towards oneself. One could infer that this emotion has captured, at least in our second study, the self-blame component implied in the awareness of a bad choice.

As regards the only positive emotion included in these studies, satisfaction, it is worth mentioning that it depended not only on outcome, but also on choice. The first finding witnesses the effective outcome manipulation, since this emotion increased in positive outcome condition and decreased in the negative one. The second finding seems to disconfirm, once again, the studies based on decision theories [40], [15] according to which satisfaction would not be affected by the type of choice. Note that in the long-term study the level of freedom attributed to choice positively mediated the relationship between choice and satisfaction, while the choice justifiability mediated this relationship in both studies: the more justifiable the choice, the more intense the satisfaction.

Finally, we think that further research is required to corroborate these findings and to better understand some aspects of the present studies. For example, the differences between the short-term and the long-term study – especially as regards the absence of the choice effect on anger towards oneself and the absence of the mediational effect of the freedom level attributed to choice on most emotions – raises some questions on the role that the different *status* of the outcome in the two studies could have played. In the short-term study the protagonist foresees the outcome of his choice; in the long-term study he experiences it. In a successive study this difference between forecast and experience should be suppressed.

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