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Tax compliance is not fundamentally influenced by incidental emotions: An experiment

Janina Enachescu[1] · Ziga Puklavec[1,2] · Jerome Olsen[3] · Erich Kirchler[1,4]

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Abstract

The present study investigates the impact of incidental emotions on tax compliance behavior in an experimental setting. Different theories are divided about how experiencing incidental emotions should influence tax decisions and the few existing studies yield inconsistent results. Our aim was to investigate differences between three specific emotions, namely anger, fear, and happiness. This allowed a comparison in compliance behavior as a function of differences in emotional valence as well as in specific emotional qualities. For this purpose, a sample of 264 individuals participated in a tax experiment. After a baseline treatment, one of the three emotions was induced using video-clips with background music. Moreover, emotional arousal was assessed by measuring electrodermal activity. Manipulation check items as well as elevated arousal levels after the emotion induction provided support for a successful emotion induction. Nevertheless, we did not observe any tax compliance differences between the anger, fear, and happiness conditions. Our results speak against a fundamental role of incidental emotions for tax compliance decisions.

Keywords Tax compliance · Incidental emotions · Experiment · Emotion induction · Electrodermal activity · Arousal

Janina Enachescu and Ziga Puklavec contributed equally to this work.

✉ Janina Enachescu
janina.enachescu@univie.ac.at

✉ Ziga Puklavec
Z.Puklavec@tilburguniversity.edu

[1] Department Occupational, Economic and Social Psychology, Faculty of Psychology, University of Vienna, Universitaetsstrasse 7, 1010 Vienna, Austria

[2] Department of Social Psychology, School of Social and Behavioral Sciences, Tilburg University, Warandelaan 2, 5037 AB Tilburg, The Netherlands

[3] Max Planck Institute for Research On Collective Goods, Kurt-Schumacher-Str. 10, 53113 Bonn, Germany

[4] IHS-Institute for Advanced Studies, Vienna, Austria

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1 Introduction

While most people are assumed to pay their taxes, not all do so voluntarily. Taxpayers show heterogeneity in their tax morale (Alm & Torgler 2011) and motivations to pay taxes (Braithwaite 2007). Arguments against taxes are often emotionally charged and tax talk is frequently accompanied by strong feelings (Enachescu et al. 2019). The question is whether tax decisions are made rationally as proposed by traditional economic models (Allingham & Sandmo 1972) or whether they are led by how taxpayers feel in the decision situation.

From a theoretical perspective, two types of emotions are linked to decision making (Lerner et al. 2015). *Integral emotions* directly stem from the decision situation (e.g., a person is angry after receiving unhelpful information from a tax officer), whereas *incidental emotions* are unrelated to the decision situation and occur casually (e.g., a person is angry because of a bad experience at the workplace). Previous studies have paid attention to a-priori selected integral emotions, namely shame, guilt, and anticipated regret (Casal & Mittone 2016; Coricelli et al. 2014; Murphy & Harris 2007), have explored which integral emotions are most relevant in tax decisions, namely anger, fear, self-blame, and general positive feelings (Enachescu et al. 2019), or what emotions are elicited by experiencing an audit (Erard et al. 2018). Importantly, experiencing such emotions that directly stem from the decision context consistently show effects on (intended) tax compliance and suggest that tax compliance decisions are at least in part influenced by emotional processes. For instance, taxpayers who experience anger due to poor services offered by the tax authorities are more likely to show dishonest compliance behavior (Enachescu et al. 2019). Publicly shaming tax evaders, on the other hand, can enhance future tax compliance if managed wisely (Coricelli et al. 2014).

However, whether incidental emotions—those that are experienced casually—also affect tax compliance is less clear. First studies investigating the impact of incidental positive versus negative affect yield inconclusive results (Enachescu et al. 2020; Fochmann et al. 2019). To contribute to the question whether tax compliance behavior is influenced by incidental emotions, in the present study we induce the emotions anger, fear, and happiness in an experimental setting and observe subsequent tax compliance.

1.1 Emotion theories

In line with Lerner et al. (2015) we use the term affect as an umbrella term for moods and emotions. Furthermore, we distinguish between integral and incidental emotions and focus on the latter. While integral emotions are logically related to the decision context itself, incidental emotions are elicited by surrounding circumstances and are not causally linked to the decision context.

Regarding the impact of incidental emotions, previous research has shown that emotions that are elicited by surrounding circumstances, such as sunny weather or a dispute with the partner, influence decisions in different contexts. For instance, sunny weather (usually associated with good mood) has been found to affect trading decisions on the stock market in the direction of more bullish behavior (Hirshleifer & Shumway 2003; Saunders 1993), as well as evaluations of one's general life satisfaction (Schwarz & Clore 1983). Furthermore, carry-over effects were demonstrated in standardized laboratory settings, influencing the presence of the endowment effect (Lerner et al. 2004), or affecting pro-social behavior like generosity and reciprocity (Cavanaugh et al. 2015; Kirchsteiger et al. 2006). Findings from consumer research suggest that mood and the associated arousal levels influence which products are preferred (Di Muro & Murray 2012).

As research on the impact of incidental emotions on tax compliance is sparse, we more generally draw from theories on the impact of emotions on decision making. There are multiple theoretical accounts of how incidental emotions can affect the decision making process. The Affect Infusion Model (Forgas 1995) emphasizes that those decisions which require substantial (computational) information processing and which are made heuristically are prone to be influenced by incidental emotions (as opposed to motivational or direct processing strategies that are not influenced by emotions). Tax compliance decisions are often assumed to require substantial information processing, as information about income, audit probabilities, tax rates, and fines has to be integrated. On the other hand, individuals with a tendency to follow norms and a high tax morale likely take decisions more heuristically in the direction of compliant behavior. The Affect Infusion Model proposes two different infusion routes of affective influence: directly as described by the Feeling-as-Information Theory (Schwarz 1990) or indirectly via mood congruent associations (Forgas 1995).

The Feeling-as-Information Theory (Schwarz 1990) postulates that current affect functions as a signal about the valence of a decision situation. Negative emotions are assumed to signal the presence of a problem that needs to be solved, leading to more thorough information processing. On the other hand, positive emotions should signal the absence of any threat or challenge, leading to the acceptance of the status quo. In line with this theory, participants relied more on general knowledge and heuristics when induced with happy as compared to sad mood in a recognition task (Bless et al. 1996). Similarly, a study using a foreign exchange trading task, found that participants induced with good mood made less accurate and faster decisions than those induced with neutral or bad mood (Au et al. 2003). Applied to tax decisions this means that negative incidental emotions can be expected to lead to more thorough processing of decision-relevant information such as audit levels and fine rates. Given that evasion is usually the monetarily optimal solution (in terms of a higher expected value from evasion than sure gain from compliance), tax compliance should be lower when experiencing negative emotions in comparison to positive emotions.

The Mood Congruency Hypothesis (Forgas 1995) states that negative (positive) emotions make negative (positive) information more accessible, leading to more pessimistic (optimistic) judgments about the future. Note that this theory functions

through the interplay of emotional states with risk perceptions. For instance, after manipulating affect by presenting newspaper articles about positive and negative events, participants evaluated subsequent risks more pessimistically (optimistically) when they were induced with negative (positive) mood, even when the content of the articles was unrelated to the risk evaluation task (Johnson & Tversky 1983). In another study, participants that were induced with negative emotions via video clips made more risk averse decisions in a life dilemma choice task, than those induced with positive or neutral mood (Chou et al. 2007). Applied to tax decisions, negative emotions should lead to an overestimation of the probabilities of getting caught cheating and therefore to higher tax compliance in comparison to positive emotions.

A different theoretical approach comes from an emotion regulation perspective. The Mood Maintenance Hypothesis (Isen & Geva 1987) assumes that when people experience positive emotions, they want to maintain this state and show risk-averse behavior, whereas negative emotions promote risk-seeking behaviors that might improve one's situation. Results from an experimental study revealed that individuals showed cautious optimism when induced with positive mood (Nygren et al. 1996). They evaluated risk optimistically but showed cautious gambling behavior when real losses were at stake in order to protect the positive state. Applied to the tax context, individuals would be expected to be less tax compliant when experiencing negative emotions in comparison to positive emotions.

In sum, the theoretical concepts suggest contradicting predictions about the influence of incidental emotions on tax decisions. Both the Feeling-as-Information Theory and the Mood Maintenance Hypothesis predict negative incidental emotions to promote *lower* tax compliance, whereas the Mood Congruency Hypothesis predicts negative incidental emotions to promote *higher* tax compliance (both in relative comparison to positive emotions).

1.2 Existing studies on the role of incidental emotions

Two recent articles have provided first empirical results on this question with inconclusive outcomes. The first suggested that negative emotions in fact lead to higher levels of tax compliance (Fochmann et al. 2019). In their experiment, the authors induced negative, neutral, and positive incidental emotions using emotionally rich pictures. Results indicated that taxpayers who experience negative emotions were more tax compliant than those experiencing positive emotions. Moreover, they surveyed 22,220 German taxpayers and found that taxpayers demonstrate higher willingness to comply when asked on a Monday than on the weekend (assumingly then in a better mood). Participants were 2.27% more likely to state favorable attitudes toward taxes on a workday compared to a weekend day.

The second study also aimed at experimentally manipulating incidental emotions, however, by playing background music in the lab; music by Wolfgang Amadeus Mozart (positive emotions), Gustav Holst (negative emotions), and a control condition without music (Enachescu et al. 2020). This study failed to find compliance differences between the positive affect and the negative affect condition. The only observed difference was that compliance was higher in the positive affect than

control condition. However, it is important to mention that the manipulation of incidental emotions via music alone was not successful in terms of the manipulation check scales. The present study builds on this design and was improved to increase the strength of the emotion induction.

1.3 The need for investigations of specific emotions

The theories and evidence outlined so far demonstrate approaches that reduce emotions to a single valence dimension. However, this is not the most informative approach when one is interested in risky decisions. Both the Feeling-is-for-Doing approach (Zeelenberg & Pieters 2006) and the Appraisal Tendency Framework (Lerner et al. 2015) stress the importance of behavioral consequences of differential single emotions. The Feeling-is-for-Doing approach assumes that emotions have a motivational component that influence behavior directly. The Appraisal Tendency Framework on the other hand proposes that incidental emotions influence how incoming information is evaluated by activating differential appraisal patterns.

For instance, anger is associated with a high sense of control, low pleasantness, and high responsibility of others (among other factors) and is therefore associated with the tendency to appraise a future negative event as foreseeable and controllable, and is linked to taking responsibility for others (Lerner et al. 2015). Once this appraisal pattern is activated, risks tend to be perceived as lower than in a neutral emotional state. In contrast, fear is associated with a low sense of control and low certainty, and therefore leads to higher subjective risk perceptions. Applied to the tax context, individuals would then be expected to be more willing to evade taxes when induced with anger and more willing to comply when induced with fear. Importantly, a dimensional view would expect an effect in the same direction of anger and fear on compliance (depending on the theory, but consistent in terms of direction) and could be too simplistic.

Integrating the dimensional view and theories on specific emotions, one could expect that a fear appraisal makes pessimistic cues more available in line with the Mood Congruency Hypothesis. Anger on the other hand has a strong inherent action tendency (Frijda et al. 1989), and is more likely to promote behavior aimed at changing the situation as proposed by the Mood Maintenance Hypothesis. In the present context, individuals would evaluate audit information more cautiously and be more compliant when induced with fear and seek to change their emotional state by increasing their income through non-compliance when induced with anger.

Regardless of the specific emotional quality, higher intensity of emotional experiences manifests itself by increased emotional arousal (Scherer 2005). Two previous experimental studies have investigated the impact of emotional arousal on tax compliance behavior and came to inconclusive results (Coricelli et al. 2010; Dulleck et al. 2016). However, in these studies the authors argued that arousal was elicited by emotions directly related to the tax compliance decisions. In this study, we will assess emotional arousal by measuring skin conductance response, in order to control for intensity of incidental emotional experiences.

Table 1 Sociodemographic characteristics of participants across conditions

Condition	Sex	n	Age				*N* (total)
			M	*SD*	*Min*	*Max*	
Happiness	Male	30	25.20	5.15	19	38	86
	Female	56	23.91	4.95	19	45	
Anger	Male	42	25.45	6.30	19	58	89
	Female	47	23.38	4.40	19	43	
Fear	Male	48	26.25	9.00	18	70	89
	Female	41	24.15	5.34	18	43	

2 Research aims and hypotheses

In the present study we investigated the influence of specific incidental emotions, namely happiness, anger, and fear, elicited by short video clips combined with background music, on tax compliance decisions in a mixed-design experiment. Participants faced multiple rounds of a tax game in which they earned money through a real effort task and then had to take tax compliance decisions with decision contingent monetary incentives. Emotional arousal was assessed by measuring skin conductance response. The extent of experienced specific emotions was measured in a post-experimental questionnaire.

Drawing on the assumptions of the Appraisal Tendency Framework, we expected that participants show higher tax compliance in the fear condition and lower compliance in the anger condition. However, we were unable to formulate directed hypothesis regarding the effect of the happiness condition compared to the other two emotions (i.e., fear and anger), as theories on the effects of positive and negative affect on risky decisions argue in different directions. According to the Feeling-as-Information Theory, we would expect more tax evasion in the fear and anger compared to the happiness condition, while the Mood Congruency Hypothesis and the Mood Maintenance Hypothesis would support the opposite prediction.

3 Method

3.1 Participants

The sample comprised 264 participants. Participants' mean age was $M = 24.67$ ($SD = 6.12$) and 54.5% were female. Participants were students from various fields. Due to possible prior knowledge of the pursued research questions at the Department of Occupational, Economic and Social Psychology, psychology students were not eligible to participate. Detailed sociodemographic characteristics and the distribution of participants across conditions are shown in Table 1.

None of the participants were excluded from the data analysis. However, due to unit malfunction (and in a single case, due to a matching error) the skin conductance

measurement data of 24 participants was not recorded and thus not included in the respective arousal analyses. This does not affect the main behavioral analysis.

3.2 Experimental design

The experiment comprised a tax game with 16 repeated rounds that was administered in one of three different emotion conditions (happiness, anger, or fear). In each round, participants started with a fixed income of 1000 Experimental Currency Units (ECU) and had the possibility to earn up to another 1000 ECU in a real-effort slider task (20 s for 10 sliders; solved $Mdn = 7$; see Gill and Prowse 2012). Following the effort task, participants faced an income tax declaration decision. The tax rate (40%), audit probability (25%), and fine in case of detected tax evasion (owed tax plus a fine of the same amount) were constant over all rounds. The audits were predetermined based on the audit probability and fixed to occur at the same time for each participant. Feedback about audits was given after each round. At the end of the experiment, one round was randomly drawn and the income was converted from ECU to Euro (1.50 Euro show-up fee plus 1.00 Euro per 300 ECU) and payed to the participant. The mean payoff was 5.25 Euro.

3.2.1 Emotion induction

After the first eight rounds, which served as a within-person baseline, a short video clip (approx. 4.5 min.) with background music was played to induce one of the three emotions. In the happiness condition, participants watched a funny scene from the movie Mr. Bean's Holiday (2007), with Symphony no. 70, D major by Joseph Haydn as background music. In the anger condition, individuals watched a bully scene from the movie My Bodyguard (1980), with The Planets—Mars, the Bringer of War by Gustav Holst as background music. In the fear condition, participants watched a scene from the movie The Shining (1980), with background music from the movie's soundtrack (Polymorphia by Krzysztof Penderecki). The background music continued to play throughout the remaining eight rounds.

The selection of film clips and music used in the experiments was based on successful use in previous experiments (Drouvelis and Grosskopf 2016; Kreutz et al. 2008; Schaefer et al. 2010). The combination of music and film was chosen to reduce demand effects as compared to other methods (e.g. Velten technique[1]; Buchwald et al. 1981) and because it has been reported to be one of the more successful methods of emotion induction in general (Gerrards-Hesse et al. 1994; Joseph et al. 2020; Westermann et al. 1996).

[1] For the Velten technique, participants are asked to read emotionally laden statements (e.g. "I feel rather sluggish now.") and are instructed to try to feel the described mood (Westermann et al. 1996).

3.2.2 Arousal measurement

Throughout the experiment, participants' arousal was measured by means of electrodermal activity (EDA). EDA refers to the variation of the electrical properties of the skin in response to sweat secretion, which is an index of sympathetic activity. EDA can be distinguished into the fast varying phasic activity (skin conductance response) and the slowly varying tonic activity (skin conductance level) (Benedek & Kaernbach 2010). While phasic skin conductance response is useful for studying attentional processes, event related (stimuli) onsets, and behavioral differences, the tonic skin conductance level can be used to investigate general states of arousal and alertness (Dawson et al. 2007). The present study utilized the tonic skin conductance level. For acquisition of EDA, TMSi Mobi8-BP units were used. Participants had to wear two electrodes on their index and middle finger of the non-dominant hand.

3.2.3 Post experimental questionnaires

After completing the tax game, participants filled out a manipulation check questionnaire, provided their socio-demographic information, and answered two open questions (i.e., "What did you thinking about, while completing the tasks of this study?", "What do you think was the purpose of this study?"). The manipulation check questionnaire consisted of an adapted German version of the Positive and Negative Affect Schedule (PANAS),[2] a 20-item mood scale (Krohne et al. 1996; Watson et al. 1988).

3.3 Procedure

The experiment took place in the Social Science Research Lab of the Department of Occupational, Economic and Social Psychology. Participants were recruited on campus and through the Laboratory Administration for Behavioral Sciences (LABS) recruitment system. Each session was run in one of the three conditions. Therefore, randomization took place on session level.

Upon arrival in the laboratory, participants took a seat at a computer cubicle of their liking. They received written instructions explaining the effort task and procedure of the tax game on the screen. Participants were instructed to put on a pair of headphones and were then attached to the electrodes of the EDA measurement on their non-dominant hand. They were told to move this hand as little as possible during the procedure. The experiment started with general instructions, followed by two test rounds to get familiar with the effort task and format of the tax compliance decisions. After the test rounds, the first eight experimental rounds were administered.

[2] The adapted version of the questionnaire was constructed as follows: The adjectives active, interested, strong, guilty, inspired, proud, irritable, enthusiastic, ashamed, alert, nervous, determined, and attentive from the PANAS were kept unchanged. Furthermore, the adjectives distressed, excited, upset, scared, afraid, hostile, and jittery were removed, while the adjectives sad, happy, stressed, fearful, helpless, angry, and insecure were added.

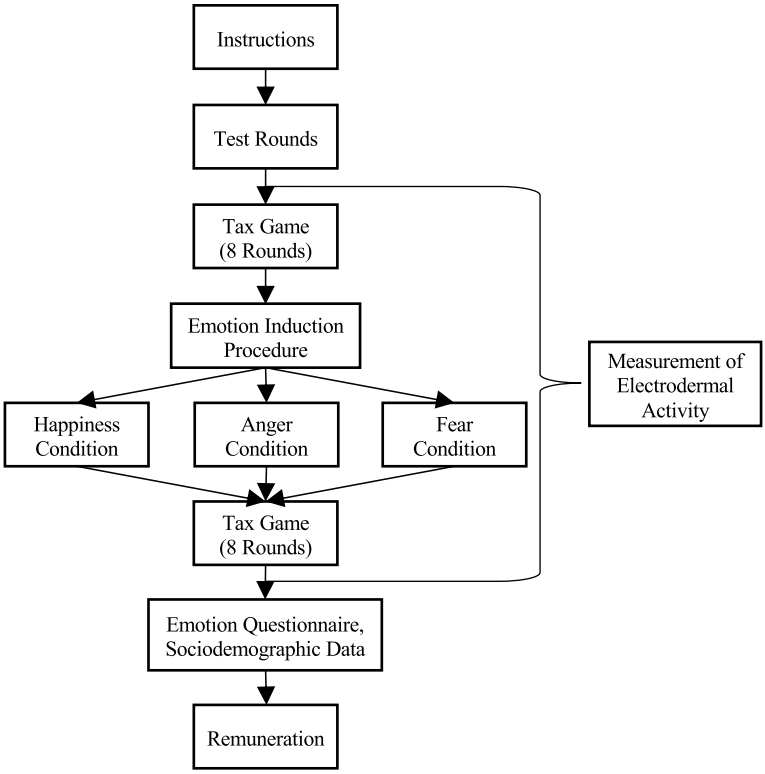

Fig. 1 Experimental procedure

Next, participants were presented with the respective video clip and corresponding background music via the headphones. The music continued to play after the video clip ended, accompanying the last eight rounds of the tax game. Then the music stopped and participants filled out the post experimental questionnaire before receiving information about their remuneration. Before leaving the laboratory, participants were payed and they signed the receipt of the money. The experimental procedure is detailed in Fig. 1. The study was approved by the Ethics Committee of the University of Vienna (reference number: 00373).

3.4 Data preprocessing

3.4.1 Tax compliance

As the earned income depended on the effort task results, the tax due amount was subject to variation. Therefore, we used relative tax compliance as a measure of tax compliance behavior. The score was computed by dividing the amount of tax declared by the actual tax due for each individual and round. Thus, the minimum

value of zero represents full evasion, while the maximum value of one represents full compliance.

3.4.2 Electrodermal activity

The raw EDA data was first transformed from voltage values into conductance values (microsiemens). We downsampled the data by a factor of 4 (256–64 Hz), applied a low-pass Butterworth filter (fourth order with 1 Hz cutoff), and applied adaptive smoothing. The data was analyzed with LedaLab (a Matlab-based software) using the Continuous Decomposition Analysis (Benedek & Kaernbach 2010) with four different sets of initial values considered for optimization. For the analyses, the tonic component of EDA was extracted and z-transformed on a within-subject level. The z-transformation is a necessity, as scores can differ widely between participants (Dawson et al. 2007). The resulting data was a mean score of tonic activity, representing the deviation from the within-subject mean value of tonic activity throughout the experiment, for each experimental participant at any of the given rounds.

3.5 Data availability

The data and a codebook have been made publicly available on the Open Science Framework (https://osf.io/qych5/). To access the supplementary materials, see https://osf.io/pvnfx/.

4 Results

First, we answer whether the emotion induction was successful in terms of the manipulation check scales as well as increases in measured arousal. Second, we present results on the effects of the experimental manipulation on tax compliance behavior.

4.1 Manipulation check

To test whether the induction of happiness, anger, and fear was successful in the respective conditions we ran a multivariate analysis of variance with the three measured emotion scores of the manipulation check scales as dependent variables and the condition as independent variable. Overall, we found that experienced emotions differed between the three conditions, $F(6, 518) = 6.867$, $p < 0.001$, $\eta_p^2 = 0.074$. On univariate level, Table 2 reveals that participants reported higher levels of the emotion fear in the fear condition, $F(2, 261) = 9.240$, $p < 0.001$, $\eta_p^2 = 0.066$, higher levels of the emotion anger in the anger condition, $F(2, 261) = 6.809$, $p = 0.001$, $\eta_p^2 = 0.050$, and also higher levels of happiness in the happiness condition, $F(2, 261) = 3.187$, $p = 0.043$, $\eta_p^2 = 0.024$. Note that the confidence interval in the happiness condition overlapped. Planned contrasts revealed significantly higher levels of the emotion happiness in the happiness condition compared to the fear condition,

Table 2 Mean values, standard deviations, and confidence intervals of reported emotion scores by experimental condition. Standardized values (z-scores)

Emotion	Condition					
	Happiness		Anger		Fear	
	M (*SD*)	CI 95%	*M* (*SD*)	CI 95%	*M* (*SD*)	CI 95%
Happy	0.21 (0.93)	[0.02, 0.41]	−0.05 (0.99)	[−0.25, 0.16]	−0.16 (1.05)	[−0.37, 0.06]
Angry	−0.15 (0.85)	[−0.33, 0.03]	0.31 (1.19)	[0.06, 0.56]	−0.17 (0.86)	[−0.35, 0.01]
Fearful	−0.25 (0.86)	[−0.43, 0.07]	−0.11 (0.89)	[−0.29, 0.08]	0.35 (1.13)	[0.11, 0.59]

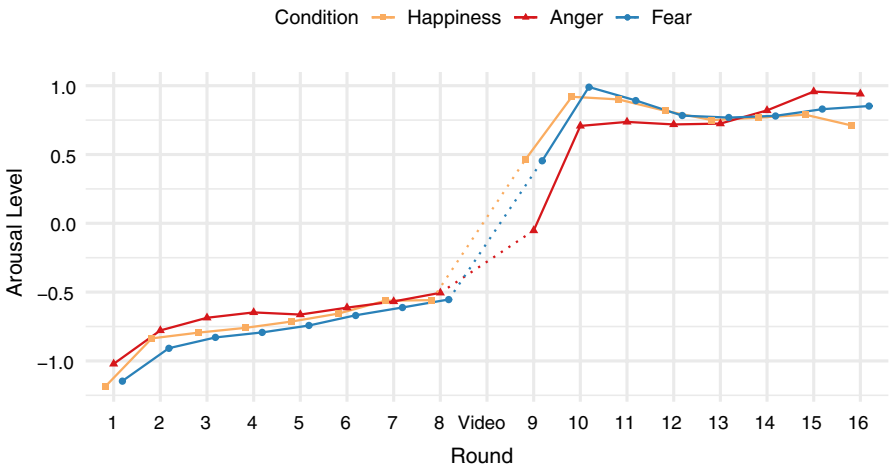

Fig. 2 Arousal levels across all 16 rounds

$t(261) = -2.462$, $p = 0.015$, but no significant differences in comparison to the anger condition, $t(261) = -1.733$, $p = 0.084$.[3] Figure S1 in the online supplementary materials provides an overview of all 20 emotions.

Additionally, we investigated the change in arousal levels after the emotion induction. Figure 2 shows that arousal increased steadily over the course of the experiment in all three conditions. Importantly, the slope visually becomes steeper right after the emotion induction and settles at a higher level than in the first half of the experiment. To test this observation, we ran two linear mixed-effects models with a random intercept for individuals to account for the

[3] Planned contrasts for the other two emotions revealed significantly higher levels of the respective emotion in comparison to both other conditions. More specifically, the level of the emotion anger in the anger condition was higher compared to the happiness condition, $t(261) = -3.09$, $p = .002$, and higher compared to the fear condition, $t(261) = -3.28$, $p = .001$. Also, the level of the emotion fear in the fear condition was higher compared to the happiness condition, $t(261) = -4.10$, $p < .001$, as well as compared to the anger condition, $t(261) = -3.16$, $p = .002$.

Table 3 Linear mixed-effects models with arousal level as dependent variable

Effect	Arousal level					
	Model 1			Model 2		
	Estimate	95% CI		Estimate	95% CI	
		LL	UL		LL	UL
Intercept	−0.74***	−0.77	−0.72	−0.76***	−0.80	−0.71
Induction [after]	1.49***	1.46	1.53	1.52***	1.46	1.59
Condition [anger]				0.07*	0.01	0.14
Condition [fear]				−0.02	−0.09	0.04
Induction [after] * Condition [anger]				−0.14**	−0.24	−0.05
Induction [after] * Condition [fear]				0.05	−0.04	0.14

*$p < .05$. **$p < .01$. ***$p < .001$

$N = 240$ with 16 repeated measures (3,840 observations in total; some missing values due to failed EDA measurement). CI = confidence interval; LL = lower limit; UL = upper limit. Induction = 0 for rounds before the emotion induction; Induction = 1 for rounds after the emotion induction. The emotion condition was dummy coded with the happiness condition as reference group, resulting in a comparison of positive (happiness) against the two negative valence conditions (anger and fear). Changing the reference group (e.g., to anger or fear) does not change the interpretation of results qualitatively

repeated measures structure of the data. The dependent variable was the average level of tonic arousal activity for each round (for details see Sect. 3.4.2). In Model 1, we entered an indicator for the emotion induction (dummy coded; before and after induction) as a fixed effect. Results (Table 3) are in support of the visual impression and revealed that there was a strong general increase in arousal levels right after the emotion induction occurred.

In Model 2, we additionally included the emotion condition (dummy coded) and the interaction terms between the emotion conditions and induction variable as fixed effects. We observed that the arousal levels did not differ between the happiness and fear condition after the induction. Yet, the interaction between emotion induction and the anger condition revealed that participants in this condition were relatively less aroused after watching the video (also see the red line in rounds 9 and 10 in Fig. 2).

In combination, the manipulation check analyses showed that participants self-reported experiencing higher levels of specific emotions in the direction of our manipulations. Furthermore, participants felt more aroused in all three conditions after the emotion induction. We conclude that the manipulation of incidental emotions was successful.

Table 4 Linear mixed-effects models with the relative tax compliance score as dependent variable

Effect	Relative tax compliance					
	Model 1			Model 2		
	Estimate	95% CI		Estimate	95% CI	
		LL	UL		LL	UL
Intercept	0.69***	0.63	0.76	0.68***	0.61	0.75
Condition [anger]	−0.02	−0.11	0.07	−0.01	−0.11	0.09
Condition [fear]	−0.02	−0.11	0.07	0.02	−0.08	0.12
Induction [after]	−0.04*	−0.07	−0.01	−0.03	−0.09	0.03
Condition [anger] * Induction [after]	0.01	−0.03	0.06	−0.01	−0.09	0.07
Condition [fear] * Induction [after]	−0.00	−0.05	0.05	−0.06	−0.15	0.02
Arousal				−0.01	−0.05	0.02
Condition [anger] * Arousal				0.02	−0.02	0.06
Condition [fear] * Arousal				0.04	−0.00	0.09

*$p < .05$. ***$p < .001$

$N = 264$ with 16 repeated measures (4,224 observations in total) for Model 1. $N = 240$ with 16 repeated measures (3,840 observations in total; some missing values due to failed EDA measurement) for Model 2. CI = confidence interval; LL = lower limit; UL = upper limit. The emotion condition was dummy coded with the happiness condition as the reference group. Induction = 0 for rounds before the emotion induction; Induction = 1 for rounds after the emotion induction. Arousal is the level of tonic activity of each experimental round.

We conducted the same analysis on the extensive margin, where we coded the relative compliance as a binary variable (any type of evasion vs. full compliance). These results are reported in the online supplementary materials in Table S1. Furthermore, we include the linear mixed model reported here with additional control variables (sex and income). These results are reported in Table S2. Both analyses support the main results

4.2 Tax compliance decisions

To test whether tax compliance differed between the three conditions we ran two linear mixed-effects models with a random intercept for individuals. The dependent variable was the relative tax compliance score. Results are reported in Table 4. In Model 1, we entered the emotion condition (dummy coded), an indicator for the emotion induction, and their interactions as fixed effects. Figure 3 depicts relative tax compliance levels for the three conditions across all 16 rounds. A difference in tax compliance between the emotion conditions after the induction would be qualified by significant interaction terms. However, Model 1 attested that there were no significant interactions and therefore no condition differences in tax compliance in the second eight rounds. There only was a general decrease in compliance levels in the rounds after the induction, as indicated by the significant effect of the induction

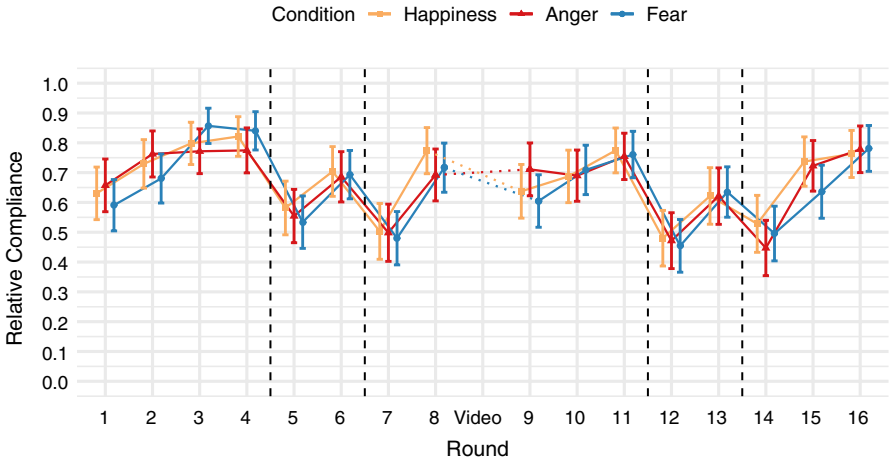

Fig. 3 Relative tax compliance across all 16 rounds. Dashed vertical lines indicate the fixed audit positions. *Note.* The main variability in compliance is caused by post-audit decrease of compliance (i.e., the bomb-crater effect; Mittone 2006) and is rather constant between conditions

dummy, meaning that compliance levels decreased with progression of the tax game, independent of the condition.

In Model 2, we additionally included mean arousal levels per round as well as interaction terms with the emotion conditions as fixed effects. After controlling for within-subject arousal level changes, again no interaction effect between the emotion condition dummies and the induction dummy were observed. This implies that individuals who were affected stronger (or weaker) by the respective emotion induction in terms of measured arousal levels also did not show a different pattern in tax compliance decisions.

5 Discussion

We investigated the influence of incidental emotions on tax compliance decisions by inducing the specific emotions fear, anger, or happiness in an experimental setting. The experimental manipulation of emotions was successful. Participants self-reported experiencing the respective emotions significantly more intensively in the corresponding conditions. Additionally, skin conductance levels were elevated after the emotion induction, indicating the presence of strong emotional arousal. Despite the successful manipulation of specific emotions and improvements in the design compared to previous studies (Enachescu et al. 2020), we do not find any differences in tax compliance between the three conditions.

In line with the Appraisal Tendency Framework, we expected that participants would show higher compliance levels in the fear condition compared to the anger condition. Fearful participants were expected to appraise incoming information as uncontrollable, and evaluate risks negatively, while angry participants were expected to appraise risks as controllable and predictable. Regarding the effects of

the happiness condition, the Feeling-as-Information Theory points into a different direction (positive affect should foster tax evasion) than the Mood Congruency and the Mood Maintenance Hypotheses (positive affect should foster tax compliance). Therefore, we did not formulate a directed hypothesis but expected a difference between compliance levels in the happiness condition compared to the two negative affect conditions (anger and fear). However, none of these effects could be shown in this study.

There are several possible reasons why we did not find the expected effects of incidental emotions on tax compliance behavior. First, we assumed that tax compliance decisions require substantial information processing, a form of processing that is theorized to be susceptible to emotional influences. However, it is possible that this kind of decisions are based on motivated or direct information processing routes, which are less likely to be influenced by incidental affect (Forgas 1995).

Second, the source of induced emotions was rather salient in this study, as participants attentively watched the four to five-minute-long video clips. Some authors argue that the carry-over effects of incidental emotions appear only when participants are unaware of the source of emotion and therefore misattribute it to the decision task (Schwarz & Clore 1983). However, in a previous experiment that served as a starting point for this investigation it was tried to conceal the source of emotion induction by only playing background music (from an adjacent room) without offering further explanation (Enachescu et al. 2020). In this study the emotion induction was not successful. Finding the balance between an emotion induction that is subtle but still works and one that is salient and prone to demand-effects poses a challenge for this stream of research.

Third, integral emotions elicited by the experimental situation itself could have interacted with the induced incidental emotions. The effort task in itself likely caused stress-related feelings, as there was a time limit for completing the task. In addition, the tax decision might have elicited feelings of anxiousness or reactance. In a review on the integration of integral and incidental affect, Västfjäll et al. (2016) conclude that the effects of integral affect dominate the effects of incidental affect when both types are present, which is a possibility in our case. Furthermore, they argue that the effects of incidental affect are strongest when they are high in salience but participants are unaware of their source, which is not the case in the present study.

Notwithstanding these possible limitations, this study makes an important contribution to the field. By inducing anger and fear separately, we overcome one of the major flaws of previous studies that focused solely on positive versus negative affect. When the specificity of negative affect is unknown, it is not clear what effects to expect, as joined occurrences of specific emotions can add up or cancel out each other (e.g. anger and fear). The experimental design allowed us to successfully induce these specific emotions and control for inter-individual differences in baseline emotionality (some participants might come to the lab stressed, while others are happy). Moreover, we assessed emotional arousal by measuring skin conductance response adding an additional dimension to the emotion measurement. The arousal measures provide less obtrusive information about the success of the emotion manipulation that is not prone to demand-effects.

We did not find any systematic effect of induced incidental emotions on tax compliance. In light of our results alongside the existing studies on emotions and taxes, one possible conclusion is that incidental emotions are not of considerable importance for tax decisions, but rather that integral emotions are more likely to affect tax decisions. Prior studies showed that emotions elicited in the taxation context itself influence compliance behavior and compliance intentions. The various sources of these emotions could be receiving a balance notice, speaking to a tax officer, or experiencing an audit (Enachescu et al. 2019), or in response to social pressure (e.g. shame, Casal & Mittone 2016). Even if there are effects of incidental affect that we missed in this study, the effects of integral emotions seem to be more relevant for the decision-making process.

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Data availability https://osf.io/qych5/.

Code availability https://osf.io/qych5/.

Declarations

Conflict of interest Not applicable.

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