THE INFLUENCE
OF GUILT EMOTION ON TIME EVALUATION
A PRELIMINARY STUDY

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Abstract

The question addressed in this paper is whether guilt serves as a source of information in the assessment of time resources. Across two studies, we examined whether state-induced guilt leads to an overestimation of the time required to complete a series of activities and an underestimation of the number of tasks one can accomplish within a given time frame. Additionally, we investigated whether individuals high in trait guilt exhibit these tendencies more than others. Participants with high and low levels of trait guilt were included in the study. Three affective states were induced: guilt, anxiety and a neutral condition. Participants were asked to estimate both the time required for various daily activities and the number of such activities that could be completed within a fixed time period. Contrary to our predictions, individuals high in trait guilt underestimated the time required to complete a given number of activities and overestimated the number of tasks they could accomplish within a set time interval after experiencing guilt induction – rather than following anxiety or neutral affect induction. We discuss these findings in relation to the prudential mode and the distinct roles of deontological and altruistic guilt in the evaluation of time resources with no-interpersonal tasks.

Keywords: Affect as Information, Emotions, Guilt, Time Evaluation, Deontological Guilt.

1. INTRODUCTION

According to cognitive psychology, emotional states influence cognitive processes in various ways, reinforcing the beliefs that sustain a given emotional condition. One of the most significant ways in which affect shapes cognition is through the use of emotions as a source of information about external events (for recent review, see Gangemi *et al.* 2021; Paredes-Mealla *et al.* 2022). Emotional reasoning, *ex-consequentia*

reasoning, and affect-as-information describe psychological mechanisms by which individuals rely on their emotions to interpret external events, even when the emotion itself is unrelated to the situation being evaluated. The theory of emotional reasoning or affect-as-information posits that human beings tend to use their emotions as key sources of information when making evaluations and judgments about the world, rather than basing their assessments solely on objective reality. Through this mechanism, emotional states can profoundly shape judgments, particularly when individuals perceive their emotions as relevant to the evaluative process (Schwarz, Clore 1988; 1996; Clore 1992; Gangemi *et al.* 2021).

When forming evaluative judgments, individuals may ask themselves how they feel about an event, an activity, or a topic under consideration (Schwarz, Clore 1996). However, in such situations, distinguishing between affective responses to the event itself (i.e., how one feels about it) and pre-existing emotional states (i.e., how one feels at that moment, independent of the event) can be difficult. Consequently, the hypothesis arises that pre-existing emotions may bias evaluative judgments of unrelated events or topics (Gasper, Clore 1998).

This phenomenon was demonstrated by Schwarz and Clore (1983), who found that individuals asked to recall a negative life event subsequently reported lower levels of life satisfaction compared to those who recalled a positive event. Scott and Cervone (2002) further explored the affect-as-information mechanism in healthy individuals, showing that participants used induced negative affect as a reference point when evaluating performance standards and satisfaction with their achievements. Specifically, they demonstrated that negative affect could lead to the establishment of higher performance standards, even when the nature of the performance was unrelated to the source of the negative affect.

Several studies have shown that negative emotions can serve as relevant information when forming evaluations and judgments, often in a prudential manner. For instance, Gasper and Clore (1998) found that anxiety influences risk assessment in a cautious direction. Participants who underwent an anxiety induction estimated both personal and impersonal negative events as more likely and severe compared to those who experienced a positive affect induction. Furthermore, the study revealed a relationship between trait affect and emotional reasoning: individuals with high trait anxiety were more likely to estimate

greater risk following a state-anxiety induction, whereas those with low trait anxiety did not. This finding suggests that one key difference between individuals high and low in trait anxiety is the extent to which they trust the informational value of anxious feelings.

These findings suggest that individuals are motivated to use negative emotions as a source of information to safeguard their goals and reduce the likelihood of critical errors, thereby minimizing potential costs (see Gangemi *et al.* 2021). This aligns with a «better safe than sorry» strategy, which is functional and adaptive in the face of perceived threats (e.g., Smeets *et al.* 2000; Mancini, Gangemi 2004; Johnson-Laird *et al.* 2006; Mancini, Gangemi 2015; Gangemi *et al.* 2019; Gangemi 2021). The activation of this reasoning pattern is more pronounced in individuals with chronic negative emotional states.

This principle appears to extend to other negative emotions, including guilt. The guilt-as-information mechanism is associated with an increased prudential sense of threat and a diminished belief in the effectiveness of preventive actions. This prudential strategy may serve to prevent further feelings of guilt, particularly by avoiding anticipated guilt for acting irresponsibly. Gangemi, Mancini, and van den Hout (2007) provided empirical evidence for this effect, demonstrating that guilt induction heightened perceptions of threat, leading participants to assess negative events as more severe and more likely to occur than those in an anxiety induction condition. Additionally, the study found that guilt specifically influenced performance standards: individuals who experienced guilt induction rated their preventive performance as more inadequate than those in the anxiety induction group, even when the guilt itself was unrelated to the task being evaluated. In line with Gasper and Clore's (1998) findings, the guilt-as-information effect was particularly pronounced in individuals with high trait guilt.

Given the influence of guilt on prudential estimations of possible outcomes and evaluations of personal performance, the present study investigates whether guilt also functions as a source of information in the assessment of time as a cognitive resource. Specifically, we examine whether guilt affects estimations of the time required to complete a task or action in a prudential manner (cf. Klemenz 2003; Willuttzki 2008). Time was chosen as a psychological and interpersonal resource for two primary reasons. First, among various potential resources, time is one of the most fundamental, as it constitutes a necessary – though not sufficient – condition for task completion. Second, it is worth ex-

ploring whether guilt contributes to systematic misjudgments of the time needed to complete tasks.

In line with the prudential mode, we propose that individuals experiencing guilt should aim to prevent additional errors, including mismanaging time. This may stem from a desire to avoid self-blame for inefficiency or failing to complete tasks ahead of deadlines. Consequently, individuals who feel guilty may adopt a prudential strategy by overestimating the time required to complete tasks, ensuring they do not run out of time or make mistakes. Simultaneously, they may underestimate the number of tasks they can complete within a given timeframe, as a means of guaranteeing the quality of their performance.

Following previous research on the affect-as-information mechanism (see Gangemi *et al.* 2007; 2021), the present preliminary study investigates whether guilt influences time assessment, even when the source of guilt is unrelated to the task being evaluated. If this effect occurs, it should be observable in individuals experiencing state guilt and should be even more pronounced in individuals with high trait guilt. Specifically, we hypothesize that individuals experiencing guilt will (*a*) overestimate the time required to complete a given task (Experiment 1) and (*b*) underestimate the number of tasks they can complete within a fixed period (Experiment 2). Furthermore, we predict that these effects will be stronger in participants with high trait guilt.

2. STUDY 1

In the present study, participants were categorized into high- and low-trait guilt groups based on a standardized measure of trait guilt. State-induced guilt was then experimentally manipulated in both groups. To ensure that any observed effects were specifically attributable to state guilt rather than negative affect more generally, participants were assigned to one of three affect induction conditions: guilt, anxiety, or neutral. Affective states were induced by instructing participants to write about a personally relevant event associated with guilt, anxiety, or a neutral experience. Importantly, these emotional states were neither elicited by nor directly related to the task used in the subsequent phase of the experiment.

The experimental task involved estimating the duration required to complete various typical daily activities (see below). Trait and state

guilt were assessed using the Guilt Inventory (Jones *et al.* 2000). Additionally, the Positive and Negative Affect Schedule (PANAS) (Watson *et al.* 1988; Terracciano *et al.* 2003) was included to verify that both negative affect induction conditions (guilt vs. anxiety) successfully elicited negative affect.

We hypothesized that participants in the guilt condition would overestimate the amount of time required to complete a given number of daily activities. Furthermore, this effect was expected to be more pronounced in individuals predisposed to chronic guilt (i.e., those with high trait guilt). Specifically, we predicted that this pattern would emerge in comparison to individuals in (*i*) the anxiety induction condition, (*ii*) the neutral affect condition, and (*iii*) the low-trait guilt group.

2.1. METHOD

2.1.1. Participants and design

The study participants consisted of 80 undergraduate and postgraduate students from the University of Palermo, Italy (35 male). Participants were recruited through advertisements posted in various locations, including public notice boards at the university. The age range of the sample was 18 to 50 years, with a mean age of 25.6 years. All participants took part on a voluntary basis. They were randomly assigned to one of six groups following a 2×3 between-subject design, which varied by trait guilt level (high *vs.* low, based on a median split) and affect induction condition (guilt, anxiety, or neutral).

2.1.2. Materials and procedures

Participants were tested in groups of approximately 25 individuals. One day prior to the experimental session, they completed the Trait Guilt Inventory (see below). At the start of the experimental session, participants were administered the State Guilt Inventory, the Positive and Negative Affect Schedule (PANAS; see below), a booklet containing the written affect induction instructions, and a questionnaire assessing the dependent variables. The questionnaire included a list of typical daily activities (see below) and required participants to estima-

te the time needed to complete each activity (i.e., our primary dependent variable). Informed consent was obtained from all participants prior to their involvement in the study.

High and low trait-guilt group. Trait and state guilt were assessed using the Trait and State Guilt Inventory (Jones *et al*. 2000), which consists of 30 items – 20 items measuring trait guilt and 10 items measuring state guilt. Responses were recorded using a 5-point Likert scale, where lower scores indicated strong disagreement and higher scores indicated strong agreement. Both subscales demonstrated strong internal consistency (Cronbach's α = .89 for trait guilt, α = .83 for state guilt). Test-retest reliability for trait and state guilt was reported as r = .72 and r = .56, respectively, over a 10-week period. The validity of the inventory was supported through comparisons with independent measures of guilt, including the Mosher Guilt Inventory (Mosher 1988) and the Hogan Personality Inventory Guilt Scale (Hogan 1985). The results indicated that each scale was more strongly correlated with alternative measures within the same domain than with scales assessing different constructs.

To classify participants into low- and high-trait guilt groups, we computed the total Trait Guilt Inventory score (ranging from 20 to 100) by summing responses across the 20 trait guilt items. A median split was then applied, with individuals scoring above the median classified as high-trait guilt and those scoring below the median classified as low-trait guilt.

2.1.3. Baseline affect

Baseline differences in guilt, anxiety, and negative affect were assessed by administering two self-report questionnaires at the beginning of the experiment. To specifically measure the participants' current level of guilt-related affect, we used the State Guilt Inventory (Jones *et al.* 2000). The total score (range: 10-50) was obtained by summing responses across the 10 items, with higher scores reflecting greater state guilt.

Baseline negative affect was measured using the Italian version of the Positive and Negative Affect Schedule (PANAS) (Terracciano *et al*. 2003). The PANAS consists of 20 emotion-related terms, on which participants rate their current feelings using a 5-point Likert scale (1 =

very slightly or not at all, 5 = extremely). The 20 items were grouped into two subscales: positive affect and negative affect, both of which demonstrated strong internal consistency ($\alpha = .73$ and $\alpha = .88$, respectively).

To create a composite measure of negative affect, we combined all ten negative affect items from the PANAS into a single negative affect factor (eigenvalue = 5.78; variance explained = 48%). Additionally, using principal components analysis, we extracted a distinct anxiety factor from two PANAS items specifically related to anxiety («jittery» and «nervous»; eigenvalue = 2.15; variance explained = 72%).

2.1.4. Affect induction

Affect was experimentally manipulated using a biographical recall task in which participants were asked to write about a personally significant life event. Participants were randomly assigned to one of three conditions:

1. Guilt Induction – Writing about a guilt-related event.
2. Anxiety Induction – Writing about an anxiety-related event.
3. Neutral Condition (Control) – Writing about a neutral event.

Following Schwarz and Clore (1983), participants were instructed to describe their guilt-related, anxiety-related, or neutral experiences as vividly as possible, detailing their thoughts and emotions at the time. Each participant was given 15 minutes to complete this task.

Immediately after the affect induction phase, participants completed the State Guilt Inventory again to quantify changes in guilt levels (guilt induction effect) and the PANAS scales to assess the effects of anxiety induction (anxiety factor score) and general negative affect (negative affect factor score).

2.1.4. Experimental task

Participants were then presented with a list of typical daily activities and asked to imagine performing them as accurately and efficiently as possible. The activities included:

– Putting away clothes in the closet (four pairs of trousers, two t-shirts, and three shirts).

Organizing the desk (appointment book, pens, pencils, notebooks, notes).

– Making the bed.

– Reorganizing the eight drawers in the desk.

– Sorting 50 books in a bookcase.

– Arranging the stereo room (40 CDs and 30 audiocassettes).

Immediately after reading the task list, participants were asked to estimate the total amount of time (in minutes) required to complete all activities.

2.2. RESULTS

2.2.1. Manipulation check: measures of affect induction

Table 1 presents the mean affect ratings on scales of guilt, anxiety, and negative affect for participants in all three affect induction conditions, both before and after the affect induction procedure. Each measure was analyzed using a 2x3 ANOVA, with Time (before vs. after) as a within-subject factor and Affect Induction Group (guilt, anxiety, or neutral) as a between-subject factor.

For state guilt, a significant Time x Affect Induction Group interaction was observed, $F(2, 77) = 13.55$, $p < .001$, $\eta^2 = .26$. The nature of this interaction was explored by examining which groups exhibited a significant pre-to-post increase in state guilt. As shown in Table 1, the increase in the guilt induction group was significant ($t(25) = 7.7$, $p < .001$, $d = 1.5$), whereas no significant effects were found in the anxiety induction group ($t(25) = .52$, $n.s.$) or the neutral group ($t(27) = .9$, $n.s.$). These results suggest that the manipulation was overall successful in inducing the intended affect. To determine whether the successful manipulation had differential effects on individuals with high and low trait guilt, a 2 (Time) x 3 (Affect Induction) x 2 (Trait Guilt) ANOVA was conducted. The results were consistent with the earlier 2 x 3 ANOVA, yet the Time x Affect Induction x Trait Guilt interaction was not significant, $F(2, 74) = .84$, $n.s.$. Thus, high-trait-guilt individuals did not exhibit a greater change in state guilt than low-trait-guilt indi-

viduals, suggesting that differences in time estimation were unlikely to be attributed to variations in state guilt changes between these groups.

For the anxiety measure, a significant Time x Affect Induction Group interaction was found, $F(2, 77) = 18.5$, $p < .001$, $\eta^2 = .35$. The nature of this interaction was explored by identifying which groups exhibited a significant pre-to-post increase in state anxiety. A significant increase in state anxiety was found in the anxiety induction group ($t(25) = 7.4$, $p < .001$, $d = 1.5$), while no significant effects were observed in the guilt induction group ($t(25) = .61$, *n.s.*) or the neutral group ($t(27) = 1.1$, *n.s.*).

For negative affect, a significant Time x Affect Induction Group interaction was detected, $F(2, 177) = 11.7$, $p < .001$, $\eta^2 = .23$. A significant pre-to-post increase in negative affect was observed in both the anxiety induction group ($t(25) = 5.5$, $p < .001$, $d = 1.1$) and the guilt induction group ($t(25) = 4.9$, $p < .001$, $d = 1$). No significant effect was found in the neutral group ($t(27) = .23$, *n.s.*).

Overall, the affect induction procedure was successful. The guilt induction condition led to an increase in state guilt, while the other conditions did not. Similarly, the anxiety induction condition resulted in increased state anxiety, with no such increase observed in the other groups. Lastly, negative affect increased in both the guilt and anxiety induction groups but remained unchanged in the control group.

TAB. 1. *Mean affect ratings (and standard deviations) of the three affect induction groups (guilt, anxiety, neutral), before and after the affect induction*

	Guilt		Anxiety		Negative affect	
	Pre-affect induction	Post-affect Induction	Pre-affect induction	Post-affect induction	Pre-affect induction	Post-affect induction
Guilt group (n = 26)	27.1 (5.6)	31.7 (7.2)	4.2 (2.2)	4.5 (2.1)	17.8 (6.8)	25.4 (7.3)
Anxiety group (n = 26)	26.3 (6.4)	26.8 (6.6)	3.42 (1.8)	6.6 (2.4)	15.6 (5.9)	24.5 (10)
Neutral group (n = 28)	28.2 (5.4)	27.7 (5.4)	4.2 (2.3)	3.8 (2.1)	17.4 (6)	16.8 (6.3)

2.2.2. Time evaluation

The mean time estimation as a function of Affect Induction (guilt *vs.* neutral *vs.* anxiety) and Trait Guilt (high *vs.* low) is depicted in Figure 1. Time estimation was analyzed using a 3x2 ANOVA, with Affect Induction (guilt, anxiety, neutral) and Trait Guilt (high, low) as between-subject factors.

A significant main effect of Affect Induction on time estimation was found, $F(2, 74) = 4.1$, $p < .05$, $\eta^2 = .1$. However, the observed effect did not follow the expected direction. Participants in the guilt induction group estimated the duration required for all activities ($M = 97.5$, $SD = 47.5$) to be significantly shorter than both participants in the neutral condition ($M = 129.7$, $SD = 43.75$, $t(52) = 2.6$, $p < .001$, one-tailed, $d = .7$) and in the anxiety induction group ($M = 131.93$, $SD = 51.34$, $t(50) = 2.5$, $p < .001$, one-tailed, $d = .7$).

A significant main effect of Trait Guilt was also observed, $F(1, 74) = 4.7$, $p < .05$, $\eta^2 = .06$. High-trait-guilt individuals estimated the required time ($M = 108.5$, $SD = 51.7$) to be shorter compared to low-trait-guilt participants ($M = 131.4$, $SD = 25.6$).
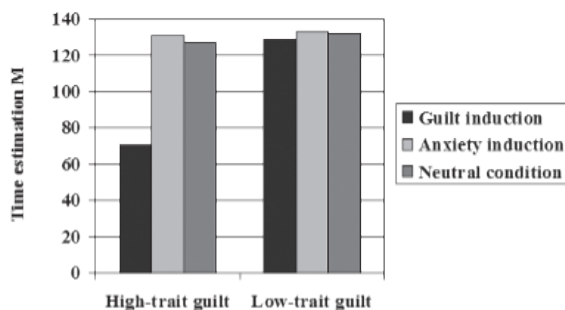

Fig. 1. Mean time estimation as a function of Affect Condition (guilt vs. neutral vs. anxiety) and Trait guilt (high vs. low).

Additionally, a significant Affect Induction x Trait Guilt interaction effect was found, $F(2, 74) = 3.1$, $p < .05$, $\eta^2 = .08$. High-trait-guilt individuals in the guilt induction group estimated the required time

($M = 70.71$, $SD = 20.5$) to be significantly shorter than both high-trait-guilt participants in the anxiety condition ($M = 130.77$, $SD = 53.8$, $t(25) = 3.9$, $p < .001$, one-tailed, $d = 1.5$) and the neutral condition ($M = 126.92$, $SD = 52.5$, $t(25) = 3.7$, $p < .001$, one-tailed, $d = 1.4$) (see Figure 1, left bars). The right bars of Figure 1 suggest that the experimental manipulations did not affect time evaluation in low-trait-guilt participants. Indeed, none of the between-group comparisons among low-trait-guilt participants reached significance (guilt group vs. anxiety group: $t(23) = .21$, *n.s.*; guilt group vs. neutral group: $t(25) = .19$, *n.s.*).

3. STUDY 2

In this second experiment, participants were asked to estimate the number of the same daily activities listed in the previous experiment that could be performed within a time interval specified by the experimenter (i.e., 30 minutes). Following the same procedure as in the prior study, participants were classified into high- and low-trait guilt groups based on a trait measure of guilt and were randomly assigned to one of three affect induction conditions (guilt, anxiety, or neutral). Additionally, a measure of Negative Affect (PANAS, Terracciano *et al.* 2003) was administered. We hypothesized that individuals in the guilt induction condition would underestimate the number of activities that could be completed within the given time frame compared to participants in whom guilt was not induced or who experienced a different emotion (i.e., anxiety). As in the previous experiment, this effect was expected to be more pronounced in individuals predisposed to experiencing chronic guilt (high-trait guilt).

3.1. METHOD

3.1.1. Participants and design

The sample consisted of 65 undergraduate and postgraduate students from the University of Palermo, Italy (30 males). Participants were recruited through advertisements and public announcements posted on university bulletin boards. The participants' ages ranged from 18 to 51 years, with a mean age of 27.1. All participants voluntarily took part in

the study. They were randomly assigned to one of six groups in a 2 x 3 between-subjects design. Groups varied based on trait guilt level (high vs. low, median split) and the type of affect induction received (guilt, anxiety, or neutral).

3.1.2. Materials and procedures

Participants were tested in groups of approximately 22 individuals. As in the previous study, the Trait Guilt Inventory was administered one day before the experimental session. At the beginning of the experimental session, participants completed the State Guilt Inventory (Jones *et al.* 2000) and the Italian version of the PANAS scales (Terracciano *et al.* 2003) to assess baseline differences in guilt, anxiety, and negative affect. Each participant received a booklet containing written instructions, a questionnaire outlining the task, and measures of the dependent variable. The questionnaire included a list of typical daily activities from the previous experiment, but in this study, the dependent variable was the estimated number of activities that could be completed within the experimenter-defined time frame. Informed consent was obtained from all participants.

3.1.3. Affect induction

Following the same procedure as in the previous experiment, affect was manipulated by asking participants to describe a personal life event that was either guilt-related (guilt induction group), anxiety-related (anxiety induction group), or neutral (control group). At the end of the affect induction phase, participants again completed the State Guilt Inventory (to quantify changes in guilt levels) and the PANAS scales (to measure the anxiety induction effect via the 'anxiety factor' score and negative affect via the negative affect factor score).

3.1.4. Task

All participants were then asked to review a list of typical daily activities and estimate how many of these activities they could realistically

complete within 30 minutes. They provided a numerical response ranging from 0 to 12.

3.2. RESULTS

3.2.1. Manipulation check: measures of affect induction

Table 2 presents the mean affect ratings for guilt, anxiety, and negative affect across the three affect induction conditions, both before and after the affect induction procedure. Each measure was analyzed using a 2x3 ANOVA, comparing Time (pre- vs. post-induction) as a within-subjects factor and Affect Induction group (guilt, anxiety, neutral) as a between-subjects factor.

For state guilt, a significant Time x Affect Induction interaction was observed, $F(2, 62) = 12.41$, $p < .001$, $\eta^2 = .30$. Further analysis revealed a significant increase in state guilt in the guilt induction group, $t(20) = 7$, $p < .001$, $d = 1.5$, while no significant effect was found in the anxiety induction, $t(21) = .81$, ns or neutral $t(21) = 1.4$, ns groups. Thus, the manipulation was overall successful in inducing the targeted affect. To assess whether high- and low-trait guilt groups responded differently to the affect induction, a 2 (Time) x 3 (Affect Induction) x 2 (Trait Guilt) ANOVA was conducted. Although the previous pattern of significance was replicated, the three-way interaction was non-significant, $F(2, 59) = .63$, ns, suggesting that high-trait guilt individuals were not more responsive to affect induction than low-trait guilt individuals.

For state anxiety, a significant Time x Affect Induction interaction was found, $F(2, 62) = 11.1$, $p < .001$, $\eta^2 = .26$. Post-hoc analysis indicated a significant pre-to-post increase in state anxiety in the anxiety induction group, $t(21) = 6.25$, $p < .001$, $d = 1.3$), but no significant effects were found in the guilt, $t(20) = .53$, ns or neutral, $t(21) = .75$, ns conditions.

Regarding negative affect, a significant Time x Affect Induction interaction was observed, $F(2, 177) = 11.7$, $p < .001$, $\eta^2 = .23$. Significant pre-to-post increases in negative affect were detected in both the anxiety, $t(21) = 4.62$, $p < .001$, $d = 1$ and guilt, $t(20) = 5.1$, $p < .001$, $d = 1.1$ induction groups, while no significant effect was found in the neutral condition $t(21) = .53$, ns.

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These findings confirm the effectiveness of the affect manipulations: the guilt induction successfully increased state guilt without influencing anxiety, the anxiety induction selectively elevated state anxiety, and negative affect increased in both the guilt and anxiety induction conditions but remained unchanged in the control group.

Tab. 2. *Mean affect ratings (and standard deviations) of the three affect induction groups (guilt, anxiety, neutral), before and after the affect induction*

	Guilt		Anxiety		Negative affect	
	Pre-affect induction	Post-affect induction	Pre-affect induction	Post-affect induction	Pre-affect induction	Post-affect induction
Guilt group (n=21)	26.33 (5.4)	30.8 (6.8)	4.3 (2.2)	4.7 (2.1)	18 (6.5)	24.7 (7.9)
Anxiety group (n=22)	25.7 (6.)	26.5 (5.7)	3.4 (1.9)	6.3 (2.4)	15.4 (6.2)	23.8 (11)
Neutral group (n=22)	28 (5.6)	27 (5.2)	4.3 (2.4)	3.9 (2.2)	17.3 (6.4)	18 (6.9)

3.2.2. Task performance: estimated number of activities

The mean number of estimated activities, as a function of Affect Induction (guilt *vs.* anxiety *vs.* neutral) and Trait Guilt (high *vs.* low), is depicted in Figure 2. The data were analyzed using a 3x2 ANOVA with Affect Induction and Trait Guilt as between-subjects factors.

A significant main effect of Affect Induction on number estimation was found, $F(2, 59) = 13.53$, $p < .001$, $\eta^2 = .31$. However, contrary to our initial hypothesis, individuals in the guilt induction group estimated a higher number of activities ($M = 5$, $SD = 2.5$) compared to those in the neutral condition ($M = 3.9$, $SD = 1.7$, $t(41) = 1.77$, $p < .05$, one-tailed, $d = .5$) and the anxiety induction group ($M = 3.7$, $SD = 1.6$, $t(41) = 2$, $p < .05$, one-tailed, $d = .6$).

A significant main effect of Trait Guilt was also observed, $F(1, 59) = 15.9$, $p < .001$, $\eta^2 = .21$, with high-trait guilt individuals providing higher estimates ($M = 4.6$, $SD = 2.2$) than low-trait guilt participants ($M = 3.7$, $SD = 1.6$).

A significant Affect Induction x Trait Guilt interaction was detected, $F(2, 59) = 14.5$, $p < .001$, $\eta^2 = .33$. In the guilt induction

condition, high-trait guilt participants estimated significantly more activities ($M = 8$, $SD = 1.1$) than high-trait individuals in the anxiety ($M = 4.3$, $SD = 1.6$) or neutral conditions ($M = 3.6$, $SD = 1.6$) (see Figure 2, left bars). No significant effects were found for low-trait guilt participants.
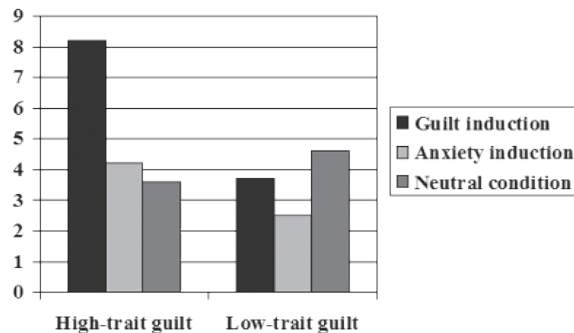

FIG. 2. Mean number of tasks estimation as a function of Affect Condition (guilt *vs.* neutral *vs.* anxiety) and Trait guilt (high *vs.* low).

4. DISCUSSION

This study investigates whether trait guilt influences the extent to which state guilt serves as informational input in the evaluation of time as a resource. To address this question, we examined how individuals with low and high levels of trait guilt processed experimentally induced guilt or anxiety. Emotion was manipulated by instructing participants to write about either a guilt-related life event, an anxiety-related life event, or a neutral life event.

The results can be summarized as follows. First, the guilt induction successfully increased state guilt, while the anxiety induction increased state anxiety. No significant changes were observed in the neutral condition. Second, we found that guilt specifically affected time evaluation: in Study 1, guilt induction led participants to underestimate the time required to complete a task, whereas in Study 2, it led them to overestimate the number of tasks that could be completed within a given timeframe. These effects were moderated by trait guilt. High-

trait guilt individuals significantly underestimated the time needed to perform daily activities and overestimated the number of tasks they could accomplish within a certain time frame following guilt induction, compared to both the anxiety and neutral conditions. This effect emerged despite guilt and anxiety sharing a common negative valence. In contrast, low-trait guilt individuals did not exhibit this pattern.

However, these findings contradict our initial predictions. We hypothesized that if individuals experiencing guilt aim to prevent further mistakes by ensuring high-quality performance, they should estimate that more time is needed to complete a task (i.e., overestimation) and anticipate accomplishing fewer tasks within the available time (i.e., underestimation). In other words, our expectation was that guilt would lead individuals to prioritize the avoidance of self-reproach for poor performance by accepting the risk of taking longer to complete tasks.

Contrary to this expectation, our data suggest the opposite. Our guilty participants appeared to adopt a prudential strategy aimed at avoiding the guilt associated with wasting time. Rather than prioritizing task accuracy, they seemed more concerned with the efficient use of time as a resource. Specifically, they underestimated the time required for task completion and overestimated the number of tasks they could perform within a fixed timeframe. From this, we can infer that guilty individuals operate according to a principle of prudence: *If I feel guilty, I must use my time as effectively as possible.* This principle manifests in two key ways: striving to complete tasks in the shortest possible time while also attempting to maximize productivity within the available time. The ultimate goal appears to be the avoidance of guilt associated with the irresponsible mismanagement of a fundamental resource – time.

5. CONCLUSIONS

Overall, our findings reinforce the conclusions of previous research demonstrating that judgments and decisions can be influenced by emotions that are unrelated to the judgment or decision at hand (e.g., Mellers *et al.* 1999; Lerner, Keltner 2000; Slovic *et al.* 2002; Gangemi *et al.* 2021).

More specifically, in line with earlier findings from various scholars (cf. Arntz *et al.* 1995; Gangemi *et al.* 2021), the present data suggest that emotions influence not only risk expectancies but also resource evaluations. Individuals with high levels of trait guilt appear to rely on feelings of guilt as informational input when estimating the time required to complete a task or assessing the number of activities that can be performed within a given time frame.

6. LIMITS AND FUTURE DIRECTIONS

We acknowledge that our study has several limitations, as it provides only preliminary insights into the relationship between guilt and time perception. Specifically, we tested our hypothesis using a relatively small sample size, necessitating cautious interpretation of the results and further validation with a larger participant pool. Nevertheless, we believe that our study raises intriguing points for consideration and hope it will inspire further research, as it generates several important questions.

For instance, existing literature on guilt suggests that it is deeply intertwined with the self, interpersonal relationships, and broader social functions (e.g., Izard 1978; De Rivera 1984; Roseman 1984; Scheff 1984; Shore, Parkinson 2017). However, in our study, the daily tasks involved in time estimation lacked interpersonal characteristics (e.g., making the bed, organizing desks). This raises a critical question: why would guilt influence time estimation for these «individual» tasks?

Moreover, prior research has classified guilt into distinct subtypes. O'Connor et al. (1997), for example, identified four categories of guilt: (1) Survivor guilt, in which an individual feels undeserving of survival or well-being compared to others who have suffered or perished; (2) Separation/disloyalty guilt, experienced when prioritizing personal success or independence is perceived as a betrayal of close relationships, family, or cultural ties; (3) Omnipotent responsibility guilt, arising from the belief that one bears personal responsibility for preventing or alleviating others' suffering, leading to an exaggerated sense of duty and self-blame; and (4) Self-hate guilt, characterized by self-directed anger and contempt, often manifesting as feelings of unworthiness or self-punishment.

More recently, Mancini and Gangemi (2021) proposed a distinction between two fundamental types of guilt: altruistic guilt (AG) and deontological guilt (DG). AG emerges when an individual perceives having harmed an innocent victim through action or omission. It is strongly linked to empathy and prosocial behavior, driving individuals to restore fairness or repair perceived harm. In contrast, DG arises from the transgression of an internalized moral norm – one that the individual intended to uphold – even in the absence of actual harm to oneself or others. Although both forms of guilt often co-occur in daily experiences, the authors argue that they are distinct constructs, with one not necessarily being reducible to the other.

According to this literature, it is plausible that different types of guilt differentially influence time evaluation. This leads to a related question to the first one reported above: what type of guilt did participants recall during the guilt induction task in our study?

Mancini and Gangemi's (2021) framework may provide useful insights for both the questions. Based on their distinction, we hypothesize that the guilt evoked in our experimental tasks aligns more closely with DG, as it lacks an interpersonal component. Our participants appeared to regulate their behavior in accordance with a norm designed to prevent guilt associated with wasting time. They seemed particularly concerned with the efficient use of time as a resource, with their ultimate goal being to avoid the perceived irresponsibility of mismanaging such a fundamental resource. Future research should investigate this hypothesis further by: 1) Inducing the two distinct types of guilt (DG and AG) while employing the same individual tasks used in our study. If our hypothesis holds, only DG should influence time estimation in individual tasks, replicating our findings. 2) Comparing individual tasks with interpersonal tasks while inducing both guilt types (DG vs. AG). We predict that DG will affect only individual time estimation tasks, while AG will influence only interpersonal time estimation tasks.

Given the limited body of research in this field and the constraints of our study, we encourage future investigations that more explicitly examine the relationship between guilt and time perception as a cognitive resource. Further research in this domain is both warranted and highly valuable.

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