PSYCHOPHYSIOLOGICAL EFFECTS OF INCENTIVE FEEDBACK ON UNMANNED AIRCRAFT OPERATORS' MOOD AND MOTIVATION

Abstract

The present paper investigates performance feedback effects on emotion and motivation related to the operation and control of computerised systems which are habitually lacking this consideration of human factors dimension. Written feedback (positive, negative, control) was incorporated after a task of speedy word finding by comparing the results to a fictional list of existing scores to feedback and assessing whether the participants performed better, worse or the same as others. Self-report questionnaires were distributed to 30 participants to measure mood state (UWIST Mood Adjective Check List, Matthews et al., 1990) and motivation (Motivation scale from Dundee Stress State Questionnaire, Matthews & Desmond, 1998). Participants' heart rate (HR) was measured through ECG using BIOPAC and calculated as R-R intervals. Results revealed a main effect for both positive and negative motivation between experimental conditions (trial, feedback, and task). A further significant main effect was demonstrated for HR alone, however not between experimental conditions. No other significant main effects for motivation or mood state were found between experimental conditions. These findings highlighted that feedback was appraised as a motivational trigger, and it could be incorporated in the ground control station of unmanned aircraft systems to monitor pilots and operation crews' motivation during flight missions and persistent surveillance tasks.

Introduction

The characteristics of real-time feedback during the operation of UAVs can have implications for the emotion and motivation of the unmanned aircraft pilot. Positive feedback such as “you are performing well”, relative to negative feedback such as “your performance is not good”, have been found to increase positive affect (Burgers, Eden, van Engelenburg and Buningh, 2015), and also increase motivation to maintain task engagement (Efklides & Petkaki, 2005). However, it remains unclear whether feedback to perform a working memory task under time pressure during the operation of UAVs could have an impact on emotion and motivation.

Emotions, and more specifically moods, are thought to have the motivational function to guide an individual’s behaviour (Gendolla, 2000). Moods can be defined as relatively long lasting affective states and have therefore been conceptualised as pervasive frames of mind (Gendolla, Brinkmann & Richter, 2007). One integrative theory, known as the Mood-Behaviour-Model explained the role of moods in the motivation process (Gendolla, 2000). According to this model, momentary mood states could have either directive or informational predictable effects on motivation. The directive mood impact is thought to influence the direction of behaviour in compliance with a person’s hedonic motive; that is, the need to elicit positive experiences. When such hedonic motive is strong, individuals will prefer to partake in behaviours instrumental for hedonic affect regulation which promise positive feelings as a result (Ewing and Fairclough, 2010; Gendolla et al., 2007). In such, a pilot will engage in assuring smooth operation of the UAVs to attain mission success. On the other hand, an informational mood impact can influence behaviour-related judgments or appraisals. When pilots and surveillance sensors operators are confronted with a mission, they may ask themselves implicit questions regarding what is required of them, whether they have physical and mental resources to complete the mission. These subjective appraisals can be influenced by mood states, with the extent of demand being perceived as lower when in a positive mood (e.g., Efklides & Petkaki, 2005).

However, research on cardiovascular literature (Blascovich, 2008; Spiridon, 2017) provided a counterargument to this assumption in that appraisal of sufficient resources for a high demand task generates an approach motivation associated with positive affective responses (accelerated heart rate), whereas low perceived resources could be associated with negative moods (decelerated heart rate). Further research (Anttonen & Surakka, 2005) reported that those who experienced negative moods had a prolonged decelerated heart rate five minutes later, despite the negative emotional stimuli not being present anymore indicating that heart rate is a good measure to index distinctive motivational responses to negative and positive emotional stimulation. In sum, the perception of achievable goals could be seen as generating positive mood responses (Hewig, Hagemann, Seifert, Naumann, & Bartussek, 2004); whereas high demand could activate an avoidance motivation leading to effort withdrawal.

Nonetheless, it could be argued that appraisal processes could be idiosyncratic in that a pilot's predisposition to tackle unquestionably a task demonstrating an approach motivation may affect their reliance on affective states as a source of information (e.g. Kramer & Yoon, 2007). Specifically, those with a predominant approach motivation will tend to chronically monitor their internal states, thus making both positive and negative affects salient. Individuals with a predominant avoidance motivation are less likely to monitor their internal states, making momentary affect less salient to them.

One underlying question is whether stimulating a certain motivation (approach vs avoidance), could act as a trigger of positive or negative emotions. There are two views: one claiming that emotional reactions are organised by underlying motivational states (Bradley, Codispoti, Cuthbert & Lang, 2001) where judgments of arousal responses to task demands dictate the intensity of the motivational activation or deactivation (Boekaerts, 2001; Schutz & Lanehart, 2002); and the contrary view that mood influences the appraisal process in that the more positive the mood the more likely to appraise the task as less demanding (e.g., Efklides & Petkaki, 2005).

One way of activating both mood and motivation could be through performance feedback. Although, feedback was found to serve motivational functions (Tyson, Linnenbrink-Garcia & Hill 2009; Burgers et al., 2015), little research had focused on the mood state as a consequence of the feedback received. Generating negative responses (shame, anxiety, anger) through negative feedback could either increase approach motivation with the aim to prevent failure and enable more methods of actions or, in the contrary, could lead to withdrawal of effort. A study conducted by Burgers et al. (2015) investigated the impact of verbal feedback on enhancing computer users' motivation and further task engagement in a brain-training task. Reports indicated that those who received negative feedback resulted in a decrease of users feeling of competence. On the contrary, positive feedback was demonstrated to satisfy users' needs for autonomy and competence, therefore increasing motivation (Burgers et al., 2015). It could be that positive feedback was potentially more persuasive, as opposed to negative feedback (Henderlong & Lepper, 2002). Moreover, receiving positive feedback has been claimed to be able to motivate individuals to voluntarily set more advanced goals to achieve, consequently increasing their performance (Tili et al., 2007). Performance, in the aviation field, is not only needed for goal achievements, but directly linked to safety of the operation, and the aviation field is a rich domain that offers a more complex and complete view of human factors attending to crew performance and avoid accidents. Decision-making processes during flight operation (landing phase, cross -winds problems, airspace awareness) are generally based upon rational elements like the speed, position, target for one or more given UAVs. However, emotional reactivity to unfavourable flight context can alter the rational reasoning by shifting decision-making criteria from safety rules to subjective ones (aversion to negative emotion) (Causse, Dehais, Péran, Sabatinim & Pastor, 2013). Although experiencing an emotion has an ambiguous role in decision making, it could trigger unconscious processes useful to decision making, in particular during complex tasks (Schoofs, Wolf, & Smeets, 2009)

In recent years, we noticed a shift from rational cold reasoning to emotional hot reasoning and its neural correlates has been demonstrated (Cause et al,2013). It has been reported that hot reasoning resulted in enhanced activation in ventromedial prefrontal cortex (Goel & Dolan, 2003). In contrast, cold reasoning resulted in enhanced activity in the dorsolateral prefrontal cortex. This finding highlights that different regions are activated during decision making according to the emotional state of participants. It is suggested that such a cerebral shift may affect performance, accuracy of decision making and reasoning (Simpson, Snyder, Gusnard, & Raichle, 2001).

Incentives tend to be used in empirical research to elicit emotion (Elliott et al., 2003) and have been found to bias cognitive processes such as short-term memory and object recognition (Causse et al., 2013; Taylor et al. ,2004). Therefore, a parallel could be drawn between experimental situations and pilots facing a conflict between expected punishments (extra fuel consumption, fatigue caused by operations of a swarm of UAVs, etc.) and rewards (accomplished mission). It could be argued based that incentives actually acted as motivational triggers rather than emotional responses towards a more risky and less rational behaviour in terms of safety issues. We need to distinguish between approach motivation which has been linked to positive emotion and avoidance/withdrawal motivation which generate negative emotion. Incentives do have an emotional effect, but it occurs through rationalisation of the context and consequently through motivation. A study to identify just in which way incentives could be leading to positive vs negative emotion/motivation responses is needed.

Within the aviation field, Bonner and Wilson (2002) found that reported subjective mental workload and heart rate (as a physiological index of stress) were higher during rare events during flight (e.g., impossibility to land) in comparison to others flight segments. In this case, pilots lack automated responses, and the involvement in the task needed to be rapidly adapted to fit the demands. In fact, the increase heart rate could have been an indication of activation of behaviour to solve the task, the energetic response to task demand. It would have been problematic if the heart rate lowered as that could have indicated overload and withdrawal from the piloting task.

Taking into consideration the need for constant monitoring of task engagement to avoid human errors while on an UAV mission, providing real-time feedback could be useful to promote positive moods and encourage approach (Burger et al., 2015). Therefore, the aim of the present study was to identify whether the introduction of feedback will stimulate a certain mood state and level of motivation in participants. It was expected that positive feedback will generate a positive mood and motivational approach towards the task, whereas the negative feedback will cause a negative mood and avoidance motivational behaviour. To make a distinction of the participants' level of self-appraisal of mood through their physiological responses, based on cardiovascular literature (Anttonen & Surakka, 2005) heart rate was expected to increase in the positive mood and decelerate in the negative mood. Increase heart rate could be also an indication of task engagement, approach motivation and it is important to know whether such increases in heart rate could be an index of mood and motivation generated by direct effects of the feedback stimuli. In this way, within the UAVs operation we will be able to understand the effect of feedback on operators' mood and motivation and the impact on performance in aircraft operation and aviation safety.

Method

Participants

The study used a total of 30 participants with an age range of 18 to 25 years (*M* = 21.03, *SD* = 1.07) (9 males, 21 females). Through opportunity sampling, participants were selected through a nonclinical population consisting of individuals who have no history of cardiovascular problems or psychiatric illnesses. Selection criteria stated that participants must not have been known to show high levels of anger, as this could be an extraneous variable leading to potential invalid results. The State-Trait Anger Expression Inventory (STAXI-2) questionnaire (Spielberger, 1999) showed participants to be relatively homogeneous across each condition $F(1,27) = .91$, $MSE = 24.43$, $p > .05$ $\eta_p^2 = .01$; see Table 1. Participation was voluntary and in conformity with the ethical principles of the institution.

Table 1. STAXI-2 Anger trait values across conditions

Condition	*M*	*SD*
Positive feedback	18.00	4.32
Negative feedback	18.20	5.18
Control	17.30	5.27

Design

A mixed design was used including a between participants independent variable, *the false feedback* at 3 levels (positive, negative, control), and a within participants independent variable - the experimental stages at 4 levels (baseline, trial, feedback and task) for mood and at 3 levels for motivation (trial, feedback and task). The motivation was measured only post-test with the trial period being considered a control experimental stage. The dependent variables were participants' mood, type of motivation and finally participants' heart rate reactivity to experimental conditions.

Materials

The State-Trait Anger Expression Inventory (STAXI-2) questionnaire (Spielberger, 1999) was used to measure Trait Anger, State Anger and Expression and Control of Anger. Participants were required to respond to statements which correspond to two subscales (e.g., It makes me furious when I am criticized in front of others.). Each requiring a response from 1 to 4 (1 for almost never, 2 for sometimes, 3 for often, 4 for almost always).

A self-report mood questionnaire (UWIST, Matthews et al., 1990) was used to measure participants' mood state. The UWIST Mood Adjective Check List (Matthews et al., 1990) was used to indicate participants' valence changes between the positive and negative feedback conditions. Participants were instructed to respond to a list of 29 words by typing a number which best describes their current mood (e.g., Energetic, Relaxed) with a number between 1 and 4 (1 = definitely, 2 = slightly, 3 = slightly no, 4 = definitely no).

A further self-report questionnaire to measure participants' motivation levels was used Motivation scale from Dundee Stress State Questionnaire; Matthews & Desmond, 1998). Each participant was required to respond to a list of eight statements (e.g., Performing badly on the task will make me feel upset). Each response required a number between 0 and 4 (0 = not at all, 1 = a little bit, 2 = somewhat, 3 = very much, 4 = extremely).

Heart rate was measured using BIOPAC (BIOPAC Systems Inc). The R-R Interval from the heart was calculated from an electrocardiographic (ECG) signal, which was sampled at 1000 Hz which filters between 0.5 and 0.35 Hz. A 2-lead electrode sensor collected the signal which was placed on the participants' left and right ankle and a ground electrode placed on the non-dominant wrist of the participant.

A cognitive task known as Word Find (see Figure 1) adapted from Fairclough & Roberts (2011), was displayed to participants in each experimental group using the same 15-inch screen PC. During the task, participants were presented with a 4 x 4 grid of individual letters in a randomised pattern and asked to find as many words in the grid as possible before the time ran out.

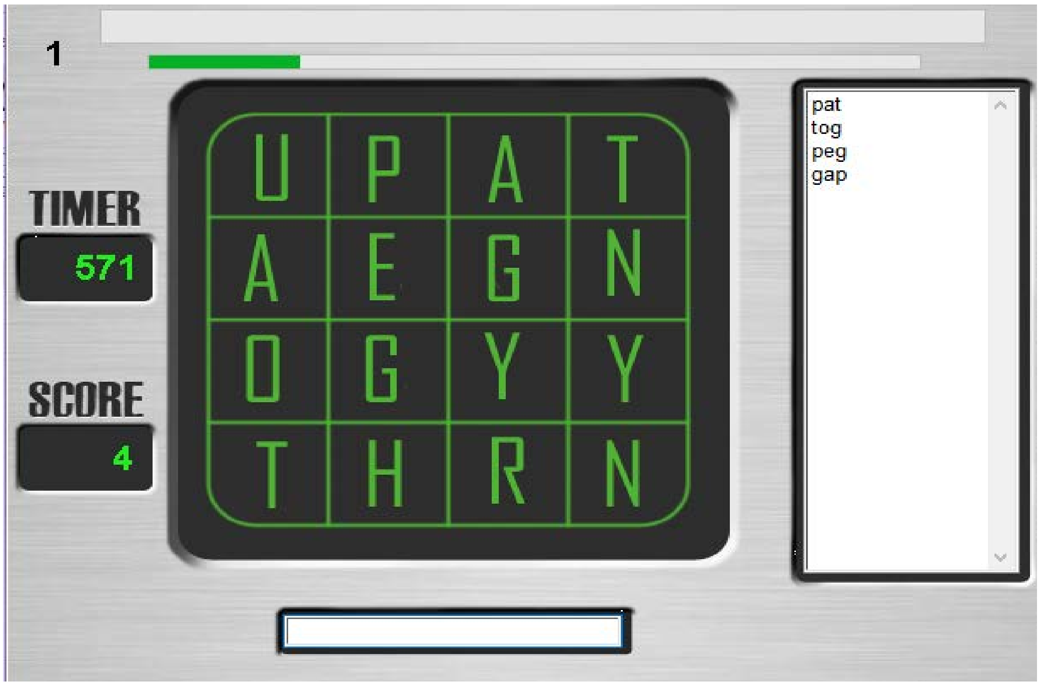

Figure 1. *Word find task used in the study*

Participants were required to search the grid for as many words as they could find, adhering to a set of rules. These rules stated that words can only be formed from letters which adjoin horizontally, vertically or diagonally in any direction. Letters were also only allowed to be used once in any single word and each word must have been a minimum of 3 letters long to be accepted. Participants were instructed to type each word they find using the keyboard and into the entry box directly below the grid (Fairclough & Roberts, 2011). Words which were successfully recognised in the dictionary would appear in the word list to the right-hand side of the grid and the bar directly above the grid would progress each time a correct word was entered. The task was deemed suitable as it required participants to perform a cognitive task (i.e., word finding) under time pressure which resembles pilots' written commands needed to be entered precisely and error free into the control systems. A control system should gather necessary details on the status of UAV and forward pre-set commands (Perez et al., 2013) but immediate adjusted commands might be necessary and an accurate speed of response is necessary.

Procedure

Participants were pre-screened for heart conditions, other medical conditions, medication, and not having high levels of anger (scored below the 80th population percentile on the Trait Anger Expression Inventory of the STAXI 2; Spielberger, 1999) to reduce the likelihood of the researcher being exposed to aggressive behaviour during the negative affect induction protocols used in the study. The participants suitable to take part were invited to the laboratory and asked to sign the informed consent form. Initially, participants completed a set of demographic questions and self-report questionnaires of their state mood (UWIST, Matthews et al., 1990). Using a blind protocol, participants were led to believe that their task requires “participation in a cognitive task”. It was necessary to initially deceive the participants in order to elicit the desired emotional reactions to feedback received in ways that closely resemble a real-life situation. However, all participants were fully debriefed afterwards as to the true nature of the experiment.

The following stage of the protocol involved connecting the participants to the ECG. Three electrodes were placed on the wrist of their non-dominant hand and the insides of both ankles to measure heart rate. The electrode leads were attached to a BIOPAC box (BIOPAC Systems Inc) and the electrical signal was filtered at 0.5 Hz and 35 Hz, respectively (Spiridon & Fairclough, 2017). A baseline measurement of the heart rate followed and continued with HR measurements during the trail, during the feedback receiving time frame and during the actual task. Each stage of HR measurements lasted for three minutes exactly. Self-report measures of mood UWIST questionnaire

(Matthews et al., 1990) and motivation (Motivation scale from Dundee Stress State Questionnaire, Matthews & Desmond, 1998), were repeated after the baseline, after feedback stage and after the actual task. The feedback protocol involved the experimenter pretended to compare the number of correct words found by the participant to the fabricated list of previous scores, ensuring that it was kept out of the participant's direct view. Depending upon which condition they were randomly placed in, participants were then shown their respective feedback sheet to inform them of how they performed with respect to the others. One condition was told they perform better, in other they were told they performed worst and the control condition group were told that their performance was similar to the others.

After completion of the last set of questionnaires, the physiological apparatus was removed from the participants and a full debriefing was provided as to the true nature of the experiment. Participants received the debriefing sheet corresponding to the experimental group in which they were placed and reminded of their ethical rights.

Results

All statistical analyses were conducted using SPSS. A one-way ANOVA showed no significant difference in anger trait between various conditions, $F(1,27)$ = .91, MSE = 24.43, p > .05 η_p^2 = .01. All remaining data was subjected to analysis through mixed ANOVAs. A summary of the descriptive statistics is presented in Table 2.

A 3 (Condition: positive, negative feedback, control) x 4 (mood: baseline, trial, feedback, task) mixed ANOVA was conducted to examine mood state. The assumption of Mauchly's Test of Sphericity was met W = .80, X^2 (5) = 5.82, p >.05. There was no significant main effect of mood between experimental conditions, F(3,

81) = .32, $p > .05$. The absence of main effects demonstrates that the participants' level of mood did not significantly alter depending on the feedback condition.

Results showed a significant main difference in negative motivation between conditions, in a 3 (condition: positive, negative, control) x 3 (negativemotivation:1,2,3) ANOVA: $F(4, 54) = 5.86$, $p < .05$. However, pairwise comparisons for motivation reflected no significant difference between conditions using Bonferroni adjustments.

Positive motivation, 3 (condition: positive negative, control) x 3 (positivemotivation:1,2,3) showed a significant main effect $F(2, 54) = 9.85$, $p < .05$. However, no significant main effect between conditions (trial, feedback, task) was found $F(4,54) = .21$, $p > .05$. Pairwise comparisons for motivation reflect no significant difference between conditions using Bonferroni adjustments.

Table 2.
Means and SD for Self-report measures of emotion and motivation for each condition across experimental stages.

	Baseline		Trial		Feedback		Task	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Positive Mood								
Positive	37.10	3.96	36.90	2.60	39.70	5.27	38.00	5.96
Negative	39.00	6.04	35.80	6.97	39.00	7.67	37.30	7.07
Control	36.60	4.30	37.60	5.13	36.50	6.02	37.30	5.76
Negative Mood								
Positive	32.70	3.59	32.30	3.16	35.50	3.27	34.50	3.89
Negative	34.20	5.25	32.90	2.51	34.00	4.24	34.60	3.72
Control	32.50	3.63	32.90	2.51	32.00	4.19	32.40	4.12
Positive Motivation								
Positive	-	-	8.10	2.69	9.70	2.75	9.60	3.57
Negative	-	-	7.30	2.63	9.00	3.53	8.80	4.13
Control	-	-	7.00	3.09	9.30	3.40	9.40	3.66
Negative Motivation								
Positive	-	-	12.30	3.77	15.60	.70	15.20	1.32
Negative	-	-	13.70	2.54	12.50	3.44	14.10	1.85
Control	-	-	14.50	1.43	13.80	1.48	13.60	1.71

To assess for cardiovascular responses for each experimental condition, a 3 (condition: positive, negative, control) x 4 (HR: baseline, trial, feedback, task) mixed ANOVA was conducted. Mean HR activity for experimental conditions is shown Figure 2.

Levene's Test of Equality of Error Variances showed each HR level to be homogenous. Mauchly's Test of Sphericity demonstrated no violation of the assumption of Sphericity, $W = .88$, $X^2 (5) = 3.25$, $p > .05$. Data reports indicated that there was a significant main effect of HR alone, $F(3, 81) = 3.53$, $p < .05$. However, there was no significant main effect found for HR between experimental conditions, $F(6,81) = 1.07$, $p > .05$. The highest HR was during the pre-test period ($M = 64.79$, $SE = 2.16$) in comparison with the trial period ($M = 69.75$, SE = 66.54) and the task itself ($M = 68.79$, $SE = 2.19$) $p > .05$. Pairwise comparisons for HR corrected using Bonferroni adjustments were used for post-hoc analysis and found no significant main effect between HR and experimental conditions.

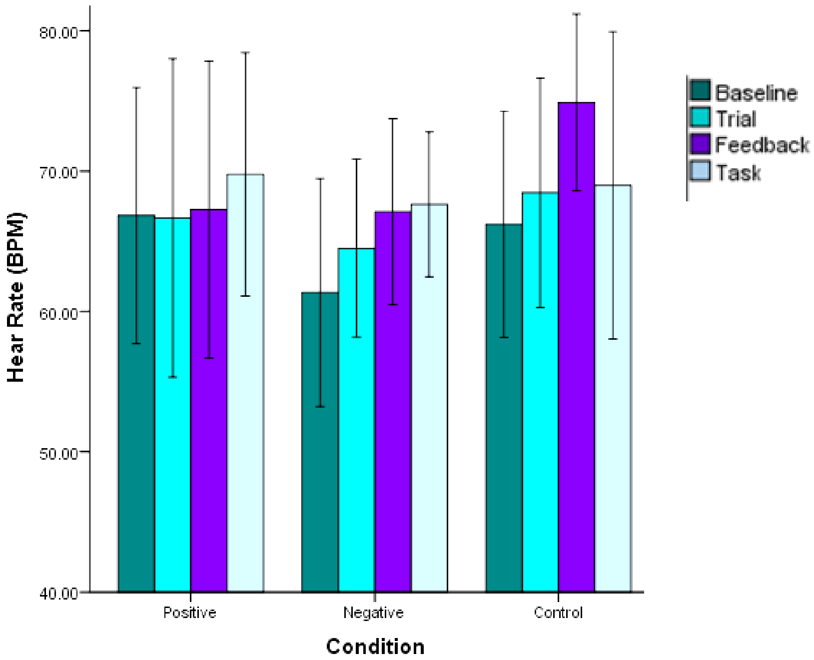

Figure 2*: Mean and standard error HR values across experimental condition.*

Discussion

With the desire to achieve an understanding of system users' motivation levels after a previous fail or triumph on a set task, the present study involved measuring oscillation of motivation levels via feedback in conjunction with mood responses and heart rate indexes. Regarding the mood component of this study, it was hypothesised that participants' mood would differ between each feedback condition. In contradiction with this prediction, the false feedback did not successfully affect participants' mood state, due to findings identifying no significant main effect for mood state between conditions. Although other studies found that false positive feedback to be significantly associated with high scores for calm and happy emotions, whilst reporting lower scores for negative emotions (Barone, Miniard, & Romeo, 2000), the present study did not duplicate such findings. One explanation for the non-significant findings could be various idiosyncratic differences apart from anger trait. Although, anger traits were equalised in the present study, other personality traits such as neuroticism could have increased emotional reactivity to the negative mood induction (Espejo et al., 2011), whereas extroversion traits could have exacerbated positive mood (Larsen & Ketlaar, 1991). Also, the sample of psychology students used in the current study could be considered mainly formed of high reappraisers with have been found to display a more adaptive profile of emotional experience (Mauss, Cook, Cheung & Gross, 2007), by downgrading negative moods. These findings emphasise the importance of subjective appraisal of feedback, a human factor aspect that needs further empirical investigation.

Respecting the current findings, it was hypothesised that participants who received negative feedback would have lower motivation levels in comparison with those who received positive feedback. Those who received positive feedback were expected to have increased motivation after the trial task. Results revealed an overall difference in motivation between conditions which aligns well with Burgers et al.'s

(2015) results that those who received negative verbal feedback generated a reduction in player's level of competence. In addition, positive verbal feedback showed an indication of participants need for competence and autonomy, thus increasing motivation. It could be claimed that task on task itself within research must be enjoyable for participants to feel motivated (Pascual-Ezama et al., (2013). In consideration with the task involved within the present research (Fairclough & Roberts, 2011), the level of entertainment this provided participants with was unaccounted for. This could potentially imply that participants' motivation levels were consequently affected by their enjoyment of the task itself and not the false feedback they received.

Two additional hypothesises were made regarding positive and negative motivation. Participants who received negative feedback on the trial task were expected to have higher negative motivation during the actual task; whereas those who would receive positive feedback were hypothesised to experience higher positive motivation during the task. The negative motivation hypothesis aligned with the current findings as reports demonstrated a significant main effect for participants' negative motivation across experimental conditions. Previous research supports the outcome of the negative motivation hypothesis. According to Davidson (1993), the avoidance system is activated as a result of aversive stimuli, which potentially leads to participants' withdrawal. This avoidance when approaching the main task, supports the result of the current study, as avoidance motivation can also be established to be negative motivation (Hewig et al., 2004).

Concerning the outcome of the negative motivation hypothesis, Van Dijk and Kluger's (2011) report demonstrates similarities with the current findings. Due to a significant main effect being found for negative motivation and not positive motivation. This supports Van Dijk and Kluger's (2011) argument of the effectiveness of negative feedback being more influential in those who were working on prevention tasks. The inclusion of the word task (Fairclough & Roberts, 2011) within this study could be considered to be a prevention task (e.g., attention to detail), rather than a promotion task (e.g., requires creativity).

Contradictory evidence surrounding the influence of positive feedback was communicated by Tili et al. (2007), who claimed that those who received positive feedback to feel inspired to voluntarily attempt more complex goals and targets to achieve. This lead to the increase in overall performance levels, which therefore increased participants' motivational levels. Barrow Mitrovic, Ohlsson, & Grimley (2008) also argued the influential effects of positive feedback towards participants. Stating that those who received positive feedback in a controlled task would occasionally seek to complete the task faster and in a more efficient way (Barrow et al., 2008). In comparison with individuals who were in the negative feedback condition. This confronts the outcome of no significant main effect being reported for positive motivation, revealing no correspondence from the current findings with this piece of previous literature.

With respect to the HR hypothesis, it was expected that HR would differ between experimental conditions. Results indicated a significant main effect of HR alone, however no main effect was found for HR between feedback conditions. These results signify a lack of cardiovascular reactivity to the false feedback received, but a direct effect of task requirements. These findings are supported by Fairclough & Roberts (2011), who reported changes in HR activity to alter depending on the level of difficulty of the task involved. Considering the significant main effect being found for HR alone and not between conditions, this may suggest that participants HR activity was only significant because of the level of difficulty the word task itself included in this research. This is further supported by Gendolla (2000) who also claimed cardiovascular reactivity to vary depending on the how complex the task itself is. Research by Delaney and Brodie (2000) showed that throughout the duration of a word task stress, interbeat HR intervals decreased. The changes in heart rate from trail to feedback stage to task could also be explained by the presence of feedback in all conditions. The presence of another control group without feedback appears necessary to distinguish whether feedback regardless of valence dimension could have an effect. Nonetheless, the unexpecting, rare tasks, for example the ones required to change the usual pattern of thinking (i.e., in aviation this will resemble abort landing) were found to increase HR (Bonner and Wilson, 2002). In this case, pilots lack automated responses, and the involvement in the task needed to be rapidly adapted to fit the demands. In fact, the increase heart rate could have been an indication of activation of behaviour to solve the task, the energetic response to task demand. It would have been problematic if the heart rate lowered as that could have indicated overload and withdrawal from the actual task (Spiridon, 2017).

Overall, the current findings highlighted that feedback has an effect on motivation, and that heart rate changes after receiving feedback. In the view that task engagement is crucial to avoid human errors while on an UAV mission, providing real-time feedback could be useful to heighten motivation (Burger et al., 2015). Furthermore, individual differences such as personality traits and reappraisal adaptive responses to feedback should be considered to tailor feedback that has a positive effect on UAV user's mood and task engagement.

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