



Phew! An exploration of the role of relief in tax compliance

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1. INTRODUCTION

Please indulge us and take a short exercise in reminiscence. Can you remember a time when you submitted a piece of coursework, job application, or perhaps a research grant request, at the very last minute before the deadline? Try to remember how you felt... Which emotions can you recollect? Is it the stress and anxiety that accompanied the process? Or perhaps the wonderful feeling of *relief* as you finally submitted the work and the weight lifted off your shoulders? Most readers can remember such an experience very well. Perhaps what they remember less well is why they procrastinated and waited until the very last minute. While procrastination can be due to a variety of factors, some people report procrastinating until the last minute precisely because they are ‘hooked’ on the uplifting feeling of *relief* elicited when they just about manage to complete the work in time (Koenfucius, 2017).

This paper takes a closer look at the emotion of *relief* and its motivational implications, specifically within the context of the relief felt upon completion of a tax return. Oddly enough, although relief is mentioned in a good number of works on the role of emotions in decision-making, no previous work has tested its effect empirically. In economic psychology and behavioural economics, as well as developmental psychology, relief is counted as a counterfactual emotion (along with regret and disappointment). Emotion research, on the other hand, has briefly looked at relief as one of the positive emotions. Below, we review these different strands of knowledge. We bring these findings together in a model of *relief*, its antecedents, and motivational implications. We then report on a test of the theory in the context of tax compliance, by examining the emotional responses of experimental subjects undertaking a mandatory task that distracts them from being able to earn money from a real effort task.

2. RELIEF – GENERAL PROFILE

In common parlance, relief is generally defined as “a feeling of happiness that something unpleasant has not happened or has ended” (‘Cambridge English Dictionary’, n.d.). In line with this definition, relief is included in emotion taxonomies as a positive emotion, either as a basic emotion (Ekman, 2000, 2012) or as a sub-category of joy (Shaver, Schwartz, Kirson, & O’Connor, 1987).

Ekman (2012) proposes that relief is “felt when something that has strongly aroused our emotions subsides”, noting that it is typically associated with relief from prolonged stress but can accompany release from any strong emotion, such as grief, or even sexual arousal. Ekman’s view is consistent with the various linguistic uses of relief as “alleviation of or deliverance from distress, anxiety, or some other emotional burden”, as well as “alleviation of physical pain or discomfort” and “sexual release or satisfaction” (‘Oxford English Dictionary’, n.d.). Ekman (2012) notes that relief is unique among emotions in that it is always preceded by another emotion. His conceptualisation of relief is based on research into basic emotions, noting that relief (along with 14 other basic emotions) possesses distinct appraisals, action tendencies, and physiology.

A different strand of research has looked at relief as the emotion resulting from comparing current reality with a more negative fictive reality (i.e. contemplating how things could have been worse) (Guttentag & Ferrell, 2004; Weisberg & Beck, 2010, 2012). As such, relief accompanies counterfactual thinking, the cognitive process of comparing current and imagined reality; while relief is elicited in downward counterfactual thinking (i.e. contemplating how things could have been worse), its

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counterparts of regret and disappointment accompany upward counterfactual thinking (i.e. contemplating how things could have been better) (e.g., Zeelenberg et al., 1998). This strand of research has mostly been concerned with the development of counterfactual thinking and emotions in childhood and adolescence (e.g., Habib et al., 2012; Weisberg & Beck, 2012).

The two strands of knowledge outlined above have different foci (children vs adults, emotion vs cognition) and may be in places contradictory. For example, Ekman (2012) proposes relief to follow other subsiding emotions. By contrast, research into counterfactual emotion has been more concerned with relief as an emotion that necessarily accompanies cognitive processes of counterfactual thinking. In the following sections, we discuss the two research strands in more detail and integrate them to propose a testable model of the role of relief in decision-making.

3. RELIEF AS EMOTION THAT ACCOMPANIES COUNTERFACTUAL THINKING

To engage in counterfactual thinking is to actively compare current reality with alternative possible realities. People often engage in counterfactual thinking, particularly following taking an action (or actively inhibiting taking an action), and especially when the actions taken are atypical (for an overview, see Byrne, 2002).

While some forms of repeated counterfactual thinking could be maladaptive (e.g., rumination), counterfactual thinking largely serves an important function in decision-making. In a challenge to traditional economic thinking which posited that people make decisions based on absolute expected gains (i.e. Expected Utility), Kahneman and Miller (1986) highlighted the role of cognitive alternatives, by which our decisions are influenced by comparing outcomes with salient alternatives. More so, our decisions are not only influenced by the outcome of the comparison, but also by the expected emotional experience related to counterfactual thinking, for example by the aversion towards feeling regret (e.g., Coricelli, Dolan, & Sirigu, 2007; Loomes & Sugden, 1982; Mellers, Schwartz, & Ritov, 1999). A number of emotions are typically proposed to accompany thoughts about 'what could have been'. Thinking about how 'things could have been worse' (downward counterfactual thinking) is proposed to elicit the positive emotion of relief, while thinking about 'how things could have been better' (upward counterfactual thinking) is associated with either regret (felt when the individual had agency in the situation) or disappointment (felt when reality was beyond individual control) (L. M. F. Martinez, Zeelenberg, & Rijsman, 2011; Weisberg & Beck, 2012; Zeelenberg, 2007). Other emotions may also accompany the contemplation of alternatives, such as guilt, blame, or pride (Byrne, 2002).

Counterfactual thinking emotions can be involved in decision-making in several ways.

- While decisions are considered, the *anticipation* of emotion may influence a certain course of action. For example, anticipating an unpleasant feeling of regret may motivate people to take a course of action that would avoid such a feeling (e.g., McCormack & Feeney, 2015).
- Immediately following the decision, the emotional intensity of the counterfactual emotion may prompt heightened information-seeking about 'what went wrong' (e.g., Shani & Zeelenberg, 2007).
- Repeated emotional experience may trigger a learning process about the value of outcomes which would influence future decisions (e.g., Camille et al., 2004; Habib et al., 2012).

Of the counterfactual emotions above, regret has received marked attention in psychology (particularly cognitive psychology), along with disappointment (e.g., Camille et al., 2004; Davison & Feeney, 2008; L. F. Martinez, Zeelenberg, & Rijsman, 2011; L. F. Martinez et al., 2011; van Dijk & Zeelenberg, 2005; Zeelenberg & Pieters, 2007). Despite many authors conceptualising regret and relief as two ‘sides of the coin’ in the emotional experience of counterfactual thinking (e.g., Camille et al., 2004; Zeelenberg et al., 1998), by comparison to regret, there is much less empirical research on the nature and implications of relief.

Overall, the literature on counterfactual emotions is equivocal on the precise nature and role of relief in decision making (not least due to methodological inconsistencies, for discussions see Duijvenvoorde et al., 2014; Weisberg & Beck, 2012). Nonetheless, it offers some useful propositions for empirical testing. First, it proposes several routes by which relief could influence decisions. (a) As anticipated emotion, it could act as an incentive to make decisions that will lead to relief. (b) As experienced emotion, it could facilitate learning from the favourable decision taken, thus leading to favouring that course of action in the future. This literature also provides some lessons for the current research. In particular, several authors found relief to be more difficult to elicit than regret, potentially because the negative outcomes following a decision is more likely to trigger counterfactual thinking (and the related emotional response) than a positive outcome (e.g., Weisberg & Beck, 2010).

From the perspective of emotion research, the literature presented above on counterfactual emotions (especially those studies that have focused on relief) are limited in what they can tell us about the nature of relief as an emotion. Regret and relief have been studied as “quintessentially cognitive-based emotion[s]” (Camille et al., 2004), and measured only as ratings of ‘(un)happiness’ following a particular outcome. Arguably, such cognitive-based understanding of relief does not provide much insight into its unique nature as an emotion. We next turn to the emotion literature to gain further insight into relief’s emotional pattern.

4. RELIEF AS DISCRETE POSITIVE EMOTION

Relief is included in several inventories of emotion, although to our knowledge no programme of empirical research in the emotion field has focused solely on relief. In order to investigate the nature of relief as a specific entity, we take the view of the existence of discrete emotion categories (for a discussion see for example Russell, 2003). We base our analysis of relief on a largely consensual model of emotion by which emotions are related to specific cognitive appraisals (I. J. Roseman, 1996) and are followed by higher potential to perform particular actions (Frijda, 1986). In addition, certain emotions considered to be basic or primary emotions (Ekman & Cordaro, 2011) are proposed to possess unique physiological manifestations and related external cues, such as facial expressions and/or vocalisations. Below we describe relief from the perspective of:

- cognitive appraisals
- action tendencies, and
- external cues.

4.1 Cognitive appraisals related to relief

In a seminal book on the cognitive structure of emotions, Ortony, Clore, & Collins (1990) categorise emotions based on their reactions to certain types of events. Some emotions, such as relief, are related to appraisals regarding the *consequences of events* (as opposed to emotions about other people or objects). In particular, the relief part of emotions is concerned with *consequences for the*

self (as opposed to others), where the *prospect of these consequences is relevant* and in particular where a *negative prospect has been disconfirmed*. Therefore, from a cognitive perspective this approach suggests that in order to feel relief, one has to take into account the consequences of events for the self in a case where negative consequences are disconfirmed. This conceptualisation is largely in line with research on counterfactual thinking described in the previous section.

As Ortony et al. (1990) point out, these appraisals lead to balanced reactions (pleasant/unpleasant), but will have to reach a certain intensity in order to be experienced as emotions. Interestingly, in their equation of relief (p. 186), the potential to experience relief when negative events were disproved is associated with the potential to experience fear during a period of uncertainty preceding relief. This is consistent with Ekman's (2012) proposal that, unlike other emotions, relief is always preceded by another emotion, typically fear.

Although research reviewed so far of relief points to appraisals of unfulfilled negative consequences of what 'might have been', it is equivocal on the individual's agency in regard to these consequences. For upward counterfactual emotions, regret is related to the emotion felt when the individual made a decision that led to a worse reality than what might have been. By contrast, disappointment occurs when reality was beyond individual control (Zeelenberg et al., 1998). However, relief seems to generally describe both situations of individual agency (relief felt when one takes a detour to avoid traffic congestion which proves faster than the normal route) but also lack of it (relief to find that despite the forecast it didn't rain after all on one's wedding day).

Although some emotional inventories categorise relief as an emotion related to circumstance-caused (as opposed to self-caused) events (Ira J. Roseman, Spindel, & Jose, 1990) we take the view that relief can occur in both cases (consistent with the definition by Weisberg & Beck, 2012). There is the potential that the two forms of relief are qualitatively different (in the same way that regret and disappointment seem to have different effects, see L. M. F. Martinez et al., 2011). Given that the present research is interested in relief in decision-making, we will be looking at relief in self-caused circumstances (as detailed in the model presented in the following section).

4.2 Action tendencies associated with relief

Specific emotions are thought to serve particular functions and as such give rise to specific action tendencies (e.g., fear to run, gratitude to repay, etc.) (Frijda, 1986). Such motivational function can lead to action mobilization, heightened awareness of certain stimuli, or interpersonal communication (Bradley, Codispoti, Cuthbert, & Lang, 2001). Counterfactual-thinking emotions are proposed to serve a *learning function* (Zeelenberg, 2007). This learning function occurs through heightened attention to the details of 'what went wrong' or 'what went well' following a decision. The experience of regret, for instance, has been found to prompt individuals to seek additional information past-decision (Shani & Zeelenberg, 2007) and even to influence future decisions made (Camille et al., 2004).

4.3 Physiology and external cues

Some further detail on the nature of relief comes from the work of Paul Ekman and collaborators. Relief is included (along with 15 other emotions) in a list of basic emotions (Ekman, 2000, 2012; Ekman & Cordaro, 2011). Such basic emotions are thought to be distinguishable from each other in a number of ways, including appraisals and motivation, as described above, but also specific physiology manifested in cues such as facial expression or vocalisation. Ekman (2012) proposes that relief can be identified by Autonomic Nervous System (ANS) activity in a qualitatively different type of breathing, a

relief 'sigh'. Providing an empirical test of this association, Sauter & Scott (2007) looked at different types of cues associated with positive emotions to find that relief is reliably associated by participants with the characteristic 'sigh'. Although the external cues may simply be associated with particular ANS activity, they usually serve a communication function.

Overall, these insights from emotion theory help build a profile of a particular case of relief. We propose a model of relief and its involvement in decision-making processes below.

5. A MODEL OF RELIEF

The review of existing literature above presents useful indicators on the nature of relief but also inconsistencies regarding the precise boundary conditions. In order to build a testable model of relief, we restrict our definition to what we consider to be the *prototypical* manifestation of relief in decision-making. Therefore, we only consider relief following counterfactual thinking which is related to a decision made by the individual (Weisberg & Beck, 2012) *and* which follows strong and long lasting anxiety (Ekman, 2012). Studying the prototypical case allows us to simultaneously draw upon the two different strands of literature described above.

The proposed model is presented in Figure 1. Relief is preceded by a state of negative emotion, such as prolonged stress. It is expected that the intensity of the preceding negative state will be related to the intensity of relief (see also Ortony, Clore, & Collins, 1990b). Our model focuses on situations where the individual can make a decision to address the stressful circumstance. Soon after this decision is made and stress eventually subsides with the resolution, relief quickly sets in as an intense positive state (with its peak at the 'deep breath' moment). Relief gradually subsides, during which time information seeking about counterfactuals and learning processes set in. In turn, the feeling of relief reinforces the decision made to address the stressful circumstance.

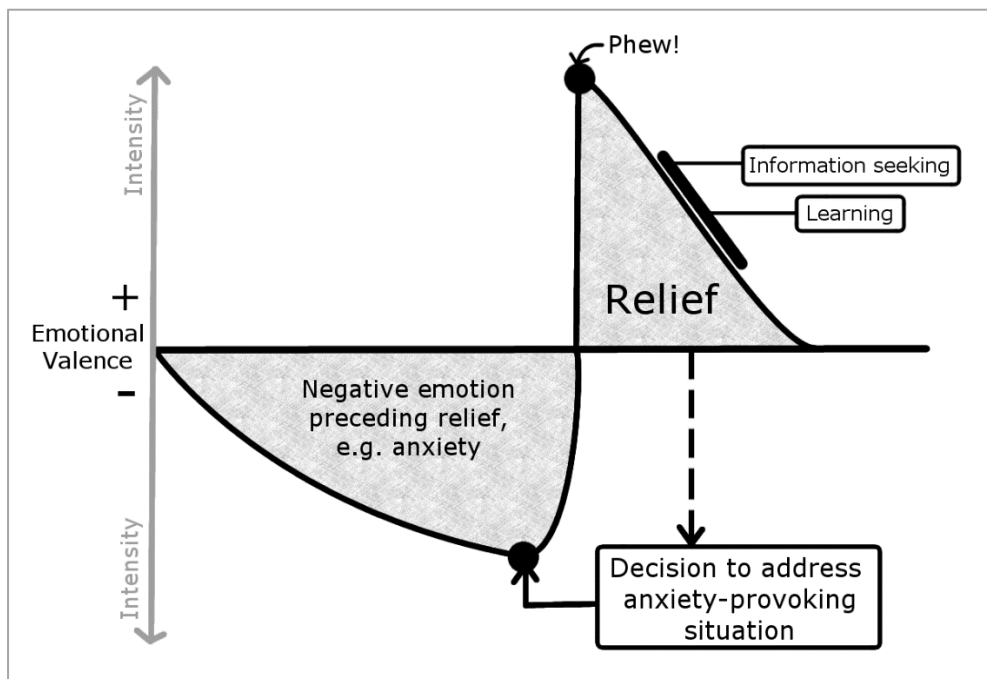


Figure 1: Illustration of model of relief

6. PROPOSED RESEARCH

Of the variety of potential contexts for studying relief in economic contexts, we chose to focus this research on fiscal behaviour, more specifically decisions of tax compliance. Qualitative research analysing discussions among taxpayers has found that taxpayers report experiencing long-lasting anxiety in the period preceding the submission of a tax return; equally, they report relief after submitting tax returns (see Onu & Oats, 2016). Therefore, the tax compliance decision seemed a useful setting to test our predictions regarding relief.

Participants take part in a real-effort task where they earn money and have to complete a tax return. Income is known to 'tax authority' and prepopulated on the submission form, so tax evasion is not possible. The variable of interest is individuals' decisions to submit their tax return *before a deadline*. If they miss the deadline they receive a fine. We chose to focus on tax compliance as timely submission as opposed to tax evasion because previous research has shown tax evasion behaviour is rare in tax games (Alm, 2018). Defining compliance as timely submission provides us with greater variance of the dependent variable.

Based on the model of relief depicted in Figure 1, we make the following predictions:

- **H1** - the time remaining until submission deadline will be negatively related to relief felt at completion (i.e., the closer participants submit to the deadline, the more relief they will feel for having completed on time)
- **H2** - higher stress levels preceding the submission of the return will be associated with higher relief ratings at the submission of the return.

[Note: These two effects may be moderated by both risk aversion and conscientiousness]

- **H3a** - higher levels of relief are associated with greater likelihood that individuals submit their return on time.
- **H3b** - the more regret individuals feel for not completing on time, the more likely they are to submit before the deadline in the next round.
- **H4** - greater relief on completion will be associated with greater rates of information-seeking about one's performance on the task.

7. SAMPLE AND METHOD

7.1 Sample

53 participants were recruited from a local list of research participants. They were invited to the experimental laboratory to take part in a study on emotions in decision-making. 64% of subjects were female with an average (mean) age of 19.6 and a standard deviation of 0.86.

7.2 Procedure

The study was run exclusively on computers. In addition, participants were asked to wear a device for monitoring their heart rate and skin conductivity.

Subjects were informed that the experiment would consist of five business years, each running for 4 minutes. They would have the opportunity to earn income through a slider task (Figure 2), which required repositioning sliders on a bar to the centre position (Gill & Prowse, 2012). Subjects could complete up to 120 sliders in each business year and were paid 1 pence per slider re-positioned correctly. Subjects could therefore earn up to an additional £6 on top of their £4 show up fee.

In business years 2 to 5 subjects were also asked to complete a tax return during the business year. The tax return required subjects to complete five separate sums consisting of the addition of two four digit numbers (Figure 3). The tax form was located on a second tab of the experimental window, and subjects could complete the tax return at any point in the round. Subjects were told that a fine of 30 pence would be imposed for the non-submission of a tax return before the end of the business year.

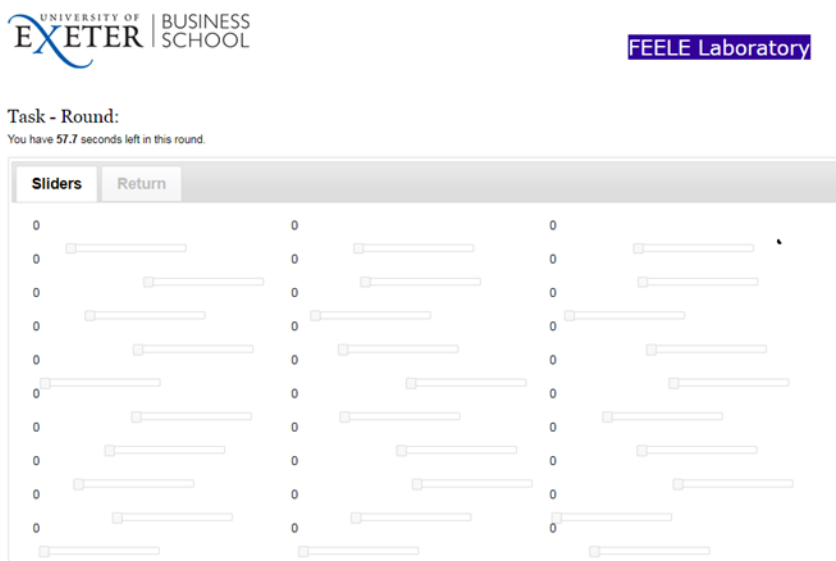


Figure 2: Sliders – Repositioning a slider to the centre (position 50) earns a subject 1 pence – there are a possible 120 sliders per business year

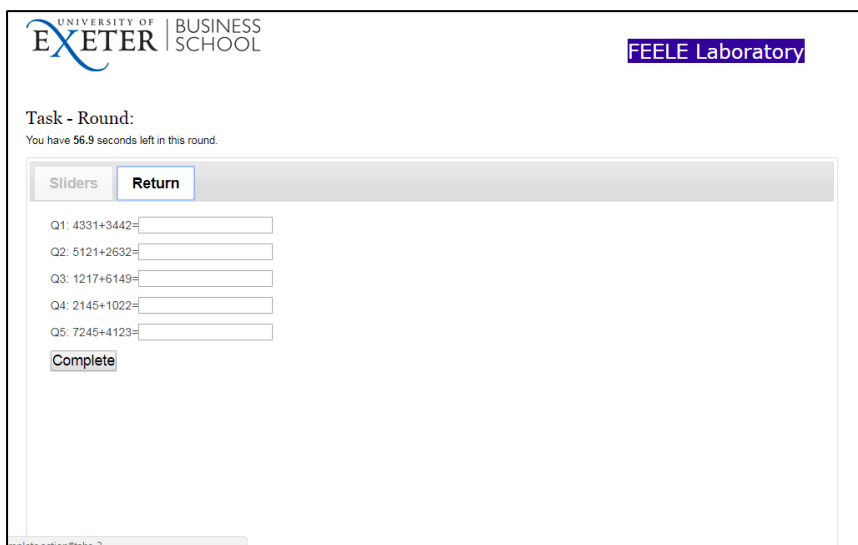


Figure 3: Experimental Tax Return Form – only shown in business years 2 to 5

7.3 Measures

Relief/regret

When they submit their calculations or when the time to submit calculations runs out, participants have to fill out 2 simple emotion measures (1) *How do you feel?* and (2) *How intense is this feeling?* by dragging a slider. In line with previous research on relief/regret in decision-making, we consider positive ratings to be indicative of relief, and negative ratings of regret.

Emotion Score

Self-reported value of emotion with higher scores indicating a higher degree of “happiness.” [Note - in initial sessions, the emotion score was recorded on a scale 1-7, whereas in later sessions on the basis of 10-70. The data is analysed with the scores for the initial sessions multiplied by 10].

Intensity Score

Self-reported value of intensity of emotion with higher scores indicating a higher degree of intensity. [Note - in initial sessions, the intensity score was recorded on a scale 1-7, whereas in later sessions on the basis of 10-70. The data is analysed with the scores for the initial sessions multiplied by 10].

Sliders

Number of sliders completed in a business year.

Start Time

Elapsed time during the business year at which a subject begins their tax return.

Submission Time

Elapsed time during the business year at which a subject completed their return.

Personality measures

A very short personality measure was included to check for potential moderating effects of personality traits (in particular, conscientiousness), based on Woods and Hampson (2005).

8. RESULTS

8.1 Sliders

Business Year	Sliders
1	60.72 (14.5)
2	53.09 (12.0)
3	49.89 (15.0)
4	55.02 (14.3)
5	54.92 (13.2)

Table 1: Average number of sliders completed by subjects in each business year (values in brackets are the standard deviation of the calculated average)

Subjects completed an average of 54.7 sliders per round (standard deviation 14.2) with some variation between the business years. There is a significantly higher slider completion rate in the first business year, relating to the fact there is no tax submission to undertake in this business year. There is a further, significant fall in business year 3, which appears to correspond to calculations that are more difficult, and therefore more time consuming, being present in this business year compared to the others.

8.2 Tax Submission

5.2% of tax returns were not submitted, with one subject failing to return 3 (out of 4) of their returns, 1 subject 2 times and 6 others failing to submit 1 tax return.

The majority of subjects (92.5%) who completed the tax return in a given round did so in one attempt (that is only one switch from the slider screen to the tax return screen and then completing it before returning to the sliders), so the results in this section focus on these submissions.

Business Year	Tax submission time
2	48.1 (15.4)
3	59.9 (26.6)
4	45.1 (18.3)
5	46.2 (21.4)

Table 2: Average time taken in seconds per business year for complete submissions made in one attempt. (Values in brackets are standard deviation of average times)

The mean time to complete the tax return was 49.7 seconds (standard deviation 21.6) with no significant change with the time at which the tax return was started. Table 2 shows that there was some variation between business years, with the calculations for year 3 taking significantly longer than for other years. This appears to be due to the calculations selected for business year 3 being more difficult than for other years (the values selected requiring more “carry” type operations in the subtraction step).

We can use the data from subjects’ performance on the slider task to assess if the fine has a material impact. We can calculate the average time spent earning money through completion of sliders worth 30 pence, the value of the fine, and compare it to the average time required to complete the tax return. The average time required to complete the tax return was found to be less than the average time to complete 30 sliders required to cover the fine, suggesting that it was rational for subjects to complete their tax returns.

71% of returns were started within 10 seconds of the round beginning. Figure 4 illustrates the form of the tax submissions by grouping submissions into ten second windows with regard to the start and end times. The series of circles on the start time equals 10 seconds corresponds to submissions started in the first ten seconds of the round, distributed by the time taken to complete. Figure 4 shows that while the majority of subjects started their tax return at the start of the round, a degree of dispersion of start times was observed. There is no change in the average time to complete the tax return with the Start Time (for completed returns).

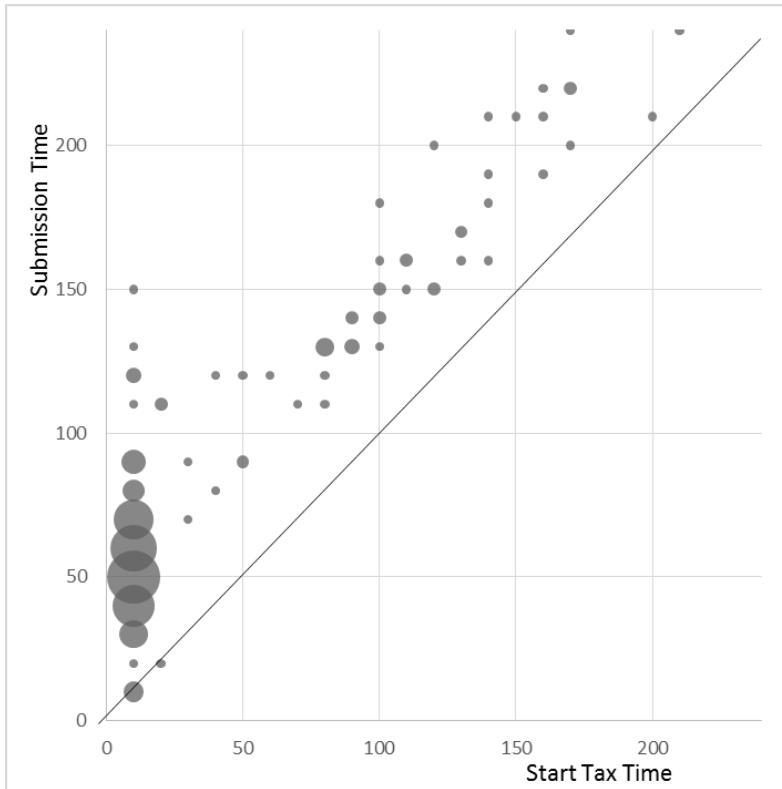


Figure 4: Intensity plot of time tax return started and time tax return completed relative to start of round bucketed by 10 second intervals for complete submissions made in one attempt

8.3 Emotions

Figure 5 shows a significant decrease in the level of emotion self-reported by subjects as the submission time within the business year progresses. This result is opposite to the main hypothesis, which predicts a positive relationship based on a higher degree of relief as the end of the business year approaches. The result in Figure 5 suggests that subjects who undertook and completed their submissions early in the period expressed higher levels of satisfaction than those who completed near to the end. Further tests show no significant role for the length of time taken to complete the tax submission.

It is worth commenting that the appropriate R^2 value¹ for the underlying regression is very low, suggesting that the model does not have much explanatory power – and the addition of personal measures does not lead to any improvement. Our initial conjecture is therefore that the emotions reported by subjects in the experiment are potentially different to those postulated in the model and therefore not captured in the experimental set up. This observation requires further investigation.

¹ R^2 is a standard measure of goodness of fit (between 0 and 1) for the regression

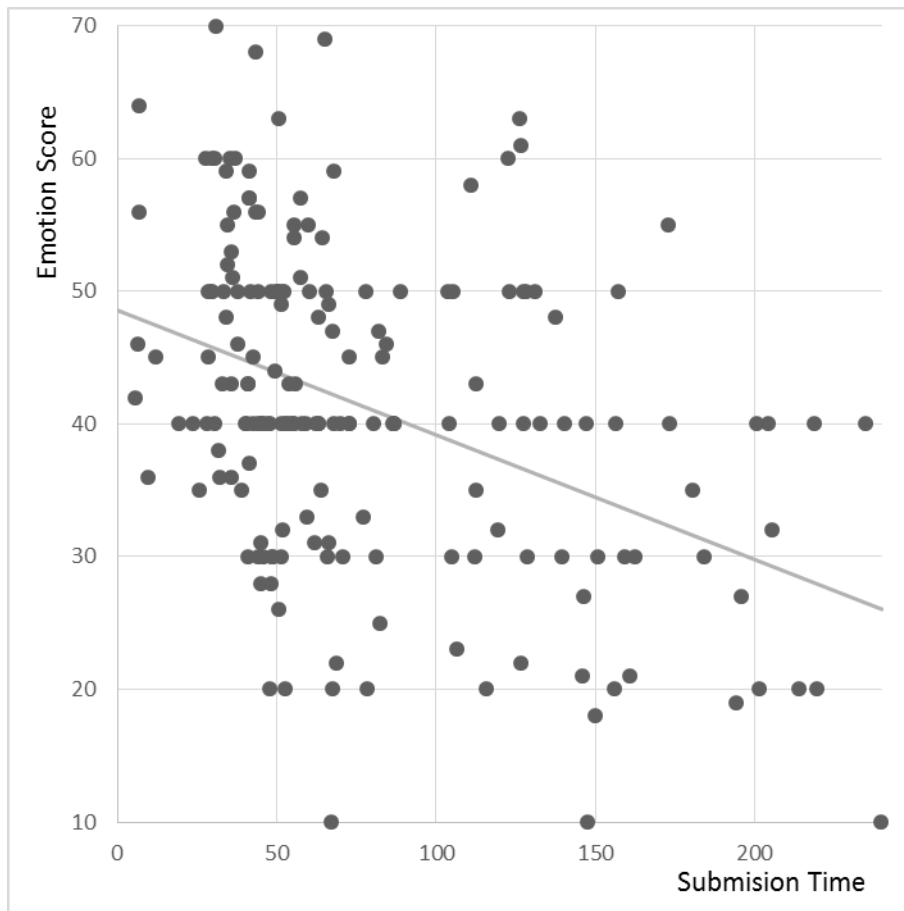


Figure 5: Scatterplot of self-reported emotion level at the completion of the tax filing request against the time in the business year that the completion was made. Grey line illustrates indicative results from the appropriate regression.

9. CONCLUSION

The result presented in the previous section runs counter to theory presented at the beginning of the report. There are a number of reasons as to why this might be the case. It is suspected that the primary reason is that the experimental set-up, while simplifying the main elements of the condition we wished to examine - that is a situation where an individual must give up the opportunity to earn income in order to complete a tax return, lacks key elements of the real world. Firstly, while the calculation task is distracting for most subjects, it is not sufficiently distracting that the majority of subjects procrastinate undertaking the task; indeed the majority switch to undertaking the task very early in the business year. Secondly, anecdotal evidence from comments at the end of a session suggested that those that did defer the task to later in the business year indeed did so because they found it unpleasant, and that this unpleasantness was reflected in their response to the emotion question, rather any degree of relief in having completed the task. A third reason may be that the calculation task lacks the authority of a tax return. Under our experimental condition, the fine level was set such that it was typically rational for experimental subjects to complete the return as the value saved by not paying the fine was more than the average earnings. The majority of subjects did complete their calculations in each round, but their motivation for doing so may have been different to that of a real taxpayer. To better test the theory proposed would potentially require an alternative task that induces procrastination among the subjects and elicits an appropriate sense of

relief. It may be that the timeframes available and the lack of other activities within the laboratory limit our ability to elicit the appropriate form of relief. One suggestion for an alternative approach would be to elicit emotions upon the submission of assignments by students, as while not an action in a tax setting, it does involve a real world deadline that is typically associated with procrastination by the subjects.

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