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Dynamic Analyses of Goal-Directed Behaviour

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Thesis submitted to the National University of Ireland, Galway in fulfilment of the requirements for the degree of Structured PhD in Arts (Psychology)

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Abstract

Goal setting research has consistently shown that high specific goals lead to increases in performance; however, the effects of unattainable goals on performance have been inconsistent, and the roles of both time and feedback on persistence have been neglected in laboratory studies. Behavioural explanations that have been provided for the processes by which goals and feedback affect behaviour have focused to a large extent on direct contact with contingencies and, as such, have had difficulty in accounting for complex human behaviour. The purpose of this thesis was to examine the effect of unattainable goals on behaviour, and in so doing, contribute to current behaviour analytic accounts of goal setting and feedback. Five studies were conducted in order to investigate the effect of goal level on performance, persistence, and feedback-solicitation. Study 1 replicated prior research demonstrating that high goals lead to higher levels of performance. Study 2 examined the effect of feedback on performance and persistence. Feedback enhanced performance, but did not significantly affect persistence. In order to examine whether or not participants would choose to seek feedback, the task was modified for Study 3 such that participants were presented with the option to choose feedback. Results showed that feedback seeking reduced in the presence of an unattainable goal. For Study 4, goal sessions were lengthened in order to investigate further the effect of an unattainable goal on persistence over time. Individual-level analyses revealed that a greater number of participants who exhibited low levels of performance during baseline demonstrated a decreasing trend in performance during the goal conditions. Study 5 investigated the effect of a series of unattainable goals on performance, persistence, and feedback seeking in the longest work sessions utilised in the series of studies. Persistence reduced in a group who received an initial extremely unattainable goal, while participants persisted in a group who received an initial marginally unattainable goal. The implications of these findings are considered and discussed in terms of current behavioural accounts of goal setting.
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Chapter 1: Overview of Thesis

The principal aim of the current programme of research was to conduct an exploration of the dynamics of goal-directed behaviour, to examine the role of specific predictors of both persistence and productivity on such behaviours. The overarching goal of the thesis was to provide a behavioural explanation of both goal setting and feedback that accounts for complex human behaviour. The project assessed the effects of goal setting on participant’s performance in a typical work task in order to evaluate the effects of goal level and feedback on task persistence or deterioration of work performance over time. For the purposes of the project, both traditional cognitive and behavioural accounts of goal setting and feedback are reviewed. It is proposed that a recent behavioural account, based on Relational Frame Theory (RFT; Hayes, Barnes-Holmes, & Roche, 2001), can significantly contribute to an understanding of how goals and feedback operate to increase performance. In a meta-analysis exploration, Locke and Latham (1990) determined that goal setting was the focus of 239 laboratory and 156 field studies involving over 40,000 people. Results of laboratory and field studies have consistently shown that high specific goals tend to lead to increased performance (Jackson & Zedeck, 1982; Latham, 2003; Locke & Latham, 2002; Steers & Porter, 1974). Much is known about the initial effects of goals on behaviour, but much less is known about how goal-directed behaviour evolves over time. Such work is crucial in order to develop effective organisational interventions that last.

To orient the reader, the structure of the thesis will be delineated briefly. Chapter two provides an account of goal setting, focusing on the cognitive theory of goal setting, which has stemmed from work by Locke and colleagues. Additionally, Chapter two outlines the abundance of research that has examined the effects of goal setting and feedback on performance, pinpointing unexplored areas such as persistence in the presence of an unattainable goal. Chapter three begins with some suggested limitations of cognitive accounts, and focuses on behavioural accounts that have been provided to explain how goal setting affects behaviour. Traditional behavioural accounts are described and the limitations associated with these explanations delineated. This chapter continues with the introduction of a novel approach to the explanation of goal setting based on relational frame theory (RFT).
Chapter four marks the beginning of the experimental chapters, and describes a laboratory study that was conducted in order to replicate the effects of goal level on performance that have been reported in the literature. An additional aim of this study was to investigate the effect of an unattainable goal on persistence. Chapter five focuses on the role of feedback on performance and persistence in the presence of a low and a high goal level, using the same experimental paradigm as in the previous study. Chapter six examines feedback-seeking behaviour in the presence of a high and a low goal in order to establish whether goal level affects frequency of feedback seeking. Chapter seven provides further investigation of goal level on persistence over time. Work sessions were lengthened for this study, and goal level was determined from baseline performance for each participant. Chapter eight presents the final study, and focuses on feedback seeking in the presence of increasingly unattainable goals, in addition to an examination of performance and persistence in the presence of unattainable goals over a lengthened work session. Within each experimental chapter (Chapters four to eight), results are discussed in relation to behavioural theory and in particular, in relation to a novel RFT account of goal setting. Finally, Chapter nine provides an overview of key findings across all five empirical studies, along with limitations and suggestions for future research.
Chapter 2: Empirical Studies of Goal-Directed Behaviour

This chapter begins with a review of cognitive goal setting theory, a theory proposed by two of the foremost cognitive theorists within goal setting, Locke and Latham. This theory has served as the basis for over thirty years of research. In this chapter, laboratory and field studies that have examined the effects of goal setting interventions on behaviour are reviewed. A number of features of goals have been investigated, including goal type, goal level, and feedback. This chapter provides a brief review of the literature on each of these phenomena and orients the reader in particular to research in the area of goal level and persistence. One of the most important determinants of the effects of goal setting on behaviour is the feedback provided to individuals while working. Previous research on this relationship is summarised in the latter half of the chapter.

Latham and Locke’s (1979) goal setting theory suggests that goal setting affects performance through four mechanisms. First, goals have a directive function in that they direct attention to relevant, appropriate activities, while simultaneously directing attention away from non-relevant, inappropriate activities. The second reported mechanism is that goals serve an energising purpose. Difficult goals require more effort than easier goals and, as such, the presentation of difficult goals demands a higher level of performance. People respond to this greater demand with greater productive energy. Third, goals affect persistence. When people have control over the time they spend on a task, difficult goals often lead to prolonged effort. The trade-off between time and intensity of effort appears to be that when given a difficult goal, people either work rapidly and intensely for a short period of time or less intensely for a longer period of time. Therefore, tight deadlines tend to produce a more rapid work pace than loose deadlines (Latham & Locke, 1979). Finally, goals have an indirect effect leading to arousal, discovery, and use of relevant knowledge or skills (Locke & Latham, 2002). This implies that when faced with task goals, people automatically use existing knowledge and skills for goal attainment. If the goal does not require automatic skills, people will draw upon skills in their repertoire that they have used in similar contexts in the past.
2.1 Goals

A prominent assertion presented by Locke and Latham is that there is a positive linear relationship between goal level and performance; as goals increase, so does task performance. Similarly, more specifically defined goals produce a greater level of performance than non-specific goals, often described as “do your best” goals (Locke & Latham, 2002). In 1990, Locke and Latham reported that results of almost 400 studies demonstrated that specific difficult goals led to higher levels of performance when compared to specific easy goals, loose “do your best” goals, or no goals. Goal specificity produces improved task performance because setting specific goals focuses attention and effort, and giving an employee goals that are highly specific in nature allows the employee to know more precisely what is expected of the task (Steers & Porter, 1974).

Latham and Yukl (1975) conducted a review of field studies based on goal setting theory, focusing on the effects of specific goals on performance, the effects of difficult goals on performance, and the mediating effects of goals on feedback, incentives, and time limits. Latham and Yukl found positive outcomes for setting specific goals with ten of eleven studies reviewed. Similarly, of seven studies reviewed examining the relationship between goal difficulty and performance, the authors found that six of these supported the assumption that goals of greater difficulty lead to higher levels of performance than easy goals. In a later review, Locke, Shaw, Saari, and Latham (1981) reported that 90% of the studies reviewed supported the assertion that specific difficult goals improve performance to a significantly greater extent than “do your best” goals, easy goals, medium goals, or no goals.

2.1.1 Goal type

Early goal research revealed that different types of goals can affect performance in different ways. Two key categories of goals that have emerged from empirical research are performance goals and learning goals, and these can have diverse effects on performance depending upon the skills required to complete a task. Seijts and Latham (2005) described performance goals as those in which a particular level of task performance is required (e.g., 20 units per week), whereas learning goals are those that specify a particular skill or strategy required to achieve the goal (e.g., discover three new strategies to increase production of units). The difference primarily lies in how the instructions are framed (Latham & Locke, 2007).
Typically, with performance goals, it is assumed that the individual possesses the skills necessary to achieve the goal, and the goal cues the individual to use these skills or strategies to attain the goal. Consequently, in a typical laboratory setting, when the task used is simple and repetitive, the goal that is manipulated is typically a performance goal. Learning goals are set in situations in which the individual is required to learn skills and strategies necessary to produce a result. Seijts and Latham (2005) asserted that learning goals are necessary to progress the individual to a point at which performance goals will increase performance. According to researchers, setting learning goals for a relatively simple task will waste time; however, setting a performance goal before an individual has acquired the skills necessary to complete the task can be detrimental to performance (Kanfer & Ackerman, 1989; Seijts & Latham, 2005; Winters & Latham, 1996). This is because setting a specific performance outcome may distract from learning or discovering strategies that may help in attaining the goal. Seijts and Latham compared performance goals and learning goals with a business simulation task that required participants to change their strategy to improve performance. Participants in a high specific learning goal group performed significantly greater than participants in a performance goal group. Interestingly there were no significant differences in performance between the performance goal group and a “do your best” goal group.

Due to the body of research examining learning and performance goals, it is commonly accepted that in situations in which knowledge of how to perform a task is necessary, “do your best” goals lead to greater performance than performance goals, while learning goals result in greater performance than both performance goals and “do your best” goals (Latham, 2003; Latham & Brown, 2006). On the other hand, Brown and Latham (2002) found that with participants who were familiar with their subject matter, performance goals led to higher levels of performance than learning goals or “do your best” goals. It is generally understood that if ability is not in question, assigning performance goals will facilitate higher rates of performance (Seijts & Latham, 2012).

2.1.2 Goal level and stretch goals

Unattainable goals or “stretch goals” are commonly implemented in organisations, and to a large extent they are an accepted management tool to improve performance. Stretch goals are implemented with the expectation that the employee will “go beyond the possible (and merely difficult) to the impossible” (Hughes,
2001, p.7). A number of researchers have cautioned against the use of stretch goals (See, Heath, & Fox, 2006) as they can demotivate poorer performers and lead to decreases in performance for these individuals. This is often masked when average increases in performance are the priority. See, Heath, and Fox (2006) suggested that a highly unattainable goal will lead to decreases in performance for lower performers. As goal difficulty increases, so too does variation in performance (See, et al., 2006).

Seijts and Latham (2005) noted that setting stretch goals without providing the resources to succeed can result in risky and unethical behaviour. For example, in the 1990s, Sears retailer set a specific stretch goal for its auto repair staff; sales of $147 per hour. This resulted in employees charging customers for unnecessary repairs, in an effort to meet the goal (Ordonez, Schweitzer, Galinsky, & Bazerman, 2009). Seijts and Latham have suggested that in instances of risky and unethical behaviour, the fault lies with the type of goal that has been set. They argue that if learning goals are set instead of performance goals, discovery of action plans and alternative methods of achieving the goal will be promoted. Similarly, the environment in which the goals are set will impact performance. If employees are assigned a difficult or stretch goal in a punitive work environment, this may lead to unethical or hazardous behaviour (Latham, 2004).

Ordonez, Schweitzer, Galinsky, and Bazerman (2009) reviewed the use of goal setting within organisations, specifically pinpointing instances in which setting stretch goals led to undesirable behaviour. Ordonez et al. described an example in which a stretch goal was set in the Ford Motor Company, to produce a new car that would be “under 2000 pounds and under $2000” (p.4), in order to increase market share to foreign competitors. This stretch goal, coupled with a tight deadline resulted in the omission of a number of safety checks, including the fuel tank, which was located in an area that would lead to ignition upon impact. Many levels of management signed off on the omitted safety check, in order to meet the deadline. Ordonez et al. reported that even after executives discovered the fault, they calculated that the lawsuits brought about by 53 deaths and many more injuries, would be less costly than fixing the design flaw. In this example, employees followed a specific, challenging goal at the expense of safety features, possibly because these safety features were not stated in the goal (Ordonez et al., 2009).
Sitkin, See, Miller, Lawless, and Carton (2011) suggested that there is no current theory to explain the potential effects of unattainable goals on performance. Sitkin et al. suggested that the implementation of stretch goals can lead to many simultaneous changes in behaviour in an attempt to reach the goal. In such situations, it may not be possible to distinguish between behaviours that led to improved performance, and ineffective behaviours. Furthermore, Sitkin et al. suggested that implementing stretch goals results in the exploration of new routines, strategies, and resources to attain the goal. This may lead to a departure from old well-functioning strategies, which may undermine performance. With the addition of stretch goals, all old routines may be discarded, and this may not necessarily be productive. Sitkin et al. argued that the success stories utilizing stretch goals are ones in which stretch goals were implemented at a time of major change within the organisation, when resources were available and recent performance had been high. They cautioned that this is not the case for all organisations and the positive effects of stretch goals should not be generalised to organisations that lack the resources or performance levels to promote unattainable goals.

Thus, despite the abundance of research demonstrating a linear relationship between goal level and performance, there is an apparent need to examine the effect of stretch goals on performance. There is evidence that stretch goals may lead to unethical behaviour, and behaviour that is not goal-directed. If behaviour is goal-directed, the assignment of an unattainable goal may give rise to increases in behaviour; however, persistence may reduce after a prolonged time in the presence of an unattainable goal and after repeated failure to attain the goal.

2.1.3 Persistence

The majority of experimental studies investigating goal setting have taken place over relatively short time periods. Several researchers have noted that longer intervals of time should be employed during laboratory studies to examine the effect that this may have on performance (Austin & Bobko, 1985; Fried & Slowik, 2004); however, few studies have specifically investigated the effects of time on persistence. If goals reach a satiation point over time, a ‘levelling off’ or even deterioration in performance may result (Austin & Bobko, 1985). Locke et al. (1981) noted that laboratory experiments are not designed to test persistence, due to time constraints, and field studies typically measure the immediate results of goal setting instead of observing ongoing performance patterns or persistence.
In an early study examining the effects of difficult goals on performance, Locke and Bryan (1967) included a measure of boredom. Participants rated their boredom levels every 15 minutes throughout a 90-minute task. Performance was significantly higher in a difficult goal group than a “do your best” goal group, and results revealed that in both the specific difficult goal group and the “do your best” goal group, interest in the task steadily decreased over time. In a follow-up study, participants were exposed to a lengthened (2-hour) task and were asked to record their boredom levels every 15 minutes. Participants in the difficult goal group displayed greater task interest than participants in the “do your best” group. All groups demonstrated a decline in task interest over time; however, the decline was more pronounced for the “do your best” group. This was an early indication of decreased persistence in the presence of a goal in a lengthened laboratory setting, yet subsequent research tended towards investigating performance in short trials. For example, Garland (1982) examined the effect of goal level on performance over fifteen 1-minute trials. Results supported prior research demonstrating that increased goal level leads to increased performance; participants in the high goal condition persisted across trials despite repeated failure. The difference in performance between the high and low level groups was greatest in the final trial, and Garland suggested that this was a demonstration of persistence; however, participants were expected to persist for just 15 minutes.

A considerable reduction in behaviour or failure to persist in the presence of a goal has been interpreted by some researchers as ‘goal abandonment’. Negotiation research has contributed significantly to the study of abandoning goals, or ‘resistance point’ (e.g., Zetik & Stuhlmacher, 2002). Zetik and Stuhlmacher (2002), in a meta-analysis of goal setting within negotiation, highlighted that goal setting researchers should focus on goal abandonment when attempting to pinpoint an optimal goal level for greater performance. Wrosch, Scheier, Miller, Schulz, and Carver, (2003) suggested that one factor leading to the abandonment of a goal may be the degree to which an individual can predict the likelihood of goal attainment. A person who can clearly see that a goal will be unattainable will be more likely to abandon it. In a study examining the effect of feedback on goal acceptance in the presence of an increasingly difficult goal, Vance and Colella (1990) found that as feedback describing the discrepancy between performance and the goal level increased, goal
rejection increased; however, performance continued at high levels for the increasingly difficult goal group.

Research has indicated that past success leads to persistence (Audia, Locke, & Smith, 2000). Particularly, organisational success can lead to persistence, even when persistence leads to dysfunctional behaviour in the presence of organisational change (Lant, Milliken, & Batra, 1992). For example, in an archival study, Audia, Locke, and Smith (2000) assessed the effects of past success on persistence in the face of organisational change for an airline company and a trucking company over a 10-year period. For both industries, the greater the performance over the five years prior to organisational change (deregulation), the more persistence with old strategies subsequent to the change. If past success leads to increased persistence, we would expect past failure to weaken persistence, yet research has suggested that this is not always the case. For example, Garland (1983) examined the effect of an unattainable goal on performance, when compared to an easy goal. Participants in the unattainable goal group demonstrated a higher level of performance than participants in the easy goal group. For the final phase of the study, participants were given the choice to continue performing or to cease. Only intent to continue working was measured; however, an equal number of participants from the unattainable goal group and the easy goal group chose to continue working. Garland (1983) interpreted this as a measure of persistence and concluded that the assignment of an unattainable goal did not negatively affect persistence. Similarly, Lant, Milliken, and Batra (1992) found that poorly performing firms persisted with performance even in the face of organisational change. These poorer performing firms had lower levels of environmental awareness, and the authors proposed this as a reason for such high levels of persistence.

Bar-Eli, Tenenbaum, Pie, Btesh, and Almog (1997) examined the effects of five levels of goal difficulty on performance with a sit-up task, over three durations (4, 6, and 8 weeks). A difficult but realistic goal led to greater performance than any of the other four goal levels, followed by an easy goal. An unattainable goal group exhibited less performance gains than a difficult realistic goal group after four weeks and six weeks, but this difference was not significant at eight weeks. Performance gains for the difficult realistic goal group and the easy goal group evidenced slight decreases at eight weeks, suggesting a drop in persistence. This was not evident for the unattainable goal group, suggesting that in the face of failure, participants
assigned an unattainable goal persisted over time, despite higher overall observed levels of performance with the difficult attainable goal group.

Research in the area of persistence and goal abandonment suggests that there are times when a goal may be so unattainable that it will not increase performance, or may result in decreases in performance. In a review of goal setting interventions, Locke et al. (1981), reported on a number of studies that demonstrated support for the relationship between goal difficulty and performance. Yet, results of six laboratory studies found no relation between goal level and performance. Locke et al. suggested that for four of these studies, the goal level was too high to be attained, thus too unrealistic for participants to attempt to reach. This suggests that in some cases, participants do not persist in the presence of an extremely unattainable goal. Determining an unattainable goal level at which participants ‘give up’, seems pertinent to furthering our understanding of the process of goal setting. Pinpointing an optimal goal level will lead to maximum performance while avoiding ‘giving up’ or goal rejection. Research examining the effect of unattainable goals on persistence has been inconsistent, and direct behavioural measurement has generally taken place over short time periods.

2.2 Goal Setting and Feedback

An important characteristic of the work environment that influences how goals affect performance is the availability of feedback. Feedback is frequently described as information about the appropriateness of past actions or behaviour (Ilgen, Fisher, & Taylor, 1979), or information about how well a person is meeting a goal (Ashford & Cummings, 1983). According to goal setting theory, feedback increases effort and performance through four mechanisms. First, feedback may induce goal setting, such that in situations in which a goal has not been set, the provision of feedback may lead an individual to self-set goals. Second, feedback may lead to self-setting higher goals when that feedback signals that an original goal has been met. A third mechanism is that feedback may increase effort by signalling to the individual that the current amount of effort is insufficient to meet the goal. Finally, feedback may provide ‘cueing’ information about how to change strategy or improve performance, in order to reach a goal (Latham & Yukl, 1975). Research has demonstrated that goals mediate the effectiveness of feedback, while feedback has been shown to moderate the effectiveness of goals (Erez, 1977; Latham & Locke,
Chapter 2 Empirical Studies

1991; Locke et al., 1981). This section of the chapter will begin with an outline of the early work demonstrating a relationship between goal setting and feedback, and will provide a review of research that has effectively applied goal setting and feedback to improve performance.

### 2.2.1 Early research on goals and feedback

Prior to Locke’s seminal work in 1967, the positive effect of feedback on performance had been well established. However, goal setting and feedback groups were generally compared to no goal and no feedback groups, thus the effect of the goal was indistinguishable from the effect of feedback. Locke (1967) furthered the research by dividing participants into “do your best” goal groups with or without feedback in the form of knowledge of score, and difficult goal groups with or without feedback. Participants completed a simple addition task in alternating trials of 10 and 15 minutes in length, for one hour. The difficult goal group performed significantly better than the “do your best” group. There was no effect of feedback observed and no goal-feedback interaction effect observed. From these results, Locke asserted that previous results attributing a ‘motivating’ effect to feedback may have been incorrect, and that previous positive results may have been a function of the goal that was associated with the feedback condition. Locke suggested that feedback is only effective when a goal has been set, or it is effective to the extent that it impacts on an individual’s goal.

While acknowledging Locke’s (1967) finding that knowledge of score may not be effective in the absence of goal setting, Erez (1977) investigated whether knowledge was a necessary condition for goals to affect performance. Participants took part in a simple number comparison task for ten minutes, with no goal present. Participants in the experimental group were then provided with feedback on their performance while the control group did not receive feedback. Following this, all participants were asked to set goals for the next session choosing from five levels of difficulty, and then completed the second 10-minute session. Results revealed that participants in the feedback group performed significantly better than participants in the no feedback group. Additionally, self-set goals were significantly higher for the feedback group, and the relationship between performance and the goal was stronger in the feedback group than in the no feedback group, indicating that the effect of self-set goals on performance was moderated by feedback. Within the goal setting-
feedback literature, the Locke and Erez studies influenced much additional research manipulating and demonstrating goal-feedback relationships.

### 2.2.2 Applied research on goals and feedback

In one of the first applied goal setting studies, Latham and Baldes (1975) demonstrated the practical implications of goal setting with employees in a logging company. Examination of net weight of logging trucks had revealed that the weight frequently fell short of the legal limit. Truckers were first encouraged with a “do your best” goal for three months, and subsequently were assigned a high goal of 94% net truck weight. Upon introduction of the goal, performance increased immediately, and continued to increase across nine months, saving the company a quarter of a million dollars (Latham and Baldes, 1975). Latham and Baldes suggested that the implementation of goal setting may have led to increased awareness or ‘use’ of knowledge of results. The intervention did not specifically manipulate feedback; however, employees had continual access to feedback prior to and during implementation of the goal setting system. Latham and Baldes noted that after implementation, employees began to keep a record of their truck’s net weight. This suggests that the provision of goals may have increased the reinforcing function of feedback.

The Latham and Baldes (1975) study introduced goals to a setting in which feedback was readily available to employees, thus the effect of feedback on goals was unclear. In order to address this, Kim and Hamner (1976) varied the type of feedback given to individuals who were assigned goals. Participants were employees at four separate plants in a telephone company, and the dependent measures were cost performance, absenteeism, safety, and service. Goals were assigned to each plant, and weekly objectives were provided to employees. In the first plant, employees were provided with external feedback from the foreman each week, in addition to informal praise during the week. In the second plant (intrinsic feedback), employees were provided with a form at the end of the week in which they would rate themselves, generating their own feedback. The third plant experienced both the external feedback and intrinsic feedback conditions, while the fourth plant received only informal feedback. Results showed that goal setting with feedback led to increased performance on two of the dependent measures, cost, and safety. On two of the measures (absenteeism and service), feedback did not significantly affect performance, although Kim and Hamner noted that on the service
measure the greatest improvement occurred in the external feedback group. These findings supported a position that recommended supervisor-provided feedback over self-generated feedback.

Research demonstrating the effectiveness of goal setting and feedback has been conducted in a variety of applied settings. Becker (1978) demonstrated the positive effects of high goals with feedback on performance in a study to reduce residential energy consumption. Strang, Lawrence, and Fowler (1978) demonstrated the superior effects of a combination of a high goal and feedback in comparison to a high goal without feedback, with students on a computational task. McCuddy and Griggs (1984) reported on a case study in which goal setting and public feedback led to a reduction in project design errors in an engineering department of a truck-manufacturing firm. Amigo, Smith, and Ludwig (2008) introduced task clarification and goal setting to decrease waiters bussing time. Task clarification took the form of a memo explaining how to correctly bus a table, and in the memo, a specific goal was assigned to reduce table-bussing time to three minutes. Bussing time reduced; however, time reduced further when feedback was introduced two weeks after the initial intervention. In a follow-up phase, feedback was removed and bussing time increased to near baseline levels. The authors suggested that task clarification likely functioned as an antecedent stimulus to provide information on correct bussing behaviour, yet this behaviour was not reliably observed until feedback was introduced and subsequently reinforced the correct behaviours.

Goal setting and feedback combinations have been implemented specifically to improve safety, and increased research in the field of behaviour-based safety has resulted in goal setting and feedback proving to be common interventions to improve safe behaviour. Komaki, Barwick, and Lawrence (1978) introduced feedback to a wholesale bakery organisation. After an initial safety training, an organisational goal of 90% performance increase was chosen. Five ‘safe’ behaviours were operationalised and targeted for improvement. Group feedback was delivered publicly on a graph, and supervisors praised employees individually when they observed safe behaviours. A multiple baseline reversal design was employed in order to compare the effect of goal setting and feedback with the removal of the intervention within the same group, and across two groups. Performance increased immediately upon introduction of the intervention for the first group, while performance remained at baseline levels for the second group. When the
intervention was introduced to the second group, performance increased immediately. For both groups, performance remained at or above the goal level while the intervention was in place, and during the reversal phase, performance decreased to baseline levels, thus demonstrating the effect of a combination of goal setting and feedback.

Reber and Wallin (1984), and Reber, Wallin, and Chhokar (1990) demonstrated the beneficial effects of adding feedback to a goal setting intervention to improve safety behaviours in a farm machinery-manufacturing firm. Cooper, Phillips, Sutherland, and Makin (1994) applied goal setting and feedback to a group of factory workers in a UK setting, in order to increase targeted safe behaviours. Results indicated significant improvements in safe behaviours along with a reduction in injuries at the plant. Similarly, Laitinen and Ruohomaki (1996) implemented a goal setting and feedback programme with construction workers at two building sites in Finland. Six items were measured including the use of protective equipment, and lighting and electricity. Safety was measured through a safety index, and scores at the first site improved from 54% in baseline to 82% after two months of the intervention. Scores at the second site improved from 67% in baseline to 90%. Both sites were at different levels of construction when the programme was implemented, thus providing evidence that goal setting and feedback improved performance independent of construction stage.

Cunningham and Austin (2007) investigated the effects of an intervention package consisting of goal setting, task clarification, and feedback on improving safe behaviours of hospital personnel during surgery. Following intervention, the passage of sharp instruments safely during surgery increased from an average of 32% to 64% in an inpatient operating room, and 31% to 70% in an outpatient operating room. Ludwig, Geller, and Clark (2010) examined the effect of group goals, group feedback, and individual feedback on safe driving behaviours, with delivery drivers. The use of turn signals increased with the provision of group goal setting and group feedback; however, further increases were observed when individual feedback was added.

As can be seen from a brief view of the literature, a combination of goal setting and feedback has resulted in positive performance improvements across a variety of applied settings. Cameron and Duff (2007) conducted a review of goal setting and feedback interventions in behavioural safety. Studies reviewed were
based in diverse settings such as mines, chemical plants, laboratories, paper mills, manufacturing plants, and shipyards, and safety behaviours such as reducing ventilation citations, activating fans when necessary, wearing respirators, covering skin, and reducing fire hazards were targeted. The review highlighted the wealth of field research, demonstrating positive results with combined interventions in numerous international studies.

Despite the wealth of feedback research, the effect of feedback in the presence of unattainable goals has largely been ignored in applied research due to practical concerns; however, this line of research has also been neglected in laboratory settings. Few studies have investigated the effects of feedback on persistence and those studies have provided non-specific, attainable goals (e.g., Medway & Venino, 1982; Schunk, 1983); thus, the effect of feedback on persistence in the presence of an unattainable goal is largely unknown.

### 2.2.3 Types of feedback

The form of feedback provided may affect how feedback interacts with goal-directed behaviour. Kim (1984) compared the effect of outcome and behaviour feedback on performance when a goal had been set, in an effort to examine the type of information provided during goal setting and feedback, and ultimately its effect on performance. Outcome feedback refers generally to a quantitative outcome (e.g., 60 sales), whereas behaviour feedback refers to the behaviours necessary to achieve the outcome (e.g., greeting customer). The study was conducted in four branches of a large retail organisation. Participants were assigned to a behaviour goal setting plus feedback group, an outcome goal setting plus feedback group, a behaviour and outcome goal setting plus feedback group, or a control group. Results showed that the group with both outcome and behaviour goal setting and feedback produced the highest level of performance, followed by the outcome goal setting and feedback group and then the behaviour goal setting and feedback group. The study demonstrated that the provision of both quantitative and behavioural feedback resulted in greater performance than either alone.

Johnson and Frederiksen (1984) examined the effects of process and outcome feedback on performance in the presence of a goal, with staff at a state hospital. Process feedback increased the rate of process behaviour, but did not affect outcomes, whereas outcome feedback did not affect outcomes or related process behaviours. The study demonstrated that the type of feedback directly improves the
behaviour specified in the feedback; if feedback is delivered on a specific strategy used to produce a result, the strategy will change contingent upon the feedback, but the result may not. Earley, Northcraft, Lee, and Lituchy (1990), compared a difficult goal with a “do your best” goal while also manipulating process and outcome feedback, with a stock-investment simulation. Process and outcome feedback were manipulated according to specificity. The highest level of performance occurred in the difficult goal condition with performance and outcome feedback, suggesting that both forms of feedback had an additive effect on the goal setting-performance relationship. Additionally, the study demonstrated that process feedback interacted with a specific difficult goal to affect the quality of the participant’s task strategies and information search, while outcome feedback interacted with the goal to affect effort and self-confidence. The authors noted that given a small discrepancy between outcome feedback and the goal, participants may remain at their current level of performance, but given a larger discrepancy, they may increase effort.

These early studies demonstrated that the type of feedback provided improves the behaviour specified in the feedback. Process feedback may affect task strategies while outcome feedback will increase effort to achieve a (usually quantitative) outcome.

2.2.4 Goal setting and feedback seeking

Research in the area of goal setting has demonstrated that feedback is more effective in the presence of goals. This suggests that goal setting increases the reinforcing functions of feedback. As such, the study of feedback-seeking behaviour in the presence or absence of goals will provide increased information on the function and processes underlying feedback. Within future experimental chapters in the current programme of research, the terms self-solicited feedback and feedback seeking will be used interchangeably, and both fall under Ashford and Cumming’s (1983) definition of feedback seeking; “conscious devotion of effort toward determining the correctness and adequacy of behaviours for attaining valued end states” (p.466).

Ashford and Cummings (1983) noted that a number of costs exist with seeking feedback, including effort costs and inference costs, in which the participant may infer a message that was not intended. Effort cost has received little attention in the research literature, and currently it is not clear to what extent effort costs impact on feedback-seeking behaviour (Ashford, Blatt, & VandeWalle, 2003; VandeWalle,
2003). Ashford (1986) conducted a correlational study examining the effects of several variables on the frequency of feedback seeking. Individuals reported that they would increase feedback seeking as they placed higher importance on goals. Additionally, and unexpectedly, individuals reported that they would seek feedback to a greater extent when they believed that they were not attaining their goals (Ashford, 1986). Ashford proposed this as evidence of the value of feedback as a resource. However, several researchers have found that individuals are less likely to seek feedback if they believe that they are performing poorly (Ashford & Tsui, 1991; Morrison & Cummings, 1992; Northcraft & Ashford, 1990).

Much of the research on feedback seeking has neglected to examine the processes involved in seeking feedback (VandeWalle, 2003). Investigation of the variables in operation during feedback seeking can provide a clearer understanding of why individuals seek feedback in some contexts and not in others, thus providing information on the function of feedback. Research on the effect of goals on feedback seeking is limited, and in particular, the effect of goal level on feedback seeking is unknown. An examination of the effect of goal level on the frequency of feedback-seeking responses can provide information on the interactive relationship between goal setting and feedback. In addition, manipulating goal level may provide the experimental conditions necessary to directly investigate effort and time costs involved in feedback-seeking behaviour.

2.3 Conclusion

This chapter outlined the abundance of research within the area of goal setting, and highlighted some key unexplored areas of research. Most notably, the effect of unattainable goals on performance and persistence over time has received little attention in the literature. Additionally, the role of feedback on persistence in the presence of an unattainable goal has been neglected. Despite an abundance of research demonstrating the positive effects of goals on performance, explanations for the processes underlying goal setting are unclear. This may be because a majority of studies have used correlational designs rather than direct manipulation (Latham & Yukl, 1975), thus causality could not be established. Additionally, the role of individual behavioural histories has received little attention within the cognitive literature. As a result, group data are relied upon and individual performance is masked. Without an examination of individual differences, it is difficult to assess
the processes underlying behavioural change in the presence of a goal or feedback. Chapter 3 will focus on behavioural explanations that have attempted to account for the underlying processes of goal setting, highlighting strengths and limitations of these accounts.
Chapter 3: Behavioural Accounts of Goal Setting and Feedback

The aforementioned research has stemmed primarily from cognitive theories of goal setting (Latham & Locke, 1979), and the majority of the results are explained in terms of cognitive theory. Despite the wealth of research, there are a number of notable limitations of cognitive accounts of the processes underlying goal setting. Within goal setting theory, much importance is placed on how much a participant accepts and commits to a goal. For the most part, this is not observed directly, and quite often is measured as a response to a question such as “how committed are you to attaining the goal?”. This commitment might change over time during a task, and is generally measured either before or after the task. The presentation of goal choice may act as a measure of commitment (Locke et al., 1981), yet this is used infrequently as a measure of acceptance or commitment. Instead, questionnaire and survey data are adopted. In laboratory settings, it is routinely assumed that commitment is a given (Latham & Locke, 1991); however, when goal-setting effects are not observed, goal commitment is often provided as a possible reason. Some researchers have noted that the true test of goal commitment is performance (Latham & Locke, 1991). Latham and Locke (1991) explained that the action taken to attain a goal reflects the thinking which preceded the action, and the choice to act on that thinking. If this is the case, then the distinction between performance and commitment warrants clarification within cognitive literature. If commitment is measured in terms of performance, then commitment can be directly measured; however, if ‘agreeing to commit’ is seen as a measure of ‘adherence’ then an important distinction warrants clarification (Malott, 1996). That is, agreeing to commit, and goal-directed performance should be measured separately, as an individual may report commitment to a goal and not exhibit subsequent goal-directed behaviour.

O’Hora and Maglieri (2006) suggested that a weakness with cognitive accounts is that the outcomes of goal setting are sometimes indistinguishable from the proposed mechanisms that underlie goal setting. O’Hora and Maglieri noted that the provision of a goal may result in more time spent on task-relevant behaviours. However, if the only evidence of directing attention to the task is that more time is spent on the task, then ‘goals direct attention’ is an explanatory fiction (Skinner,
That is, the process used as an explanation (‘goals direct attention’) is no different from the event itself (more time is spent on the task). O’Hora and Maglieri suggested that in this instance, the outcome has been restated (more time is spent on the task) rather than explained.

Organisational behaviour management (OBM) is the application of behavioural principles to organisations (Bucklin, Alvero, Dickinson, Austin, & Jackson, 2000). The current programme of research examines goal-directed behaviour from a behavioural perspective, therefore Chapter 3 outlines behavioural accounts that have been provided to explain the effects of goals and feedback on performance. Behavioural researchers have implemented goal setting and feedback in a variety of settings, and behavioural theory is increasingly incorporated into organisational settings, most notably in the form of behaviour-based safety (e.g., DePasquale & Geller, 1999; Geller 2011; Komaki, Barwick, & Scott, 1978).

Mawhinney (1975) noted that mainstream organisational psychologists tend towards describing contingencies of reinforcement in terms of a response and a consequence. He criticised that these psychologists neglect important features such as individual histories of reinforcement or punishment. Behavioural accounts attempt to describe the behavioural histories that give rise to the goal setting and feedback effects found in both cognitive and behavioural research.

Empirical research has demonstrated that specific difficult goals lead to increases in performance, and that feedback enhances the effect of goals on performance (Chapter 2). Chapter 3 begins with an assessment of early behavioural accounts that were provided to explain how goals affect behaviour. These accounts were based on contact with direct contingencies and attempted to explain goals in terms of discriminative stimuli and conditioned reinforcement. Agnew (1997) added to earlier accounts by explaining goals as establishing operations. Additionally, the current chapter assesses later behavioural accounts such as Malott’s (1993) account of goals as rules. The latter half of the chapter focuses on an account of goal setting based on Relational Frame Theory (RFT; Hayes, Barnes-Holmes, & Roche, 2001).

### 3.1 Early Behavioural Accounts

Behavioural researchers within applied settings have recommended the use of goals to increase performance, and early research includes the work of Komaki and colleagues in which goal setting and feedback were introduced to increase safe
behaviours in a food manufacturing plant (see Chapter 2; Komaki, Barwick, & Lawrence, 1978). In addition to examining the effects of goals and feedback on performance, Komaki and colleagues assessed the effects of training and feedback on performance in a number of applied settings. Komaki, Heinzmann, and Lawson (1980) examined the effects of training and feedback on safety performance in a vehicle maintenance division. Performance improved only slightly during the training condition; however substantial improvements were observed during the feedback condition. In a similar study, Komaki, Collins, and Penn (1982) examined the role of antecedents (training) and consequences (feedback) on safety performance in a processing plant. Performance increased with the introduction of the antecedent condition for only two out of four departments, while performance significantly increased in all departments with the introduction of feedback. Even though behavioural researchers promoted the use of goals and feedback, the theory of how goals or feedback worked was largely implicit. Perhaps the first explicit theoretical account of goal-directed behaviour in the workplace was provided by Fellner and Sulzer-Azaroff (1984).

Fellner and Sulzer-Azaroff (1984) suggested that goals can function as both discriminative stimuli and conditioned reinforcers. A discriminative stimulus is a stimulus that, when presented, increases the frequency of a particular response due to a prior pairing of that stimulus with reinforcement. According to this account, the combination of a goal and feedback places behaviour under stimulus control, with the goal acting as the antecedent stimulus and feedback operating as reinforcement. Considering a goal as an antecedent stimulus and feedback (e.g., praise) as a consequence, through frequent pairing, the goal will signal the availability of feedback as a consequence, thus evoking goal-directed behaviour. Fellner and Sulzer-Azaroff suggested that through frequent pairing of goal achievement and a reinforcing consequence, goal achievement itself can function as a conditioned reinforcer. They further suggested that goal setting alone may be ineffective if the performance behaviour has been inadequately differentially reinforced in the presence of the goal. Similarly, Balcazar, Hopkins, and Suarez (1985) suggested that if feedback has not been paired with a reinforcing consequence, then the provision of feedback will not improve behaviour. That is, according to the discriminative stimulus account, a history of reinforcement in the presence of a goal or feedback is necessary in order for the goal or feedback to affect behaviour.
In Agnew’s (1997) account of the establishing operation (EO) in organisations, a goal is described as an EO that alters the value of a reinforcer, rather than signalling the availability of the reinforcer. An EO is a change in the environment, which momentarily alters the effectiveness of an object or event as reinforcement and simultaneously momentarily alters the frequency of the behaviour that has been followed by that reinforcement (Michael, 1982). While a discriminative stimulus signals the availability of reinforcement, an establishing operation alters the value of a reinforcer. Olson, Laraway, and Austin (2001) provided an accessible summary of the effect of an EO; “the reinforcer-establishing effect makes a person ‘want something’ more or less, and the evocative effect causes a person to behave in ways that are likely to result in ‘getting what they want’” (p.16).

Agnew (1997) argued that an EO account can describe the role of feedback in relation to goals. Agnew explained that in a traditional discriminative stimulus account of the effect of feedback (as a reinforcer) on goal-directed behaviour, feedback is differentially available in the presence of the goal, and the goal signals the availability of the reinforcer (feedback). However, in a typical work setting, feedback is present before the goal setting intervention has been implemented, but is more valuable when the goal has been put in place, thus the goal functions as an EO. Agnew suggested that discriminative stimulus accounts can account for some goal setting effects when the reinforcer is not available in the absence of the goal, but viewing a goal as an establishing operation can better explain more instances of goal-directed behaviour. Additionally, if goals function as EOs, then feedback in isolation may not operate as reinforcement; however, in the presence of a goal (the EO), the reinforcing value of feedback has been altered, and thus those behaviours that result in feedback will increase. This is consistent with findings in cognitive literature that a combination of feedback and goal setting improves performance to a greater extent than feedback alone.

Huber (1986) expanded Fellner and Sulzer-Azaroff’s (1984) model of goal setting and suggested an operant model based on the assumption that the effectiveness of goals can be predicted through an examination of individual reinforcement history, levels of deprivation and satiation, and behavioural contingencies. While Huber described goals in terms of discriminative stimuli, she also acknowledged the role of rule-governed behaviour in goal setting. Huber
suggested that employees learn through both direct contingencies and descriptions about a contingency. Similarly, Peterson (1982) argued that the temporal delay between the exhibition of behaviour and the delivery of feedback does not lend to an explanation of the process of feedback in terms of reinforcement or stimulus control, and it is more likely that rule-governed behaviour explains feedback.

3.2 Rule-Governed Behaviour Accounts

Rule-governed behaviour explains complex human behaviour in terms of descriptions of contingencies rather than direct-acting contingencies. According to Skinner (1969), a rule functions as a contingency-specifying stimulus, in that the rule (antecedent stimulus) specifies the behaviour and the consequence. For verbal humans, a rule can exert control over behaviour in the absence of a history of contacting a direct contingency, and rule-governed behaviour and contingency-shaped behaviour are considered different operants. Zettle and Hayes (1982) described rule-governed behaviour as behaviour in contact with two sets of contingencies, one of which is a verbal stimulus. Hayes (1986) defined a verbal stimulus as “a stimulus that has its discriminative, establishing, eliciting, reinforcing, or other effects because of its participation in relational frames established by the verbal community” (p.357). That is, rule-governed behaviour is behaviour controlled by verbal stimuli, thus is a type of verbal behaviour (Hayes, 1986). In an early study on instructional control conducted by Galizio (1979), participants were placed on particular schedule contingencies along with various instructions, or contingency specifying stimuli at odds with those schedule contingencies. The overall results of four experiments supported the hypothesis that rule-governed behaviour may over-ride control by direct schedule contingencies. Participants demonstrated instructional control almost immediately, and this persisted when instructions were withdrawn. For example, if participants were asked to go slowly on a task, they would do so even if a ratio schedule was in place in which higher rates of responding would result in reinforcement.

Fellner and Sulzer-Azaroff (1984) suggested that there are times when goals function through rule-governed behaviour, for example, when an individual meets a goal in the absence of past pairing with reinforcement. In this case, the individual’s behaviour has come under the control of the supervisor’s instructions. Komaki, in her applied work examining the effect of goals and feedback on performance, did not
explicitly state that goals functioned as rules; however, she stated that “goals, for example, are viewed as clarifying expectations for performance, specifying the relation between behaviour and its consequences and/or signalling occasions in which consequences are likely to be provided contingent on behaviour” (Komaki, Zlotnick, & Jensen, 1986; p261). In suggesting that goals change behaviour through the specification of behaviours and consequences, Komaki’s account therefore seems to suggest that goal statements operate as rules (i.e., contingency specifying stimuli).

**3.2.1 Goals as rules**

Numerous behavioural accounts of goal setting have described goals as rules that exert control over behaviour (e.g., Agnew & Redmon, 1993; Malott, 1993; Malott, Shimamune, & Malott, 1993). The statement of a rule (a goal) alters the value of a delayed consequence by making its influence immediate. Setting up a rule creates an immediate controlling circumstance that affects behaviour until the delayed consequences can exert more direct control (Malott, 1993). Malott (1993) provided an example in which a person has four hours to complete a task, and the person states “If I do not get to work right now, I will miss the deadline and look bad” (p. 54). In this instance, the rule statement may function as an EO, establishing non-compliance with the rule as an aversive condition.

Although the delay between behaviour and the outcome is crucial for direct contingencies of reinforcement, this delay has little effect when rules describe those contingencies (Malott, 1993). For example, a rule can be provided that will describe a consequence that will occur a week later, contingent upon the behaviour. Given sizable and probable outcomes, people will follow rules even though those outcomes are delayed. Malott, Shimamune, and Malott (1993) asserted that the majority of research within OBM reports on procedures that employ indirect-acting analogues to reinforcement rather than direct-acting contingencies. That is, rules describe contingencies or occasions when the response will produce a reinforcer; rules govern behaviour by establishing direct-acting contingencies of reinforcement or punishment (Malott et al., 1993).

Haas and Hayes (2006) suggested that for human performance, target behaviours are established through verbal rules, and feedback includes feedback on both task behaviour (e.g., “see how they are coming out smoothly now? Three a minute is just about what I’d normally hope to see and you are already there”; p. 94) and the form of rule-governed behaviour that has been observed (e.g., “that’s right.
Like I said, push that one first, and then turn this hard. Good” (p.94). In a study investigating the effects of rule-following feedback and task performance feedback on rule-governed behaviour, Haas and Hayes manipulated feedback such that it was inaccurate or non-contingently positive. Participants were exposed to a task in which they were required to move a sign through a visual grid on a computer screen to earn points. In the first part of the experiment, participants were instructed on how best to earn points, but once participants had learned to do this, the computer game changed so that participants could earn additional points by ignoring the original instructions. Participants were assigned to one of a range of rule conditions. One control group received the original instruction on how to best earn points, but no rule-following feedback, while the other control group received minimal instructions on how to earn points during the first stage (minimal rule), allowing an evaluation of the effect of the rule alone. Two of the experimental groups received accurate rule-following feedback on whether they were following the original rule (‘you are/are not following the rule that you were given at the start of the session’) and one of these also received performance feedback (e.g., ‘you earned 10 points’). Two more groups received random rule-following feedback (50% following, 50% not following, regardless of performance) and one of these groups received performance feedback.

Results showed that the minimal rule group were most sensitive to the change in experimental contingencies, in that most participants showed increases in responding soon after the schedule of responding was changed. The least sensitive group was the one that received accurate rule-following feedback and performance feedback, illustrating that the group who received the most accurate feedback performed most insensitively. During the second part of the experiment, this group received messages telling them that they were not following the original instructions, but they also received information on the impact of their behaviour through the points earned. It would be expected that participants would be more likely to ignore the rule-following feedback when they had access to performance feedback; however, the opposite was the case. Accurate performance feedback enhanced the effect of the rule-following feedback, which in turn impaired performance. Haas and Hayes (2006) suggested that the results may explain why such inconsistent findings have emerged from applied feedback research. Supervisors may provide both rule-following and task performance feedback. If the supervisor is resistant to change, he
or she may provide rule-following feedback counter to task performance feedback, thus task performance feedback might undermine performance improvements.

Exactly how rules specify contingencies is a theoretical issue beyond the bounds of the current research (see O’Hora, Barnes-Holmes, Roche, & Smeets, 2004; Schlinger & Blakely, 1987; Skinner, 1969). Accordingly, the current overview will be restricted to a description of functional classes of rule-governed behaviour that are of particular interest in an examination of goal setting in organisations.

### 3.2.2 Pliance and tracking

Zettle and Young (1987) described three functional classes of rule-governed behaviour; pliance, tracking and augmenting. Two of these classes, pliance and tracking, are of particular relevance to a description of the effects of goal statements on behaviour. A ply is a rule under the control of socially mediated consequences, thus for pliance to be reinforced a member of the social community must be capable of observing and monitoring the rule-following behaviour (Zettle & Young, 1987). Following orders can be viewed as instances of pliance, and O’Hora and Maglieri (2006) have described this rule following as “doing what you’re told”. If a line manager issues a direct instruction to an employee, and the employee follows the instruction because the manager has reinforced behaviour in accordance with previously presented instructions, then this is an example of pliance. The second functional class of rule-governed behaviour is tracking, described as rule-governed behaviour under the control of the apparent correspondence between the rule and the way in which the environment is arranged (Zettle & Young, 1987). Reinforcement for tracking results from natural contingencies. Accordingly, unlike in the case of pliance, a member of the social community is not required to monitor tracking. While following orders can be viewed as instances of pliance, following directions and advice from others, or following written instructions can be viewed as instances of tracking. For example, if an employee is provided instructions on how to build a particular product, and that employee follows the instructions because of the apparent correspondence between the rule and the completed product, then this is an example of tracking. O’Hora and Maglieri suggested that in the case of tracking, the rule controls behaviour because the individual stating the rule has accurately described environmental contingencies in the past.
O’Hora and Maglieri (2006) suggested that pliance and tracking repertoires of employees allow for goal statements to affect performance. For example, when a goal statement is delivered, responding may occur due to prior delivery of reinforcement in accordance with following rules delivered from the goal-setter. In this case, the goal statement functions as a ply. A goal statement may function as a track if the goal statement accurately describes, or participates in a ‘coordination relation’ with the employee’s description of environmental contingencies. O’Hora and Maglieri suggested that the way in which a goal statement is ‘interpreted’ affects performance in relation to the goal. They suggested that the practices of the organisation should be a priority when examining the effects of goal statements on behaviour, rather than the topography of the goal statement. That is, an examination of the history of rule-following contingencies will reveal whether or not an employee typically works under plies or tracks. The advantage of pliance is that performance can change rapidly when the goal statement is provided; however, as the behaviour is under contingencies directly from the goal-setter, performance may be dependent on the presence or oversight of the goal-setter, and performance may endure even when it is no longer suitable (insensitivity to changes to contingencies). If the environment changes, the employee may still perform under the original ply even if it is now unsuitable. Tracking may not lead to such rapid behaviour change, as the contingencies necessary to improve performance might not be under the managers control; however, as tracks describe environmental contingencies, behaviour is more likely to change as environmental contingencies change. That is, provided the manager is aware of environmental contingencies, and describes them accurately to the employee, tracking should lead to longer lasting, durable behaviour change.

3.3 Limitations of Early Behavioural Accounts

Cognitive researchers have suggested that traditional behavioural accounts of the practice of goal setting and its influence on performance are limited. Most notably, behavioural accounts have largely ignored the effect found in cognitive literature that higher goals lead to greater levels of performance (O’Hora & Maglieri, 2006). Fellner and Sulzer-Azaroff (1984) suggested that goals should be reasonable enough for participants to come into contact with reinforcement, and then gradually and systematically increased, as the goal has now acquired some discriminative and reinforcing properties. This somewhat explains why higher goals lead to higher
levels of performance, yet this account fails to explain why, in the absence of a history of reinforcement, those goals that are highest and therefore least likely to be attained are those goals that encourage the highest levels of behaviour. Early behavioural accounts describing goals as discriminative stimuli and establishing operations lack the specificity required to be tested. For example, these early accounts fail to describe why differing goal statements result in differing levels of behaviour; goal statements prescribing higher levels of behaviour (e.g., “make 60 sales) result in greater performance.

Additionally, some arguments against the provision of early behavioural accounts can be drawn from the definition of the behavioural processes described. For example, Michael (1982) asserted that for a stimulus to be a discriminative stimulus the differential responding in its presence when compared to its absence must be a result of a history of differential reinforcement in its presence compared with its absence. If goals are considered as discriminative stimuli and feedback as reinforcement, responding must occur in the presence of the goal and not in its absence. This is not often the case within organisations. Furthermore, implicit in the requirement of a discriminative stimulus account, is that the reinforcement must have been equally effective as reinforcement in the absence and in the presence of the stimulus, prior to stimulus control (Michael, 1982). In this case, feedback must have been equally effective in the absence of a goal than in its presence; again, this may not be the case in organisational settings.

From a broader perspective, a notable limitation of behavioural theory and research within organisations is that human behaviour tends to be described in terms of direct contingencies. Malott (1996) noted that we should not confuse direct contingencies with indirect-acting complex rule-governed analogue contingencies. Attempting to explain behaviour within organisations in which consequences are often delayed by days or even weeks (e.g., goal setting) in terms of direct contingencies, limits our analysis of the behaviour, and results in explanations that do not accurately describe the processes in operation. Individuals within organisations are aware that verbal descriptions of contingencies may influence the value of consequences; however, traditional behaviour analysis falls short in a provision of a technical analysis of such situations (Hayes, Bunting, Herbst, Bond, & Barnes-Holmes, 2006). Rule-governed behaviour accounts have not been specific in identifying exactly how goals function to establish reinforcing functions.
Additionally, empirical research in support of behavioural accounts is limited, possibly because the accounts have not supplied sufficient detail to formulate comprehensive empirical predictions (O’Hora & Maglieri, 2006). Indeed, within the field of OBM, there are many instances in which behaviour analysis is unable to predict and influence behavioural phenomena, and amongst behaviour analysts, debates have raged about whether to incorporate non-behavioural areas of psychology into our analysis or to expand or create additional behavioural principles (Hayes, 2004).

Hayes (2004) argued that in order to provide an adequate analysis of complex behaviour in organisations, behavioural theory will need to be expanded. Hayes suggested that Relational Frame Theory (RFT), an approach to human language and cognition, can deal experimentally with a broad range of verbal and cognitive phenomena and is equipped to provide a comprehensive analysis of behaviour within organisations. Specifically, O’Hora and Maglieri (2006) proposed a novel behavioural account based on RFT to explain the effect of goal statements on performance, focusing on both the content of goal statements and behavioural contingencies.

### 3.4 Relational Frame Theory

Relational Frame Theory (RFT; Hayes et al., 2001) is a behavioural theory that describes the core processes of language (e.g., semantics) in terms of relations between words and stimuli in the world. The theory emerged from the consensus amongst some behaviour analysts that Skinner’s (1957) account of verbal behaviour did not add significantly to accounts of human behaviour. That is, it did not expand experimental research beyond what was already evidenced from typical operant studies with non-human subjects. Additionally, this account of verbal behaviour was almost universally rejected by non-behavioural psychologists (Hayes, 2004). RFT is a contemporary behavioural account of complex human language and cognition that is grounded in behavioural principles and yet can account for a range of complex verbal and cognitive phenomena.

Hayes (2004) argued that when behavioural principles are applied only to direct contingencies, there are inconsistent effects with their application. He suggested that when dealing with verbal adults, direct contingencies do not effectively explain or predict behaviour, particularly in situations in which
environmental variables are not controlled, as is the case in organisational settings. For example, Hayes asserted that no technical account has been provided to adequately explain goal setting (a verbal concept). Hayes proposed that RFT can address complex human verbal behaviour, while also being strongly grounded in behavioural theory. Essentially, RFT provides a behavioural account of how words relate to stimuli in the environment, and articulates how such relations can establish novel behaviours and novel consequences for individuals in the work environment. Inherent in RFT is the understanding that words change how the world around us affects us (through transformation of function), and changes our behaviour. Hayes, Bunting, Herbst, Bond, and Barnes-Holmes (2006) suggested that many of the antecedent, consequential and motivating functions analysed in both applied and organisational settings may not be direct-acting, rather they are the result of an interaction between direct and derived (not directly trained) functions.

At the centre of an RFT approach is the concept of derived relational responding. Derived relations refer to “relations between stimuli that are not trained directly but are observed reliably given the training of other relations in particular contexts” (O’Hora & Maglieri, 2006, p.142). That is, derived relational responding is responding that is controlled not only by the properties of events, but also by contextual cues. A relational frame is a specific form of derived relational responding that is due to a history of reinforcement for derived relational responding in the presence of similar contextual cues, and can alter other behavioural processes through transformation of function (Stewart, Barnes-Holmes, Barnes-Holmes, Bond, & Hayes, 2006). Stewart, Barnes-Holmes, Barnes-Holmes, Bond, and Hayes (2006) drew on an example to illustrate this. An individual learns that A is more than B, and that B is more than C. If a reinforcing function is attached to B, it is likely that A will become more reinforcing, and C will become less reinforcing than B. Stewart et al. explained that this is due to participation of A and C in comparison relations (more than/less than). They further noted that this transformation of function of the stimuli A and C cannot be described in terms of stimulus generalisation as it is not based on formal properties of the event, and it cannot be described by conditioned reinforcement because both A and C are paired with B, but the effects differ. Studies have examined responding in accordance with a number of different relations. Coordination relational responding is the most fundamental relational operant. Coordination is the relation of sameness or similarity, and is often observed between
words and their corresponding objects or events in the environment. Among the many relational operants, comparison relations are essential to an RFT explanation of the effects of goal statements on performance. Comparison relations are established when an event or an object is responded to in terms of a quantitative or qualitative relation along some dimension with another event or object. These can include relations such as heavier than/ lighter than or more than/less than.

3.5 O‘Hora and Maglieri (2006) Model

According to RFT, rules can be defined as examples of relational networks and transformations of function. O‘Hora and Maglieri (2006) provided an RFT account of goal setting that explicitly focuses on the ongoing dynamics of goal-directed behaviour. By examining the relations established by goal statements, they suggested a functional explanation of how goals establish reinforcement of goal-directed behaviour. O‘Hora and Maglieri suggested that goal statements operate by setting up comparison relations between the goal statement and ongoing self-statements that describe current level of performance. They described an example in which a goal statement is given to employees: “For this week, everyone is expected to make 60 sales”. Initially, the level of behaviour prescribed participates in a co-ordination relation with the event that has occurred in the past for work behaviour (e.g., “60 sales” = positive feedback). As the week progresses and the employee works, the employee issues self-statements (e.g., “I have made 20 sales”), and compares current performance to goal level performance. The comparison relations (‘less than’ relations) between the current performance and the goal decrease gradually as the person works. For example, if the employee states “I have made 30 sales”, the ‘less than’ comparison between the performance and the goal (60 sales) has decreased to 30. Later, after further work, the employee can state “I have made 40 sales”, and the comparison relation has decreased further to 20. Figure 3.1 illustrates O‘Hora and Maglieri’s model for the above example. O‘Hora and Maglieri suggested that reducing these comparison relations serves as derived reinforcement of goal-directed behaviour. In order for goals to be effective, the employee must ‘feel like’ he is getting closer to the goal. The role of feedback in this model can be either self-stated or delivered externally, and is transformed such that it acquires derived reinforcing properties. Feedback delivered by a manager (“you have made 40 sales”) will lead to self-statements, or alternatively an employee
can issue self-statements (“I have made 40 sales”) in the absence of external feedback.

Figure 3.1. Relational control of an employee’s behaviour when the goal statement “you must make 60 sales” has been delivered.

The O’Hora and Maglieri model provides an explicit, testable account of the effects of goals on behaviour. In particular, the account explains how high specific goals result in the highest levels of behaviour. Within O’Hora and Maglieri’s model, behaviour will increase until goal level of performance has occurred, and then will cease because the relationship with reinforcement no longer maintains performance. That is, the ‘less than’ relations no longer occur. According to the model, stating specific goals will ensure that more task-relevant behaviour is likely to be reinforced. With regard to difficulty of the goal, the more difficult the goal is, the longer and harder the employee will work to decrease ‘less than’ relations. These relations will be present until the employee reaches the goal, and thus acquires goal-based reinforcement.
3.6 Persistence

The current research focuses on persistence of goal-directed behaviour in the presence of an unattainable goal. Two important areas within behavioural research that have focused on persistence of behaviour are behavioural momentum and learned helplessness. Behavioural momentum deals with the strength of the relationship between an antecedent stimulus, a response that occurs in its presence and a reinforcing consequence. Specifically behavioural momentum suggests that the strength of this relationship is increased through reinforcement and it can be measured in the resistance to extinction or change when conditions have been altered (Nevin, 2012). Persistence, therefore, may be described as the resistance to change of discriminated operant behaviour when disrupted by extinction or some other condition (Nevin & Grace, 2000), and it is measured by examining decreases in response rates relative to pre-disruption response rates.

Behavioural momentum uses physical momentum as a metaphor for response strength, in which response rates are analogous to velocity and previous reinforcement is analogous to mass. Response strength is proportional to both response rate and the rate of reinforcement and is expressed in greater persistence under novel conditions (e.g., extinction). Basic studies have demonstrated that the tendency for reinforced behaviour to continue at a given rate when exposed to conditions such as extinction is a positive function of rate of reinforcement (e.g., Nevin, 1974). That is, the more a person receives reinforcement for a particular behaviour, the more likely it is that this behaviour will persist when reinforcement is no longer available. Additionally, research has shown that individuals are more likely to persist when they experience a series of failures if they have previously experienced intermittent schedules of positive outcomes (Goltz, 1999). That is, behavioural momentum is a function of the previous level of responding by the individual prior to extinction, which in turn is a function of the relative amount of reinforcement (Goltz, 1999). For example, a person who receives intermittent feedback (reinforcement) for a particular behaviour is likely to exhibit the behaviour at a high rate, and is more likely to continue this behaviour when feedback has been removed.

In an examination of behavioural momentum applied to organisational behaviour, Goltz (1999) utilized a financial decision making simulation in which students played the role of a financial manager who was required to make repeated
financial allocation decisions. Participants in a large magnitude group, in which market gains (according to the simulated task) were larger, invested significantly higher amounts than participants in a small magnitude group, indicating that participants were matching their responses to the magnitude of increases experienced. Additionally, during a subsequent extinction phase, resistance to extinction was observed for the large magnitude group and this resistance was significantly higher than in the small magnitude group. Behavioural momentum was observed; matching and momentum affected the rate of persistence in an extinction condition. It is worth noting that magnitude of reinforcement affected momentum; however, rate of reinforcement did not. This suggests that magnitude of positive outcomes experienced has a greater effect on allocation behaviour than rate of positive outcomes.

Learned helplessness is an outcome observed in the basic behavioural literature that may be relevant to persistence of goal-directed behaviour in the absence of reinforcement. Learned helplessness is a term used to describe how organisms become passive after repeated punishment or failure, and remain so when the environment changes such that success is possible (Martinko & Gardner, 1982). Research has demonstrated that organisms exposed to certain uncontrollable events will exhibit disruptions in behaviour (Abramson & Seligman, 1978). For example, dogs that are new to a shock condition will exhibit escape behaviours to get away from the aversive condition, whereas dogs that have been first exposed to a shock condition that they could not escape from show marked deficits in escape behaviours when exposed to a condition in which escape was possible. Similar patterns have been observed in human participants. For example, Hiroto, (1974) examined the effect of controllable and uncontrollable noise on participant’s escape behaviours in a subsequent controllable condition. Participants who had been exposed to uncontrollable noise sat passively listening to the noise, while participants who had been exposed to controllable noise or no noise quickly learned to escape the noise by pressing a lever.

Abramson and Seligman (1978) proposed an account of learned helplessness based on attributions that individuals make about their circumstances. Specifically, they suggested that a particular flow of events leads to learned helplessness. The first is that the person perceives that their responses are noncontingently related to the desired outcome. That is, the person perceives that no matter what they do it will
not affect the outcome. For example, “I’ll never reach my target this year”. Second, the person makes an attribution about that noncontingency. The person attributes the noncontingency to something that is out of his or her control and thus creates an expectation of future noncontingencies between the person’s acts and an outcome. To continue the previous example, the person might conclude that “there’s no point in trying to reach the target because my boss always sets targets that are too high”. As a result, the person expects that any future response will be futile in obtaining a particular outcome.

Some goal setting theorists have also pointed to the role that attributions play in the persistence or deterioration of goal-directed behaviour. According to Locke (1968), people who do not attempt to reach a difficult goal have decided that the goal is impossible to reach and so will not attempt to reach it. Martinko and Gardner (1982) suggested that for these people, the problem is in perceptions of contingency. When a person perceives a goal to be impossible, that person fails to see a contingency between their behaviour and the outcome. Helplessness is induced and the person becomes passive. If this were the case, then that person would remain passive even if contingencies changed such that an easier goal was prescribed. According to this theory, if an individual is assigned an unattainable goal, and helplessness is induced, resistance to extinction will not be observed and a decrease in goal-directed behaviour will be evident. From a behavioural perspective, attributions such as these can be described as persistent relational networks or rules (e.g., “I’ll never make my targets this year”).

3.7 Aims of Thesis

Chapter 2 presented cognitive goal setting theory that has formed the basis of over thirty years of empirical research. The chapter outlined features of goals such as goal type and in particular goal level. As noted in the chapter, the effect of unattainable goals on performance and persistence has been inconsistent, and the current programme of research aims to explore these effects in a laboratory setting. Chapter 3 presented an overview of behavioural accounts of goal setting. These accounts attempt to explain the processes underlying goal setting from a functional perspective. Limitations of earlier behavioural accounts are that these accounts have difficulty explaining the results found in the research that higher goals increase behaviour.
The overall aim of this thesis is to provide a functional behavioural explanation of *how* goals and feedback operate. O’Hora and Maglieri’s (2006) account provides a dynamic explanation of the findings in the goal setting research to date, in terms of behaviour change over time. In addition, O’Hora and Maglieri provide testable predictions that run counter to previous research. According to the model, behaviour will increase until goal level of performance has occurred, and then will cease because the relationship with reinforcement no longer maintains performance; the higher the goal, the higher the level of performance required. Second, even though higher goals will result in higher performance, initially achieving goal levels periodically is necessary in order to maintain performance. Unattainable goals may give rise to high levels of performance, but the level of behaviour should decrease over time because reinforcement cannot be obtained. The current programme of research aims to test these predictions.

In particular, the research will examine the effect of goal level on performance and persistence. Within the current series of studies, unattainable goals are considered goals that are unattainable by each individual participant. That is, the high goal level is one that is not met by a participant throughout the study. If a participant meets the goal it is not considered unattainable and the participant’s data will be removed from the study. Research investigating the effects of unattainable goals on persistence over time has produced inconsistent results, and according to O’Hora and Maglieri (2006), when an individual is presented with an unattainable goal, performance will initially increase; however, extinction effects should be observed, as the participant does not progress sufficiently towards the goal. Additionally, the current programme of research will examine the effects of feedback on performance and persistence over time. According to O’Hora and Maglieri’s model, feedback will lead to self-statements about current performance level, which are compared to the goal statement. As such, the provision of feedback should increase performance in the presence of an attainable goal. These results have been found in the literature, and an aim of this thesis is to explain the process of how feedback operates in terms of O’Hora and Maglieri’s novel approach. As noted earlier (Chapter 2), the effects of feedback on performance in the presence of an unattainable goal are largely unknown, and an aim of the current thesis is to investigate these effects in light of O’Hora and Maglieri’s model. Additionally, the effect of goal level on feedback seeking will be examined, as in the presence of an
unattainable goal feedback (functioning as a derived reinforcer) may be solicited less often. The aims of each study will be described in each experimental chapter, and results will be discussed as they relate to previous research described in Chapters 2 and 3, and as they relate to O’Hora and Maglieri’s model.
Chapter 4 (Study 1): The Effects of Goal Level on Productivity and Persistence

As discussed in previous chapters, goal setting is one of the most widely used and effective interventions to increase work performance. There have been numerous cognitive and behavioural theories posited to account for goal setting and to explain goal-directed behaviour (e.g., Austin & Vancouver, 1996; Latham, 2003; Latham & Locke, 1979; Steers & Porter, 1974; Waldersee & Luthans, 2001). Industrial-organisational researchers have focused, to a large extent, on the effects of goal level (Locke & Latham, 2002), and goal specificity (Latham, 2003) on performance. Results have consistently shown that high specific goals tend to lead to increased performance (Jackson & Zedeck, 1982; Locke & Latham, 2002; Steers & Porter, 1974). Study 1 was conducted in order to replicate prior reported results, and to examine the effect of an unattainable goal on performance in a laboratory setting.

Within the field of behavioural theory, a number of accounts have been provided to describe goal setting and goal-directed behaviour. These accounts were detailed in Chapter 3, so they will be briefly discussed in the current introduction. Early accounts have described goals as both discriminative stimuli and conditioned reinforcers (Fellner & Sulzer-Azaroff, 1984; Huber, 1986). In a review of goal setting research from a behaviour analytic perspective, Fellner and Sulzer-Azaroff (1984) suggested that the combination of a goal and feedback places behaviour under stimulus control, with the goal acting as the antecedent stimulus and feedback operating as reinforcement. According to this account, if meeting a goal is paired with a reinforcing consequence, then goal achievement itself can assume the properties of a conditioned reinforcing stimulus. Thus, according to Fellner and Sulzer-Azaroff, goals can function as both discriminative stimuli \textit{and} conditioned reinforcers.

In contrast, some accounts of goal setting (e.g., Agnew & Redmon, 1993; Malott, 1993; Malott, Shimamune & Malott, 1993), have described goals as rules that exert control over behaviour. The statement of a rule (a goal) alters the value of a delayed consequence by making its influence immediate. Setting up a rule creates an immediate controlling circumstance that affects behaviour until the delayed consequences can exert more direct control (Malott, 1993). Malott (1993) noted that
the delay between the behaviour and the outcome is crucial for direct contingencies of reinforcement, but has little effect when rules describe those contingencies; a goal is provided, and a week later the behaviour occurs that will result in reinforcement. Given sizable and probable outcomes, people will follow rules even though those outcomes are delayed.

In Agnew’s (1997) account of the establishing operation in organisations, a goal is seen as an establishing operation (EO) that alters the value of a reinforcer, rather than signalling the availability of the reinforcer. Agnew explained that in a traditional discriminative stimulus account of the effect of feedback (as a reinforcer) on goal-directed behaviour, feedback is differentially available in the presence of the goal, and the goal signals the availability of the reinforcer (feedback). However, in a typical work setting, feedback is present before the goal setting intervention has been implemented, and it is more valuable when the goal has been put in place. Agnew suggested that discriminative stimulus accounts can explain some goal setting effects when the reinforcer is not available in the absence of the goal, but viewing a goal as an establishing operation can better explain more instances of goal-directed behaviour.

O’Hora and Maglieri (2006) provided an account of goal setting based on relational frame theory (RFT) that focused on the content of goal statements and the organisational contingencies that maintain goal-directed behaviour. By examining the relations established by goal statements, their intention was to provide a functional explanation of how goal statements allow reinforcement of goal-directed behaviour. O’Hora and Maglieri suggested that goal statements work by setting up comparison relations between the goal statement and ongoing self-statements that describe current levels of performance. As a person works, the self-statements establish smaller and smaller ‘less than’ relations between the current performance and the goal. O’Hora and Maglieri suggested that reducing these ‘less than’ relations serves as derived reinforcement of goal-directed behaviour.

4.1 Productivity and Goal Level

Latham and Locke (1979) proposed that there is a positive linear relationship between goal level and performance. That is, as goal level increases so does task performance. Latham (2003) reported on a group of loggers who set a specific high goal around a number of trees to cut down in a week. The results were an increase in
both attendance and performance. Similarly, specific goals produce a greater level of performance than loose “do your best” goals (Locke & Latham, 2002). Locke and Bryan (1967) conducted a series of studies in which participants were asked to complete addition, perceptual speed, and psychomotor coordination tasks. In the first of these experiments, participants were required to work on a number task and were assigned either a specific hard goal or a “do your best” goal. Participants given specific hard goals performed at a higher level in the first 15-minute period, and this size difference increased throughout the 90-minute study. Participants given the specific hard goal scored an average of 9% higher than the group that was told to do their best. Latham and Baldes (1975) implemented specific hard goals with truck drivers, to improve performance. Previous data had revealed that the net weight of logging trucks had frequently fallen short of the legal maximum weight, and the aim of the goal setting intervention was to increase the net weight of trucks transporting logs, by introducing a specific hard, yet attainable goal. Prior to implementation, the truckers had been told to “do their best” and the percent net weight of 36 logging trucks was reported as between 55 and 65. Results showed a substantial increase in performance upon introduction of the specific difficult goal, with a rise in net weight to approximately 90%, which was maintained across eight months.

The first aim of the current study was to replicate previous findings that high specific goals lead to greater performance (Jackson & Zedeck, 1982; Locke & Latham, 2002; Steers & Porter, 1974). The aim was to test whether the introduction of a goal would significantly affect productivity. Productivity was measured as mean correct responses per condition. It was expected that performance would significantly increase in the presence of the high goal, and if mean baseline performance was below the low goal level, performance would increase when the low goal was introduced.

4.2 Persistence and Goal Attainability

Goal setting theory suggests that difficult goals lead to higher performance levels; however exactly how difficult a goal should be is unclear (Locke & Latham, 1990). Researchers have shown that goals that are too high may not encourage long-term increases in performance. See, Heath, and Fox (2006) examined persistence of goal-directed behaviour in the presence of two unattainable goals; one that was ‘just out of reach’, and the other that was a high unattainable goal. Participants were
required to “sit” on air with their backs straight against a wall and knees bent to a 90-degree angle, for either 4.5 minutes or 6 minutes. Participants in the low unattainable goal condition persisted with the task for a longer period than those in the high unattainable goal condition (when tests of median performance were analyzed); however, when individual data were examined, the authors noted that individual differences existed in patterns of persistence. Low performers persisted less in the high goal condition, and high performers persisted more with the high goal. The authors asserted that a goal that is “well beyond reach of most people” may result in a drop in performance for those people (p.25).

In line with the See et al. (2006) study, Wrosch, Scheier, Miller, Schulz, and Carver (2003) suggested that one factor leading to the abandonment of a goal may be the individual’s perception of the probability of goal attainment. To put it simply, a person who believes that a goal is attainable is less likely to abandon it, and more likely to persist. Hatzigeorgiadis (2006) examined the effects of unattainable goals on performance with a group of sports students in a rowing task. The researcher split participants into an ‘attainable goal’ group and an ‘unattainable goal’ group. The study primarily measured approach and avoidance coping as a function of goal attainment expectancies; however, a secondary level of analysis examined the rowing performance of the two groups. In the attainable goal group, in which scores were higher for effort and planning, the rowing tempo significantly increased in the last leg of the task. Conversely, in the unattainable group, in which scores were higher on behavioural disengagement, rowing tempo did not significantly change throughout the task. When the high, unattainable goal was in effect, performance remained the same throughout the task. A high goal may seem attainable over a short period of time, but over a longer period of time, as the person’s performance does not significantly progress towards the goal, performance may stabilize or decrease.

The second aim of the current study was to examine persistence within a high, unattainable goal condition. It was proposed that at some point, in the absence of goal attainment, goal-directed behaviour would extinguish. According to behavioural accounts of goal setting, behaviour occasioned by verbal rules will extinguish over time in the absence of reinforcement (Fellner & Sulzer-Azaroff, 1984). O’Hora and Maglieri (2006) proposed that achieving goal levels periodically is necessary in order to maintain performance. Unattainable goals may give rise to
high levels of performance, but the level of behaviour should decrease because the derived reinforcing function of the employee’s self-statements may extinguish over time. For the purpose of the current study, persistence was defined and measured as a stable or positive trend across sessions within a goal condition. It was expected that performance would decrease within the high goal condition, which would be determined by a negative persistence score.

The study employed a reversal design in order to investigate whether performance would revert to baseline levels when the goal was no longer present. Additionally, the study examined whether participants would choose a low, easily attainable goal, or the alternative, a high, yet unattainable goal. In a recent study examining goal choice, Scott, Barreto, Quintal, and Oakley (2011) exposed participants to a number of scenarios depicting individuals or families and their energy consumption. Following each scenario, participants were asked to select goals for the family, from a choice of eleven goals. Participants were provided with immediate feedback in the form of money saved and impact on the carbon footprint. Participants selected four goals per scenario and were asked to rate whether or not they believed the goals to be realistic. Participants chose contextual goals, in which the goal was related to a contextual cue provided in the scenario. For example, if a scenario described that a woman does not use energy saving light bulbs, the goal to buy energy saving light bulbs is directly related to the contextual cue. Additionally, participants selected easy goals significantly more than difficult goals despite the low impact on measures of energy consumption. The study effectively demonstrated a preference for low goals over high goals, despite the reduction in gain (reducing energy consumption). A low goal allows easier access to reinforcement (goal attainment and/or feedback); therefore, in the current study, it was predicted that participants would choose a low goal condition when presented with a choice.

4.3 Method
4.3.1 Participants
Sixty participants, ranging in age from 17 to 39 years ($M_{\text{age}} = 20.38$) took part in the study (40 females and 20 males). Participants were first and second year undergraduate psychology students at the National University of Ireland Galway, recruited through an online university system. Participants earned course credit for
taking part in the study, and ethical approval for the study was obtained through the University.

4.3.2 Apparatus and setting

The experimental task was designed in Visual Basic 6.0 to mimic a medical data entry task, and participants used both the keyboard and mouse to respond. The program presented all stimuli and recorded all responses. The task was presented on a Fujitsu Siemens personal computer with a 17-inch CRT screen, in a laboratory room in the School of Psychology, for a total duration of 1 hour 20 minutes. The experimenter remained in the room for the training component of the study, and the participant was alone for the testing phase.

4.3.3 Design

The experiment tested the effects of goals on task performance over time. A modified single subject reversal design (ABACX) was used, which consisted of a two intervention (ABAC) reversal design followed by a final choice condition (X). Conditions proceeded as follows:

a) Baseline, in which the participant was not provided with any goal;

b) First goal, in which a manager (either Bob or Todd) provided a high or a low goal;

c) Second baseline;

d) Second goal, in which the alternative goal condition to b) was presented; and

e) Choice, in which the participant was presented with a choice between the managers from the low or high goal conditions.

The presentation of the low and high goal conditions was counterbalanced across participants to avoid order effects. Similarly, the allocation of the names Bob or Todd to the high goal was counterbalanced.

Dependent variables. Task performance was measured in two ways: (a) productivity, which was defined as the mean number of correct responses per condition, and (b) persistence, defined as the change in number correct per session across sessions within a condition. Trend was measured across sessions within a condition, and a stable or positive trend was indicative of persistence.

Independent variables. The independent variable, goal, was presented in three levels: (a) no goal, (b) low (attainable) goal, and (c) high (unattainable) goal. For the low attainable goal, a goal level was chosen that would be readily achievable.
by participants. For the high goal, a level was used that was almost attainable; however, for most participants it would not be attainable. Both the low and high goals were selected from the results of pilot studies.

4.3.4 Procedure

A data entry task was utilised, which was designed to simulate typical electrocardiogram (ECG) data a nurse might enter into a database system. The simulation was modified from a task used in a prior experiment by Maglieri (2007). The screen contained fictional medical information related to an ECG reading, and participants were required to examine the data provided for each patient and decide whether they were within range or out of range for each patient. Participants followed a series of steps to enter the correct data. Figure 4.1 shows the work task screen.

![Figure 4.1. Work task screen. The numbers in the figure illustrate the steps that the participant was required to take to complete the task.](image)

The participant entered the patient’s identification (ID) number (`1` in Figure 4.1) in the PATIENT ID box (2) in the centre of the screen. The participant then...
checked the patient’s gender (3), and his or her QT interval number (a measure of
time between the Q wave and the T wave in the heart’s electrical activity), (4) and
compared it to the relevant range of numbers in the box (5) in the centre of the
screen (i.e. for female patients, compare the FEMALE range, for males, the MALE
range). The participant ticked the appropriate dot (either within or out of range) to
classify the data (6). If the patient’s QT interval was within the range for his or her
gender, then the participant ticked the dot next to ‘within range’. If not, the
participant ticked ‘out of range’. When the above steps were completed the
participant clicked on SUBMIT in the centre of the screen (7). If the patient’s data
was entered correctly the number at the bottom of the screen increased by one (8).
The screen was then refreshed and the participant began the next trial. Each work
session lasted for four minutes, with three work sessions per condition. At the end of
each work session, feedback was presented to the participant indicating how many
patients were entered correctly during that work session, and how many were entered
incorrectly. Figure 4.2 displays the screen presented to participants at the end of
each condition. The screen presented feedback on amount correct for each work
period, overall amount correct for that condition, and the number of errors for that
condition.

**Training.** All participants signed a consent form before taking part in the
study (Appendix A). During the training session, a pop-up window appeared on the
screen and provided the participants with detailed instructions about the task (see
Appendix B for instructions). Participants were encouraged to stop at any time to
ask questions. The training session consisted of two 1-minute conditions. The first
condition was a reduced-length version of the baseline condition in which no
manager was present. The second condition was a reduced-length version of the
final ‘choice’ condition, in which participants were asked to choose between either a
high or a low goal. These conditions will be detailed fully below. The experimenter
ensured that the participant could engage in the required responses before entering
the testing phase. When the training was complete, the experimenter set up the
testing program and informed the participant that the experimenter would be leaving
the room.
Figure 4.2. End-of-condition screen displaying a count of correctly entered patients’ data for each of the work periods in that condition. The screen also shows the amount of errors in the condition, along with the average correctly entered data per work period, and the total patients correctly entered for all of the conditions.

Testing. Testing lasted a total of 60 minutes, with five 12-minute conditions. Each condition consisted of three 4-minute work sessions. Pilot studies indicated that 4-minute sessions provided sufficient variability in performance across participants and three presentations of each session was short enough to complete within scheduled timeslots.

Baseline. Participants classified the data as stated previously, and could see the number of patients’ data they were entering correctly throughout the entire work session (number (8) in Figure 4.1). Feedback on the number of correct and incorrect entries was also displayed following each work session. At the end of the baseline condition, feedback was presented on the number of correct and incorrect entries per work session, in addition to the total correct for the entire condition.

Low goal. When presented with the low goal, participants were provided with instructions from a virtual manager, Bob, to enter 20 patients’ data correctly for each work session. The instruction was given via a pop-up window on the screen, and the instruction remained on the task screen throughout the condition. As in
baseline, feedback was provided on the screen throughout the task, informing participants about correctly entered patient data. Feedback on the number of correct and incorrect responses was also provided at the end of each work session. At the end of the condition, feedback was provided on the number of correct and incorrect responses per work session, along with a cumulative correct score for all conditions.

**Baseline.** This condition was identical to the first baseline condition. No goal was given; however, as in previous conditions, the participant received feedback during the work session, at the end of the work session, and at the end of the condition.

**High goal.** During the high goal condition, participants were provided with instructions from a different virtual manager, Todd, who asked for 40 correct data entries. Again, each participant received feedback on correct entries throughout, and feedback on the number of correct and incorrect data entries following each work session. The manager’s instructions remained on the task screen for the duration of the condition. At the end of the condition, participants received feedback on the number of errors and correct responses for each work session, in addition to a cumulative number of correct responses for the entire condition.

**Choice.** The fifth condition was a choice condition in which participants were required to choose between managers Bob (low goal) and Todd (high goal). The manager they selected dictated the goal condition to which they would be assigned. The manager’s instructions remained on the screen throughout the task, along with feedback on the number of correct responses. At the end of the work session, participants received feedback on the number of correct and incorrect data entries for that work session. At the end of the condition, feedback was presented on the number of errors and correct responses per session, along with a cumulative correct score for the entire experiment.

Participants had the option to take a break between sessions or between conditions. The experimenter remained outside the room for the duration of the testing. At the conclusion of the study, the experimenter debriefed the participant on the goal of the study, and thanked the participant for taking part.

### 4.4 Results

It was expected that performance would significantly increase with the introduction of a high performance goal. Three participants were removed as their
scores exceeded the high goal level of 40. The fifth, choice condition was examined separately, as it was expected that performance in this condition would vary depending on which goal level the participant chose. A 2 (group) x 4 (phase) mixed analysis of variance (ANOVA) was conducted to examine whether performance differed between the group who received the high goal first and the group who received the low goal first, and across the first four phases. There was no significant difference in overall performance between the two groups, $F(1,55) = 0.35, p = 0.56, \eta_p^2 = 0.01$. A main effect of phase was observed, $F(3,165) = 102.39, p < 0.001, \eta_p^2 = 0.65$, indicating that performance was significantly different across phases. Mean performance was highest in the fourth phase (second goal condition; $M = 25.89, SD = 4.79$) and lowest in the first phase (baseline; $M = 21.04, SD = 3.90$). A significant group x phase interaction was observed, $F(3,165) = 3.95, p = 0.01, \eta_p^2 = 0.07$, indicating that performance differed across phases depending upon goal condition.

![Figure 4.3](image.png)

**Figure 4.3.** Average performance for the high goal first group and the low goal first group. The dashed horizontal line represents the low goal level of 20. The high goal level of 40 is not depicted on the scale. Error bars represent standard error of the mean.

Figure 4.3 displays average performance across the first four phases by the high goal first group and the low goal first group. The general increase in performance demonstrated the expected effect of the presentation of the high goal.
Performance increased to a greater extent in Phase 2 (first goal condition) when the initial goal introduced was the high goal than when it was the low goal. For the low goal first group, performance increased in Phase 2, and increased again when participants were presented with the high goal in Phase 4.

To further analyze the interaction effect reported above, 2 one-way (phase) within-subjects ANOVAs were conducted to investigate how the introduction of a high or low goal affected performance for the high goal first group and the low goal first group.

High goal first. When the high goal was the first to be introduced, a significant difference in performance across phases was observed, $F(3,84) = 64.11, p < 0.001, \eta_p^2 = 0.70$. Performance was highest in Phase 4 (low goal condition; $M = 25.71, SD = 4.86$) and lowest in Phase 1 (first baseline; $M = 21.18, SD = 3.98$). A series of planned comparison $t$-tests were conducted to examine significant differences between conditions (Table 4.1). Significant differences were observed between the first baseline condition and all later conditions, demonstrating that performance increased upon introduction of the high goal, and then remained stable, as shown in Figure 4.3. Control for multiple testing was ensured using Hochberg’s (1988) procedure for multiple tests of significance (critical $p$-value = 0.0125).

<table>
<thead>
<tr>
<th></th>
<th>High Goal</th>
<th>Second Baseline</th>
<th>Low Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Baseline</td>
<td>-9.45* ($p &lt; 0.001$)</td>
<td>-11.59* ($p &lt; 0.001$)</td>
<td>-10.95* ($p &lt; 0.001$)</td>
</tr>
<tr>
<td>High Goal</td>
<td>-0.85 ($p = 0.40$)</td>
<td>-1.10 ($p = 0.28$)</td>
<td></td>
</tr>
<tr>
<td>Second Baseline</td>
<td></td>
<td>-0.35 ($p = 0.73$)</td>
<td></td>
</tr>
</tbody>
</table>

Note. Hochberg’s (1988) procedure for multiple tests of significance was used to control for multiple comparisons (each for 28 degrees of freedom, critical $p$-value = 0.0125).

* $p < 0.0125$. 
Low goal first. A further one-way (phase) within-subjects ANOVA was conducted to examine the effect of goal conditions on performance, when the low goal was introduced first. A significant difference in performance across phases was observed $F(3,81) = 44.83, p < 0.001, \eta^2_p = 0.62$. Performance was highest in Phase 4 (high goal condition; $M = 26.08, SD = 4.80$) and lowest in Phase 1 (first baseline; $M = 20.89, SD = 3.89$). Results from six planned comparison $t$-tests are presented in Table 4.2. As with the previous group, control for multiple testing was ensured using Hochberg’s (1988) step-up sequential method, and the critical $p$-value from the high goal first group was retained, as this was the more conservative value (critical $p$-value = 0.0125). Significant differences were observed between the first baseline condition and all later conditions. Additionally, significant differences were observed between the low goal and the high goal condition, and between the second baseline and the high goal condition, indicating that performance in the high goal condition (Phase 4) was significantly greater than performance in all other conditions.

### Table 4.2

$t$-values Obtained in Planned Comparison $t$-tests, Comparing Overall Phase Means of Correct Responses for the Low Goal First Group

<table>
<thead>
<tr>
<th></th>
<th>Low Goal</th>
<th>Second Baseline</th>
<th>High Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Baseline</td>
<td>-7.03* ($p &lt; 0.001$)</td>
<td>-7.349* ($p &lt; 0.001$)</td>
<td>-9.81* ($p &lt; 0.001$)</td>
</tr>
<tr>
<td>Low Goal</td>
<td></td>
<td>-0.77 ($p = 0.45$)</td>
<td>-4.16* ($p &lt; 0.001$)</td>
</tr>
<tr>
<td>Second Baseline</td>
<td></td>
<td></td>
<td>-4.40* ($p &lt; 0.001$)</td>
</tr>
</tbody>
</table>

* $p < 0.0125$.

Note. Hochberg’s (1988) procedure for multiple tests of significance was used to control for multiple comparisons (each for 27 degrees of freedom, critical $p$-value = 0.0125).

An increase in accurate responding may be achieved by reducing errors at the current rate, or by increasing the rate of correct responding. In order to establish how participant’s scores increased from baseline to the goal conditions, the relative
accuracy across sessions was measured by calculating the percentage of correct responses per phase. Mean percent correct scores did not differ between phases for either the high goal first group or the low goal first group. Table 4.3 shows overall mean percent correct scores for each phase, for the high goal first group and the low goal first group. In the high goal first group, four participants’ mean percent correct scores were below 80%. Within the low goal first group, only one participant’s mean scores were below 80% correct.

Table 4.3

| Overall Mean Percent Correct Scores (with standard deviation in parenthesis) for Each Phase, for the High Goal First Group and the Low Goal First Group |
|----------------------------------|------------------|------------------|------------------|------------------|------------------|
| Baseline 1                       | High Goal        | Baseline 2       | Low Goal         | Choice           |
| % correct                        | 93 (7.35)        | 94 (5.77)        | 94 (5.32)        | 93 (7.14)        | 93 (7.03)        |
| Baseline 1                       | Low Goal         | Baseline 2       | High Goal        | Choice           |
| % correct                        | 94 (5.39)        | 96 (4.48)        | 95 (4.60)        | 95 (3.47)        |

4.4.1 Persistence measure

In order to quantify trends within phases, slope values were calculated for each goal condition for each participant using least squares regression (see Appendix C for slope values). These values were compared using two one-way within subjects ANOVAs, one for each group, to investigate whether trends varied significantly across phases. Upward or stable trends (positive or 0 slopes) indicated persistence.

**High goal first.** For the high goal first group, a significant difference in slope was observed across phases, $F(3,84) = 4.77, p = 0.004, \eta^2 = 0.15$. When control for multiple testing was employed (critical $p$-value = 0.01), significant differences were observed between the first baseline and the second baseline, $t(28) = 3.77, p = 0.001$, and between the first baseline and the low goal condition, $t(28) = 3.15, p = 0.004$. Mean slope for the first baseline condition was strongly positive ($M = 1.19$), and slope in the subsequent high goal condition was slightly positive ($M = 0.38$). Mean slope was slightly negative during the second baseline condition ($M = -0.09$), and stable in the low goal condition ($M = 0.00$). The initial strong positive trend was most likely indicative of a practice effect during baseline.
**Low goal first.** When the low goal was the first to be introduced, there was no significant difference in slope observed across phases, $F(3,81) = 1.26, p = 0.30, \eta^2_p = 0.05$.

### 4.4.2 Choice condition

Forty of the fifty-seven participants (70%) chose the low goal condition in the final choice condition. The low goal first group provided eleven of the seventeen participants who chose the high goal, thus these participants were exposed to the high goal condition as their second and most recent goal condition. For the low goal first group, mean scores did not differ between the second goal condition and the choice condition, $t(27) = 0.97, p = 0.34$. For the high goal first group, a significant difference was observed between the second goal condition and the choice condition, $t(28) = -3.30, p = 0.003$. Mean scores were lower in the second goal condition (low goal; $M = 25.71, SD = 4.86$) than in the choice condition ($M = 26.99, SD = 5.29$). For this group, performance remained high throughout Phases 2 to 4 and increased again in the choice condition (Phase 5), despite only six participants choosing the high goal.

### 4.4.3 Single-subject analyses

Single subject graphs are presented for all participants in Figure 5.7 (p.73) and Figure 5.8 (p.74). Analyses consisted of visual inspection of the data, along with inspection of slope values. To provide detail on individual performance, each participant’s phase mean, maximum score and slope are provided in Appendix C. A level difference was counted if mean performance differed between conditions by a minimum value of 2. Single-subject analyses further highlighted the trends observed in the group data.

**High goal first.** For the high goal first group, 76% of participants demonstrated an increasing trend in performance during Phase 1 (baseline). This may be due to an acquisition effect during initial introduction to the task. For 82% of participants, an increase in level was observed upon introduction of the high goal in Phase 2. An increasing trend within the high goal condition was observed for 62% of participants. For 28% of participants, a decreasing trend in performance was observed during the high goal condition, while trend remained stable for 10% of participants. Only 14% of participants in Phase 3 (second baseline condition) displayed a decrease in level of performance, whereas 45% of participants showed a decreasing trend within this condition. For the remaining participants, a stable
(10%) or increasing (45%) trend was observed. Figure 4.4 shows scores from one participant, displaying a negative trend in performance during the second baseline condition. With the introduction of Phase 4 (low goal), level of performance decreased for 14% of participants, and increased for 21% of participants. Throughout Phase 4, an increasing trend was observed for 41% of participants, while a decreasing trend was found for 38% and a stable trend for 21% of participants.

![Graph](image)

**Figure 4.4.** Scores from one participant, highlighting a decreasing trend during the second baseline condition. The horizontal dashed line represents the low goal level.

**Low goal first.** Seventy-one percent of participants demonstrated an increasing trend during Phase 1 (baseline). Sixty-four percent of participants demonstrated an increase in level of performance with the introduction of the low goal in Phase 2. During Phase 2, an increasing trend was observed for 57% of participants, while a decreasing trend was found for 25% of participants. The remaining 18% of participants demonstrated a stable trend during the low goal condition. For the low goal first group, a return to baseline (Phase 3) resulted in a decrease in level of performance for 14% of participants, and a decreasing trend was observed for 36% of participants within this condition. The remaining participants demonstrated an increasing (46%) or a stable (18%) trend within this phase. The introduction of the high goal in Phase 4 resulted in an increase in level of performance for 46% of the group. During Phase 4, 39% demonstrated a decreasing
trend in performance (see Figure 4.5 for one of these participants); while 43% demonstrated an increasing trend and trend remained stable for 18% of participants. Figure 4.6 provides an example of a level increase for one participant with the introduction of the high goal in Phase 4.

**Figure 4.5.** Scores from one participant, highlighting a decrease in performance within the high goal condition.

**Figure 4.6.** Scores from one participant, highlighting a performance level increase with the introduction of the high goal.
4.5 Discussion

Overall findings demonstrated a greater increase in performance during the high goal condition than during the low goal condition; however, patterns of persistence and deterioration in responding varied across participants. In the current study, three specific findings demonstrated the effects of high goals on performance. First, mean performance increased by 19% when a high goal was introduced after baseline (high goal first group), whereas mean performance only increased by 14% when a low goal was introduced (low goal first group). Second, for both groups, performance increased significantly upon introduction of the high goal (see Figure 4.3). Finally, in the low goal first group, performance was highest in the high goal condition, and in the high goal first group, performance increased in the high goal condition, and did not significantly increase beyond that level. These findings are broadly in line with previous research demonstrating that the provision of high specific goals increase performance compared to baseline levels (Latham & Locke, 1979; Locke & Latham, 2002; Steers & Porter, 1974). The current findings are in line with Locke and Bryan’s (1967) findings in which performance increased by 9% more when a specific difficult goal was introduced than when a “do your best” goal was introduced. In keeping with Locke and Bryan’s findings, performance increased immediately upon introduction of the high goal.

The within-phase trend was measured using slope values within the high unattainable goal condition in order to identify any decreases in persistence due to the unattainability of the high goal. It was expected that a negative trend would be observed across sessions in the high goal phase. Although no participants reached the goal, a negative trend in performance was observed within the high goal condition for only 33% of participants. According to the O’Hora and Maglieri (2006) model, although high goals lead to higher levels of behaviour, achieving goal levels periodically is necessary to maintain goal-directed behaviour. The majority of behavioural accounts agree that goal attainment is necessary to maintain performance. Fellner and Sulzer-Azaroff (1984) have stated that some goals can function through rule-governed behaviour, however, without the support of external contingencies, behaviour under verbal rules may extinguish over time, as in the case of an unattainable goal. According to O’Hora and Maglieri, as participants were not getting closer to the goal, derived reinforcement would be undermined. This effect was not reliably observed in the current study.
When the high goal was presented as the second goal condition, a negative trend was observed for more participants (39%) than when it was presented as the first goal condition (28%). According the O’Hora and Maglieri model, it may the case that with repeated exposure to the task, although there was an initial increase in productivity, the ‘less than’ relations between current self-statements and the goal may not have reduced significantly to increase performance further. Similar patterns of variation in persistence were obtained by See et al. (2006). Although the authors found that the median participant in a low unattainable group persisted for longer (113 seconds) with a task than the median participant in a high unattainable group (81 seconds), they noted that there was high variability between participants. These authors found that most participants persisted longer with a lower goal, but they noted that when mean performance was analyzed, the low performance in the higher goal condition was offset by the high performance of the top 15% of the group. As with previous studies examining the effect of goal level on performance, ongoing feedback was available to participants in the See et al., study and in the current study. For Study 2, session length remained the same as in the current study; however, feedback was removed in order to examine persistence in the absence of feedback when compared to the feedback group from the current study.

In the final phase of the current study, forty of fifty-seven participants chose the low goal (involving the least effort to attain), when given the choice between a low and a high goal. Locke (1967) suggested that choices should be given to determine preferred goal level, and studies have investigated the effect of choice when investigating participation in goal setting (Earley, 1985; Erez & Zidon, 1984; Garland, 1983; Latham & Saari, 1979; Locke, Frederick, Lee & Bobko, 1984); however, these studies have not examined a controlled forced choice, rather participants choose an arbitrary goal level. Matching law (Herrnstein, 1961) states that the relative rate of reinforcement for a response will determine its strength or frequency. Specifically, when given a choice between two schedules of reinforcement, a participant will choose the schedule with the highest value (and least effort to attain). If goal attainment serves as a generalised or derived reinforcer (Fellner & Sulzer-Azaroff, 1984; O’Hora & Maglieri, 2006), then matching law predicts the observed responding. Interestingly, during the choice condition, eleven of the seventeen participants who chose the high goal were presented with the high goal as their second goal condition, immediately before the choice condition was
presented. This effect was unexpected, and the choice condition was retained for Study 2 in order to examine whether this effect would differ when feedback was not available to participants.

It was expected that when the low goal level was introduced first, those who performed below 20 during baseline would increase their performance to 20 to meet the goal. According to the O’Hora and Maglieri (2006) model, performance will increase until goal levels have been reached, and then will cease. In the current study, performance levels increased with the introduction of the low goal (Figure 4.3). Interestingly, scores for those participants who performed above 20 during baseline continued to increase following the introduction of the low goal condition. It was anticipated that performance would either remain stable or reduce to the goal level if baseline performance had been above 20 correct entries. Of those participants who scored above 20 in baseline, 69% continued a positive trend through the low goal condition, and 69% demonstrated a level increase with the introduction of the low goal condition. A possible reason for the continuing rise in performance is that participants were learning the task through baseline, and continued a learning trend into the low goal condition. The effect of such ‘skill acquisition’ was not measured in the paradigm, and future studies in the current programme of research will seek to implement an extended baseline, in addition to longer work sessions. With an extended baseline, it may be possible to establish a stable rate of responding before introducing the goal condition. This may ensure that any increase in variability of performance upon introduction of the goal is produced by presentation of the goal statement and not simply a learning trend.

4.5.1 Considerations

The current study highlights the contribution that basic research can make to understanding how goal setting interventions work in industry. A limitation of the current study was that feedback was presented to each participant. Although this is typical with goal setting interventions, the effect of the goal cannot be isolated from the enhancing effect of feedback. Study 2 will allow for a comparison of the current study’s group with a group who do not receive feedback in order to examine the effects of feedback on productivity and persistence when an unattainable goal has been assigned. Prior research has demonstrated the utility of goal setting interventions (Latham, 2003; Jackson & Zedeck, 1982); however, the current study constitutes a first step in examining the behavioural processes that underlie goal
setting interventions. By characterizing the dynamics of goal-directed behaviour, we can begin to develop more sensitive interventions to encourage employee productivity.
Chapter 5 Study 2: The Effects of Feedback on Productivity and Persistence in the Presence of a Low and a High Goal

Results of Study 1 supported prior research demonstrating that goals increase performance (Latham & Locke, 1979; Locke & Latham, 2002; Steers & Porter, 1974). In particular, a greater increase in performance was observed during a high goal condition than during a low goal condition. Results were analysed according to order of goal presentation, and for both the high goal first group and the low goal first group, performance increased significantly upon introduction of the high goal. In the low goal first group, performance increased in the low goal condition and increased further in the high goal condition. In the high goal first group, performance increased in the high goal condition and did not significantly increase beyond that level. Results of Study 1 highlighted varying patterns of persistence and deterioration of performance across participants. Research has emphasised an interactive relationship between feedback and goal setting (Becker, 1978; Erez, 1977; Strang, Lawrence, & Fowler, 1978), hence the majority of goal setting studies have incorporated feedback. Study 1 combined goal setting with feedback, as is typical with laboratory goal setting studies, and applied goal setting interventions (see Cameron & Duff, 2007, for a review of interventions with safety). The broad aim of Study 2 was to remove feedback in order to examine whether or not the effects reported in Study 1 were supported by feedback, particularly the effect of the high goal on performance and persistence.

5.1 Feedback and Goal Setting

Performance feedback is a prevalent and largely effective intervention within Organisational Behaviour Management (OBM). Prior research has revealed positive effects of a combination of goal setting and feedback on performance, and studies have shown that the effect of performance feedback is mediated by goals (Erez, 1977; Locke, 1967). That is, feedback has a much greater impact on performance when goals have been set. Locke (1967) asserted that goals cannot be set meaningfully unless the goal is specific and the participant has knowledge of current performance in relation to a goal. Similarly, Erez (1977) established that feedback in
the form of knowledge of score is a necessary condition for the goal setting-performance relationship.

Prior research has provided evidence for improved performance in the presence of a high goal with feedback. In a field study designed to reduce energy consumption in residential settings, Becker (1978) manipulated goal level and the presence or absence of feedback. Forty families were assigned a difficult goal (20% energy reduction) and forty were assigned an easy goal (2% energy reduction). Within each group, half of the families received feedback three times per week and the other half did not receive feedback. The difficult goal group with feedback conserved the most energy (13-15.1% reduction). According to Becker, improved performance was a result of the joint effect of feedback and a difficult goal. Reber and Wallin (1984) examined the effects of knowledge of results on goal setting, to increase safety in a farm machinery-manufacturing firm. A specific difficult goal was introduced first, followed by feedback. Goal setting increased performance; however, the goal was not achieved by nine of the eleven departments until the addition of feedback. The results of these studies have provided external validity for previous lab studies demonstrating that knowledge of results is a necessary condition for goal setting. Reber and Wallin suggested that feedback may permit ‘intrinsic reinforcement’, when it signals goal achievement. Participants performed at or above goal level after feedback was introduced, suggesting that goal achievement was sufficiently reinforcing for participants. Interestingly, ten of the eleven departments outperformed the assigned goal level during the feedback condition. Knowledge of results may have been used by participants to set new standards or goals, resulting in a higher goal than the original. Reber, Wallin, and Chhokar (1990), replicated the study in a similar setting, and as before, performance increased significantly upon introduction of a goal; however, the goal was not consistently achieved until feedback was provided. Reber and Wallin suggested that knowledge of results leads to an increase in effort, encourages new goals to be attempted, and acts as reinforcement for goal-directed behaviour. Previous studies have neglected to provide an explanation for why feedback is effective, and researchers have stressed that if supervisors can understand why feedback works then they may be able to maximize its effectiveness. Behavioural psychologists have suggested a number of ways in which behavioural principles can explain the effects of feedback on performance.
5.2 Behavioural Accounts of Feedback

Balcazar, Hopkins, and Suarez (1985) provided a review of applications of feedback in organisations, excluding analogue and laboratory studies. A total of 126 feedback applications were reviewed, from four major journals over a 10-year period. Results of each study were categorized into four distinct groups: consistent effects, in which desired effects were evident in all participants, settings and/or behaviours; mixed effects, in which desired effects were observed for some but not all participants, settings and/or behaviours; no effects, in which desired increases or decreases were not observed; or unknown effects, in which baseline information was not sufficient to compare intervention effects. The authors reviewed a number of feedback combinations: feedback-alone; feedback and behavioural consequences, in which rewards were delivered in conjunction with feedback; feedback and goal setting; and feedback goal setting and behavioural consequences. Consistent effects were found in 41% of the feedback interventions, and mixed effects in 49%. A combination of feedback with goal setting (53% consistent effects) or behavioural consequences (52% consistent effects) were more effective than feedback alone (28% consistent effects). Interestingly, the feedback alone applications produced the highest proportion of no effects (15%), and were the most frequent interventions applied by researchers. The authors suggested that feedback may function as a discriminative stimulus to occasion an employee to work faster, or may function as conditioned reinforcement by signalling improved work performance. This may explain instances in which feedback interventions do not improve performance; feedback has not been paired with a reinforcing consequence. According to Fellner and Sulzer-Azaroff (1984), feedback enhances the effectiveness of goal setting provided that the feedback itself is functioning as a conditioned reinforcer. These authors proposed that if feedback is specifically related to meeting the goal, and is paired with a reinforcer (e.g., praise), the goal will evoke similar behaviour in the future. The goal and feedback occasion behaviour under stimulus control.

In an updated review of applications of feedback in organisations, Alvero, Bucklin, and Austin (2001) identified 68 applied interventions incorporating feedback, from the years 1985 to 1998. Effects of each intervention were categorised in the same manner as the Balcazar et al. (1985) review. Combinations of feedback interventions were categorised in a similar way, with the addition of the
following categories: feedback and antecedents; feedback, antecedents and behavioural consequences; and feedback, antecedents, goals and behavioural consequences. Antecedent stimuli included staff training, task analyses, job aids, weekly objectives, and supervisor prompts. This was considered a separate category to goal setting, which was defined as specifying a performance outcome or standard of performance. As in the earlier review, the most frequently reported intervention was feedback alone. Results of this updated review revealed that the lowest consistent effects occurred with feedback and goal setting (29%), and this was the only category in which there were no effects. However, the highest levels of mixed effects were in this category. Alvero et al. reiterated that there is no agreement over the behavioural function of feedback. Several researchers describe feedback as an antecedent stimulus whereas some view it as functioning as a reinforcer. Duncan and Bruwelheide (1985) suggested that feedback may serve to make the accomplishment of work more valuable, and evoke performance which produces that accomplishment, thus functioning as an establishing operation. However, these authors agreed that there are numerous behavioural explanations of feedback, and suggested that there is a need for research to concentrate on functional clarification of feedback rather than structural examination.

A number of researchers (Agnew & Redmon, 1992; Peterson, 1982) maintain that due to the delay between the behaviour and the reinforcer, feedback operates through rule control. Agnew and Redmon (1993) argued against earlier discriminative stimulus accounts of feedback, stating that if feedback functioned as a discriminative stimulus, then it would be consistently paired with a reinforcer, and would be delivered immediately. If feedback functioned as a reinforcer, it would be delivered immediately and contingently, and would reliably increase the behaviour in the future. Agnew and Redmon argued that these observations rarely occur within organisations, and that in the absence of observing these contingencies it is likely that rules are involved. From an RFT perspective, according to O’Hora and Maglieri’s (2006) model, performance feedback will lead to self-statements describing current performance, which result in comparison relations between current level of performance and the goal level. As an individual works, the reduction of these comparison relations allows for reliable reinforcement of goal-directed behaviour. Examining the effect of feedback on performance and
persistence across a variety of goal conditions may add clarity to behavioural explanations of feedback and goal-directed behaviour.

Feedback is generally classified according to the information that is provided. Outcome feedback refers to a quantitative outcome (e.g., 60 sales), whereas behaviour or process feedback draws attention to the behaviours necessary to achieve the outcome (e.g., greeting customer). Kim (1984) compared the effects of outcome and behaviour feedback on performance when a goal had been set, in an effort to examine the form of information provided during goal setting and feedback, and ultimately its effect on performance. Results revealed that a group with both outcome and behaviour goal setting and feedback produced the highest level of performance, followed by an outcome goal setting and feedback group. Earley, Northcraft, Lee, and Lituchy (1990) asserted that the key to the interaction between goal setting and feedback is not the mere presence of feedback, but the clarity of the feedback. In a similar study, these authors manipulated feedback according to specificity, providing combinations of process and outcome feedback. Earley et al. found that goal setting interacted with outcome feedback to influence effort and self-confidence to a greater extent than the interaction with process feedback. The strongest performance was found in the specific difficult goal and specific process and outcome feedback group. The task in the current study was a simple performance task, and the feedback provided was outcome feedback in the form of specific knowledge of score and time remaining in the task. Examination of the effect of type of feedback on goals may provide further information on the function of feedback.

The current study builds on Study 1 to investigate the effects of feedback on productivity over time, in the presence of attainable and unattainable goals. Results of Study 1 revealed a significant increase in performance with the introduction of a high goal, when compared to an initial no goal condition or a low goal condition, when feedback was presented throughout the entire experiment. Sixty novel participants completed the same procedure as in Study 1, but no feedback was provided within phases (i.e., directly contingent on performance). These new participants constituted one group in Study 2 (no feedback) and their performance was compared to the participants in Study 1 (feedback). As in Study 1, goal level was manipulated such that a low goal level, and a high, unattainable goal level could be compared in the presence or absence of feedback. A second aim of Study 2 was
to ascertain whether feedback affects persistence in the presence of an unattainable goal. Some research suggests that feedback positively affects persistence (e.g., Medway & Venino, 1982); however, few studies have examined the effect of feedback on persistence in the presence of an unattainable goal. Results of Study 1 illustrated that only 33% of participants displayed a decreasing trend in performance within a high unattainable goal condition, when feedback was present throughout that condition. The remaining 67% of participants demonstrated persistence in the form of a stable or increasing trend throughout the high goal condition. Becker (1978) suggested that feedback has a motivating effect, allowing an individual to persist when faced with a difficult goal. For participants in the current study, feedback was removed to enable a comparison between the feedback group and the no feedback group, to assess whether or not feedback enhanced persistence.

Results of Study 1 revealed that the majority of participants continued to perform at a high level in the second baseline condition, when provided with ongoing feedback (only 14% demonstrated a reduction in level of performance). The current study investigated whether the removal of feedback would affect this pattern of behaviour. The provision of ongoing outcome feedback may lead participants to set their own performance goals, and performance may continue to increase in the second baseline condition to a greater extent for the feedback group. A final aim of the current study was to investigate whether feedback would affect participant’s decisions when given the choice between a high and a low goal. A low goal allows easier access to reinforcement (goal attainment and/or feedback); therefore, it was predicted that participants would choose a low goal condition when presented with a choice. However, Garland (1983) found that when subjects in an unattainable goal condition were offered the choice to continue with a task or cease, 66% of participants chose to continue, despite contacting repeated failure throughout the experiment. This may be evidence that participants will choose to persist with an unattainable goal despite their inability to reach the goal. Results from Study 1 showed that 70% of participants chose the low goal. The current study examined whether the removal of feedback would affect this choice.
5.3 Method

5.3.1 Participants

Sixty novel participants took part in Study 2; 41 females and 19 males, ranging in age from 17 to 60 ($M_{age} = 22.2$). The sixty participants from Study 1 were used for comparison, and were counted as the feedback group. Participants were first and second year undergraduate psychology students at the National University of Ireland Galway, recruited through an online university system. Participants earned course credit for taking part in the study, and ethical approval for the study was obtained through the University.

5.3.2 Apparatus and setting

The apparatus and setting were identical to those used in Study 1. See page 39 for a detailed description.

5.3.3 Design

The experiment tested the effects of goals on task performance over time, with two groups; a feedback group and a no feedback group. A modified single subject reversal design (ABACX) was used, which consisted of a two intervention (ABAC) reversal design followed by a final choice condition (X). Feedback was present for half of the participants (from Study 1) and absent for the remaining participants. Conditions were identical to those used in Study 1; see page 39 for a detailed description.

Independent variables. There were two independent variables in the study. Goal level constituted the first independent variable, and was presented in three levels: (a) no goal, (b) low (attainable) goal, and (c) high (unattainable) goal. Feedback, the second independent variable, was manipulated such that it was present for the 60 participants from Study 1 (feedback) and absent for the 60 participants from Study 2 (no feedback). Feedback was presented in two forms. Participants were presented with a countdown timer on the task screen that provided continual feedback about time remaining in the session. Also, participants were presented with a counter that displayed the cumulative amount of patient data they had inputted correctly in that session and in that condition. This counter incremented by one every time a participant submitted a correct response.

Dependent measures. As with Study 1, task performance was measured in two ways. Productivity was defined as the mean number of correct responses per condition. Persistence was defined as the change in number of correct entries per
session across sessions within a condition; a stable or positive trend was considered indicative of persistence.

### 5.3.4 Procedure

The task used was identical to the one used in Study 1. The screen contained fictional medical information related to an ECG reading, and participants were required to examine the data provided for each patient and decide whether it was within range or out of range for each patient. Figure 5.1 shows the work task screen. The labels ‘1’ and ‘2’ show where the feedback was present on the screen for the feedback group (participants from Study 1). The screen was blank at the labelled points for the no feedback group.

![Figure 5.1. Work task screen. The numbers in the figure indicate the two forms of feedback presented to the feedback group.](image)

For the feedback group, if the patient’s information was entered correctly the number at the bottom of the screen increased by one (labelled ‘1’ in Figure 5.1), in both the ‘number correct in this period’ box and the ‘total correct in this session’ box. Additionally, for the feedback group, a countdown clock was visible on screen
throughout each work period (2). These sources of feedback were absent for the no feedback group.

At the end of each work session, feedback was presented to all participants indicating how many patients were entered correctly during that work session, and how many were entered incorrectly. Figure 5.2 displays the screen presented to participants at the end of each condition. The screen presented feedback on amount correct per work session (named ‘period’ on screen), overall amount correct for that condition (named ‘session’ on screen), and the number of errors for that condition. Participants in both the feedback group and the no feedback group were presented with this screen.

Figure 5.2. End-of-condition screen showing a count of correctly entered patients’ data for each of the work periods in that condition. The screen also shows the amount of errors in the condition, along with the average correctly entered data per work period, and the total patients correctly entered for all of the conditions.

Training. Training was carried out as in Study 1 (see page 41 for a detailed description), with one exception; feedback was not present on the task screen during training.
Testing. Testing lasted a total of 60 minutes, with five 12-minute conditions. Each condition consisted of three 4-minute work sessions. Conditions proceeded as in Study 1 (see page 42 for description), with the exception that ongoing feedback was not present on the screen during each session for participants in Study 2.

Feedback. The 60 participants from Study 1 received ongoing feedback throughout the experiment. Figure 5.1 shows the task screen in the feedback group from Study 1. For the sixty participants in Study 2, the screen was blank at the two points labelled in the figure.

Participants had the option to take a break between sessions or between conditions. The experimenter remained outside the room for the duration of the testing. At the conclusion of the study, the experimenter debriefed the participant on the goal of the study, and thanked the participant for taking part.

5.4 Group Results

Results were examined at both a group level and an individual level, in order to investigate individual variance in performance. Four participants were removed as their performance exceeded the high goal level of 40 (three from the Study1 group and one from the Study 2 group). The fifth choice condition was analysed separately, as performance in this condition may have varied depending upon which goal level the participant chose. Table 5.1 presents mean performance and standard deviation (SD) for the first four conditions, for the feedback group and the no feedback group. Data are divided into high goal first and low goal first groups.

A 2 (group) x 2 (order) x 4 (phase) mixed Analysis of Variance (ANOVA) was conducted to investigate differences in performance between the feedback group and the no feedback group, the high goal first group and the low goal first group, and across the first four phases. As predicted, a significant main effect of feedback was observed, $F(1,112) = 5.27, p = 0.02, \eta^2_p = 0.05$. Performance was higher in the feedback group (highest in Phase 4; $M = 26.60, SD = 5.61$) than in the no feedback group (highest in Phase 4; $M = 24.26, SD = 5.60$). A series of post-hoc $t$-tests were conducted to examine significant differences between groups in each condition. A significant difference was observed between the feedback group and the no feedback group in the first goal condition (Phase 2), $t(114) = 2.56, p = 0.012$, and not in any other condition. Control for multiple testing was ensured using Hochberg’s (1988) procedure for multiple tests of significance (critical $p$-value = 0.0125). No main
effect of order was observed, \( F(1,112) = 0.14, p = 0.71, \eta_p^2 = 0.001 \), indicating that performance did not significantly differ depending upon which goal level was assigned first. A significant effect of phase was observed, \( F(2.26, 253.54) = 156.20, p < 0.001, \eta_p^2 = 0.58 \), indicating that performance significantly differed across phases. The analysis revealed no feedback x order x phase interaction, \( F(2.26, 253.54) = 1.62, p = 0.20, \eta_p^2 = 0.01 \), no feedback x phase interaction, \( F(2.26, 253.54) = 0.26, p = 0.80, \eta_p^2 = 0.002 \), and no phase x order interaction \( F(2.26, 253.54) = 2.05, p = 0.13, \eta_p^2 = 0.02 \). That is, the effect of one independent variable on performance did not change depending on the level of another independent variable.

Table 5.1

*Mean Performance and Standard Deviation (in parenthesis) in Each Condition, for the Feedback and the No Feedback Group*

<table>
<thead>
<tr>
<th></th>
<th>Baseline 1</th>
<th>Goal 1</th>
<th>Baseline 2</th>
<th>Goal 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Feedback</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Goal First</td>
<td>21.18 (3.98)</td>
<td>25.30 (4.59)</td>
<td>25.59 (4.76)</td>
<td>25.71 (4.86)</td>
</tr>
<tr>
<td>Low Goal First</td>
<td>20.89 (3.89)</td>
<td>23.98 (3.57)</td>
<td>24.25 (4.10)</td>
<td>26.08 (4.80)</td>
</tr>
<tr>
<td><strong>No Feedback</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Goal First</td>
<td>18.80 (4.01)</td>
<td>21.70 (5.38)</td>
<td>22.37 (5.60)</td>
<td>23.22 (5.43)</td>
</tr>
<tr>
<td>Low Goal First</td>
<td>19.36 (5.25)</td>
<td>23.18 (4.83)</td>
<td>23.55 (5.45)</td>
<td>24.87 (6.13)</td>
</tr>
</tbody>
</table>

The high goal first group and the low goal first group were examined separately in order to investigate differences in performance depending upon which goal level was presented first. Two 2 (group) x 4 (phase) ANOVAs were conducted to investigate performance differences between the feedback group and the no feedback group across the first four phases.

**High goal first group.** A significant difference in overall performance was observed between the feedback group and the no feedback group when the high goal was introduced first, \( F(1.57) = 5.88, p = 0.02, \eta_p^2 = 0.09 \). Mean scores for the feedback group (highest in the fourth phase; \( M = 25.71, SD = 4.86 \)) were higher than those in the no feedback group (highest in the fourth phase; \( M = 23.22, SD = 5.43 \)). A main effect of phase was observed, \( F(2.32, 132.32) = 80.91, p < 0.001, \eta_p^2 = 0.59 \),
indicating that performance significantly differed across phases. There was no phase x group interaction, $F(2.32, 132.32) = 1.67, p = 0.19, \eta^2_p = 0.03$. Figure 5.3 displays average performance for the feedback group and the no feedback group when the high goal was presented first.

![Figure 5.3](image)

*Figure 5.3.* Average performance for the feedback group and the no feedback group when the high goal was presented first. Error bars represent standard errors and the horizontal dashed line represents the low goal level. The high goal level of 40 is not depicted on the scale.

**Low goal first group.** There was no significant difference in performance between the feedback group and the no feedback group when the low goal was introduced first, $F(1.55) = 0.68, p = 0.42, \eta^2_p = 0.01$, indicating that feedback did not significantly affect performance for this group. A main effect of phase was observed, $F(2.16, 118.68) = 77.25, p < 0.001, \eta^2_p = 0.58$; however, there was no phase x group interaction effect observed, $F(2.16, 118.68) = 0.33, p = 0.74, \eta^2_p = 0.01$. Figure 5.4 displays average performance for the feedback group and the no feedback group when the low goal was presented first.
Results indicated that feedback affected performance in a different way for the high goal first group and the low goal first group. Examination of mean scores per condition (Table 5.1) revealed that in the low goal first group, differences between mean scores for the feedback group and the no feedback group were not as pronounced as differences between groups when the high goal was presented first.

Slope values were calculated across the three sessions in each condition for each participant using least squares regression, in order to establish trends within each condition. In this way, it was possible to examine whether the goal and feedback conditions had any effects on persistence within conditions. The low goal first group and the high goal first group were examined separately to assess whether differences in persistence were observed between the feedback group and the no feedback group depending on which goal was presented first.

**High goal first group.** Table 5.2 displays the slope values and standard deviation for each condition for the feedback group and the no feedback group, when the high goal was presented first. A 2 (group) x 4 (phase) mixed ANOVA was conducted to investigate differences in persistence between the feedback group and the no feedback group, across phases. No overall main effect was found, $F(1,57) = 0.002, p = 0.97, \eta^2_p = 0$. A main effect of phase was observed, $F(3,171) = 5.68, p = 0.001, \eta^2_p = 0.01$, indicating that persistence differed across phases. There were
significant differences in persistence between the first baseline (positive trend) and the second baseline (stable trend), \( t(58) = 3.63, p = 0.001 \), and between the first baseline (positive trend) and the low goal condition (slightly negative trend), \( t(58) = 4.20, p < 0.001 \) (critical \( p \)-value = 0.01). No phase x group interaction was found, \( F(3,171) = 0.55, p = 0.65, \eta_p^2 = 0.01 \), indicating that the effect of goal condition on persistence did not significantly differ depending on whether feedback was present or absent.

Table 5.2

\textit{Mean Slope Values and Standard Deviation (SD; in parenthesis) for the Feedback Group and the No Feedback Group per Condition, for the High Goal First Group}

<table>
<thead>
<tr>
<th>Condition</th>
<th>Feedback Mean (SD)</th>
<th>High Goal Mean (SD)</th>
<th>Baseline 2 Mean (SD)</th>
<th>Low Goal Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline 1</td>
<td>1.19 (1.29)</td>
<td>0.38 (1.46)</td>
<td>-0.09 (1.34)</td>
<td>0.00 (1.48)</td>
</tr>
<tr>
<td>No Feedback</td>
<td>0.78 (1.45)</td>
<td>0.65 (1.70)</td>
<td>0.08 (2.21)</td>
<td>-0.07 (1.42)</td>
</tr>
</tbody>
</table>

\textit{Low goal first group.} Table 5.3 presents the slope values and standard deviation for each condition for the feedback group and the no feedback group, when the low goal was presented first. There was no overall significant difference in persistence between the two groups, \( F(1,55) = 0.01, p = 0.92, \eta_p^2 = 0 \). A main effect of phase was observed, \( F(3,165) = 8.77, p < 0.001, \eta_p^2 = 0.14 \). There were significant differences in persistence between the first baseline (strongly positive trend) and the low goal condition (positive trend), \( t(56) = 4.13, p < 0.001 \), between the first baseline and the second baseline (positive trend), \( t(56) = 3.26, p = 0.002 \), and between the first baseline and the high goal condition (slightly positive trend), \( t(56) = 4.22, p < 0.001 \) (critical \( p \)-value = 0.01). There was a significant phase x group interaction effect, \( F(3,165) = 2.70, p = 0.05, \eta_p^2 = 0.05 \), suggesting that the effect of goal condition on persistence significantly differed depending on feedback. In the no feedback group, slope was negative in Phase 4 (high goal condition; mean slope = -0.33), indicating a decreasing trend in the high goal condition. The slope in the feedback group was positive in Phase 4 (mean slope = 0.46), indicating persistence within the high goal condition for participants who received feedback.
Table 5.3

*Mean Slope Values and Standard Deviation (SD; in parenthesis) for the Feedback Group and the No Feedback Group per Condition, for the Low Goal First Group*

<table>
<thead>
<tr>
<th></th>
<th>Baseline 1 (Mean SD)</th>
<th>Low Goal (Mean SD)</th>
<th>Baseline 2 (Mean SD)</th>
<th>High Goal (Mean SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedback</td>
<td>1.04 (1.70)</td>
<td>0.41 (1.17)</td>
<td>0.36 (1.27)</td>
<td>0.46 (1.93)</td>
</tr>
<tr>
<td>No Feedback</td>
<td>1.57 (1.06)</td>
<td>0.45 (1.07)</td>
<td>0.66 (1.01)</td>
<td>-0.33 (1.65)</td>
</tr>
</tbody>
</table>

In all groups, performance increased across phases throughout the study. A trend was established for each participant using least squares regression, and is represented on the single case graphs with a dotted line on each graph, in Figures 5.7, 5.8, 5.9 and 5.10. Using the R statistical analysis environment (R Development Core Team, 2011), this trend was extracted for each participant to examine whether goals affected behaviour to a greater degree than a practice effect or linear trend (using the R package RSEIS, Lees, 2012). The remaining value at each data point for each participant constituted the detrended data. The mean detrended data for the feedback group and the no feedback group who received the high goal first are presented in Figure 5.5. When a linear trend was removed, visual inspection of the data revealed that differing patterns of responding emerged between the feedback group and the no feedback group, when the high goal was presented first. In particular, responding in the feedback group was observed to be further from the trend than the no feedback group, in the high goal condition (second phase). Additionally, in the low goal condition (fourth phase), responding was slightly further from the trend (below trend) for the feedback group than for the no feedback group. This may indicate a decline in rate of responding for participants in the feedback group, as the feedback was providing information on goal attainment.
Figure 5.5. Detrended data for the feedback group and the no feedback group who received the high goal first. Filled circles represent the feedback group and filled squares represent the no feedback group. The dotted horizontal line represents the mean extracted trend, and error bars represent standard error.

Figure 5.6 presents the detrended data for the feedback group and the no feedback group when the low goal was the first goal introduced. When the low goal was presented first, the feedback group and the no feedback group presented with similar performance patterns. In the second baseline (Phase 3) and second goal condition (Phase 4; high goal), performance was close to the trend for both groups. It may be more difficult to assess the effect of goals on performance for this group as the order of presentation of goal levels (low first, and then high) was in the same direction as a practice effect (linear trend).
Figure 5.6. Detrended data for the feedback group and the no feedback group who received the low goal first. Open circles represent the feedback group and open squares represent the no feedback group.

5.5 Single Case Results

Single case data were analysed to examine variability in performance, and investigate patterns of behaviour consistent with typical group results obtained from goal setting and feedback studies. Single case graphs for all participants for the first four conditions are presented in Figure 5.7 for the high goal first feedback group, Figure 5.8 for the low goal first feedback group, Figure 5.9 for the high goal first no feedback group, and Figure 5.10 for the low goal first no feedback group. The dotted line on each plot represents the direction of performance over time, and the high and low goal levels are indicated with horizontal dashed lines. Analyses consisted of visual inspection of the data, along with inspection of slope values. Positive slope values indicated an increasing trend, while negative slope values indicated a decreasing trend. Slope values of 0 were considered a stable trend. To provide detail on individual performance, each participant’s condition mean,
maximum score, and trend are provided in Appendix C (feedback group) and Appendix D (no feedback group).

5.5.1 Performance

Data were examined to determine the number of participants for which the goal and feedback did not affect performance. For twenty-two participants (19%), performance did not increase throughout the study, and for two of these participants an overall decrease in performance was evident. This suggests that these participants seemed insensitive to the goal in that high goals did not increase performance above baseline levels and low goals did not decrease performance. When the feedback group and the no feedback group were examined separately, it was evident that this goal insensitivity was more common in the no feedback group than in the feedback group. In the feedback group, eight participants (14%) did not demonstrate an increase in performance throughout the study, whereas, in the no feedback group, fourteen participants (24%) did not display a performance increase. Performance for two of these participants decreased throughout the study. This suggests that feedback may have increased sensitivity to the goal, or minimally in the absence of a goal effect, feedback may have enhanced a practice effect over time leading to increases in performance for more participants in the feedback group than in the no feedback group. Figure 5.11 displays performance from one participant in the no feedback group, displaying a decrease in performance throughout the study. Visual inspection of single case plots produced a group of participants who displayed an increase in performance and a group of participants who displayed no increase in performance, for the feedback group and the no feedback group. A Chi-Squared test was conducted to investigate whether there was a significant association between the presence or absence of feedback and an overall increase in performance throughout the study. No significant association was found, $\chi^2 (1, N = 116) = 1.20, p = 0.27$, suggesting that there was no significant relationship between feedback and overall increasing performance.
Figure 5.7. Single case plots for each participant in the feedback group who received the high goal first. Participant numbers label each plot. Dashed horizontal lines represent the high and low goal levels, and the dotted line represents the direction of performance over time.
Figure 5.8. Single case plots for each participant in the feedback group who received the low goal first. Participant numbers label each plot.
Figure 5.9. Single case plots for each participant in the no feedback group who received the high goal first. Participant numbers label each plot. Dashed horizontal lines represent the high and low goal levels, and the dotted line represents the direction of performance.
Figure 5.10. Single case plots for each participant in the no feedback group who received the low goal first. Participant numbers label each plot.
Figure 5.11. Scores from one participant in the no feedback group, highlighting a decrease in performance throughout the study. With all single case graphs presented, the horizontal dashed line indicates the low goal level of 20. The high goal level (40) is not depicted.

A number of participants exhibited low levels of performance, and for fifteen participants (13%), performance did not exceed the low goal level of 20 throughout the study. Three of these participants were from the feedback group (5% of the feedback group) and the remaining twelve participants were from the no feedback group (20% of the no feedback group). A significantly greater number of participants in the no feedback group demonstrated low levels of responding (below the low goal level of 20) throughout the study than in the feedback group, $\chi^2 (1, N = 116) = 5.04$, $p = 0.02$. This suggests that feedback increased overall levels of responding. Figure 5.12 shows an example of a participant with scores below 20 throughout each condition.
5.5.2 Goal effect

While a single subject examination of overall performance revealed the additive effect of feedback on performance, the effect of a goal was unclear. Individual mean performance was examined to assess how many participants demonstrated an increase in mean performance with the introduction of a goal, and to assess how many participants displayed an increasing trend (positive slope) within the first goal condition. In this way it was possible to examine how many participants did not evidence an increase in performance upon introduction of a goal, thus demonstrating no goal effect. Level differences were counted if the mean performance differed from one condition to another by a minimum of 2 (see Appendix C and Appendix D for tables of mean scores). Data were divided into participants who displayed an increase in level of mean performance between the first baseline and the first goal condition and those who did not demonstrate this increase. Increases in performance upon introduction of a goal did not significantly differ between the feedback group and the no feedback group, $\chi^2 (1, N = 116) = 1.25$, $p = 0.26$. That is, feedback did not significantly enhance performance in the first goal condition. Participants in the feedback group and in the no feedback group were examined separately in order to explore particular patterns of responding in each group.
Feedback group. Overall, for the feedback group, 23% of participants did not demonstrate an increase in mean performance when a goal was introduced, and 40% of participants did not demonstrate an increasing trend in performance throughout the first goal condition. For the high goal first group, mean performance increased for twenty-four participants (83%) upon introduction of the first goal. Five participants in the high goal first group (17%) demonstrated no increase in mean performance. Within the first goal condition (high goal), eighteen participants (62%) demonstrated an increasing trend in performance; however, for eight participants (28%) a decreasing trend was observed, and for three participants (10%) trend was stable. For the low goal first group, mean performance increased for twenty participants (71%) when the first goal was introduced. During the first goal condition (low goal), sixteen participants (57%) demonstrated an increasing trend in performance, while seven participants demonstrated a decreasing trend (25%) and trend was stable for five participants (18%).

No feedback group. Overall, for the no feedback group, 34% of participants did not demonstrate an increase in mean performance when a goal was introduced, and trend was either stable or decreased in the first goal condition for 54% of participants. For the high goal first group, seventeen participants (57%) demonstrated an increase in mean performance when the first goal was introduced. Within the first goal condition (high goal), fourteen participants (47%) demonstrated an increasing trend, while eight participants (27%) demonstrated a decreasing trend and trend was stable for eight participants (26%). For the low goal first group, twenty-two participants (76%) demonstrated an increase in level of mean performance in the first goal condition. Within the first goal condition (low goal), thirteen participants (45%) demonstrated an increasing trend in performance, while ten participants (34%) demonstrated a decreasing trend, and trend was stable for six participants (21%). Figure 5.13 presents an example of a participant in the no feedback group, demonstrating no increase in mean performance with the introduction of the first goal.
Mean performance did not increase when a goal was introduced, for 23% of participants in the feedback group, and 34% of participants in the no feedback group. This suggests that for these participants, the introduction of a goal did not affect performance. Mean performance did not increase for a greater number of participants in the no feedback group, suggesting that feedback increases sensitivity to goal demands.

5.5.3 Persistence

Group analyses revealed no main effect of feedback on persistence for the high goal first group and the low goal first group; however, a significant phase x group (feedback) interaction effect was found in the low goal first group. Performance in the high goal was examined for each participant in an effort to determine patterns of responding in the presence of an unattainable goal.

**Feedback group.** A decreasing trend in performance in the high goal condition was observed for nineteen participants (33%) in the feedback group. Trend was stable for eight participants (14%) in this group, and was increasing for thirty participants (53%). When the high goal was the first goal condition, eight participants in the feedback group (28%) demonstrated a decreasing trend, eighteen (62%) demonstrated an increasing trend, and trend was stable for three participants (10%), in the high goal condition. When the high goal was the second goal
condition (low goal first group), a decreasing trend was observed for eleven participants (39%) within this condition, an increasing trend was observed for twelve participants (43%), and trend was stable for five participants (18%).

No feedback group. In the no feedback group, a decreasing trend was observed in the high goal condition for twenty-one participants (35%). An increasing trend was observed for twenty-four participants (41%) and trend was stable for fourteen participants (24%). When the high goal was introduced first, a decreasing trend was observed for eight participants (27%) in the high goal condition, while an increasing trend was observed for fourteen participants (47%), and trend was stable for eight participants (26%). When the high goal was the second goal condition (low goal first group), a decreasing trend was observed for thirteen participants (45%), an increasing trend was observed for 10 participants (34%) and trend was stable for six participants (21%) in the high goal condition. Figure 5.14 displays performance from one participant in the no feedback group, illustrating a decrease in performance during the high goal condition.

Figure 5.14. Scores from one participant in the no feedback group, highlighting a decreasing trend during the high goal condition, and a decrease in level upon removal of the goal (Baseline 2).

Single case data were grouped according to participants who displayed an increasing or stable trend in the high goal condition (persistence) and those who
displayed a decreasing trend, for the feedback group and the no feedback group. Chi-Squared analysis revealed no significant association between group (feedback and no feedback) and persistence within the high goal condition, $\chi^2 (1, N = 116) = 1.22, p = 0.27$, suggesting that the presence of feedback did not significantly affect persistence in the high goal condition. In both the feedback and the no feedback groups, a decreasing trend was more prevalent in the high goal condition when that condition was the second goal condition that the participant was exposed to (the fourth condition); however Chi-Squared analysis revealed no significant relationship between order of goal presentation and persistence, $\chi^2 (1, N = 116) = 0.03, p = 0.86$.

5.5.4 Withdrawal phase

Inspection of mean performance did not reveal a consistent reduction in performance upon removal of a goal (Figures 5.3 and 5.4). In addition to this, a negative slope in the second baseline was found for only the high goal first group who received feedback (slightly negative; $M = -0.09, SD = 1.34$). It was expected that performance would significantly decrease when the goal was removed, and analysis of single case data was conducted to investigate variation in patterns of behaviour in the second baseline condition.

**Feedback group.** For the feedback group, eight participants (14%) demonstrated a decrease in mean performance in the second baseline. Four of these participants were in the high goal first group and four were in the low goal first group. Overall, nine participants (16%) showed an increase in mean performance in the second baseline, while mean performance for forty participants (70%) remained equivalent to the previous goal condition. Within the second baseline condition, twenty-three participants (40%) demonstrated a decreasing trend in performance; ten participants in the high goal first group and thirteen in the low goal first group. Twenty-six participants (46%) demonstrated an increasing trend during the second baseline condition, and trend was stable for eight participants (14%).

**No feedback group.** Seven participants in the no feedback group (12%) demonstrated a decrease in mean performance in the second baseline. Four of these participants were in the high goal first group and three were in the low goal first group. Mean performance increased in the second baseline for fifteen participants (25%) and remained equivalent to the previous goal condition for thirty-seven participants (63%). Figure 5.14 shows performance from one participant in the no feedback group, with a reduction in mean performance in the second baseline.
Fifteen participants (25%) demonstrated a decreasing trend within the second baseline; eleven participants in the high goal first group and four in the low goal first group. Trend increased in the second baseline for thirty-three participants (56%), and remained stable for eleven participants (19%).

Chi-Squared analysis revealed no significant relationship between feedback group and trend (increasing or not increasing) within the second baseline, $\chi^2 (1, N = 116) = 0.86, p = 0.35$. The presence of feedback did not significantly affect level of mean performance or trend in the second baseline. The majority of participants continued to perform despite the removal of the goal, and overall only 13% of participants demonstrated the expected reduction in mean performance.

5.5.5 Choice condition

In the choice condition, participants had the option to work in either the high goal condition or the low goal condition. It was expected that participants would choose the low goal condition, as this allows easier access to reinforcement; however, thirty-seven participants (32%) chose the high goal. For these participants, performance in the choice condition was compared to performance in the high goal condition to assess whether performance was significantly different between a condition in which an unattainable goal was assigned and one in which an unattainable goal was chosen. For the high goal first group who chose the high goal, performance was significantly different between the two conditions, $t(17) = -5.01, p < 0.001$. Performance was significantly higher in the choice condition ($M = 24.43, SD = 6.17$) than in the high goal condition ($M = 21.80, SD = 6.06$). For the low goal first group who chose the high goal, performance was significantly different between conditions, $t(18) = 2.10, p = 0.050$. For this group, performance was significantly higher in the high goal condition ($M = 27.04, SD = 4.61$) than in the choice condition ($M = 26.02, SD = 5.34$). The number of participants who chose the high goal and the number who chose the low goal were grouped according to whether or not feedback was present, and a Chi-Squared analysis was conducted to investigate whether there was an association between the presence or absence of feedback and goal choice (high or low goal). No significant relationship was found, $\chi^2 (1, N = 116) = 0.22, p = 0.64$, suggesting that there were no significant differences between the feedback group and the no feedback group with regard to goal choice.
5.6 Discussion

The current study provides further support for prior research demonstrating that feedback increases performance significantly further than goal setting alone (Cameron & Duff, 2007; Erez, 1977; Reber & Wallin, 1984). A number of notable results emerged from the current study. First, feedback increased overall performance, and increased sensitivity to goal statements. Second, evidence of persistence differed across groups. Third, an unexpected number of participants chose the high goal, when given a choice between the high and low goal. Finally, single case analyses demonstrated that feedback and goal effects were not observed consistently across participants; some participants seemed insensitive to both.

Group results revealed a significant effect of feedback on performance, providing further support for the effect of feedback on goal-directed behaviour. O’Hora and Maglieri’s (2006) model suggests that feedback will lead to self-statements describing current performance, which results in comparison relations between current level of performance and the goal statement. When these comparison relations decrease, reinforcement for goal-directed behaviour occurs. Participants in the feedback group had continuous access to their score, which, according to the model may have led to an increased frequency of self-statements regarding performance. According to this model, reductions in comparison relations between performance and the goal functions as derived reinforcement for goal-directed behaviour, and this may serve as an explanation for significantly higher performance in the feedback group.

When the low goal first group and the high goal first group were examined separately, there was no significant difference in performance between the feedback and the no feedback groups who received the low goal first. For the high goal first group, there was a greater increase in performance for the feedback group when the high goal was introduced. This is in line with previous research findings that a high goal plus feedback results in higher levels of performance. Becker (1978) compared performance when a difficult goal and feedback were provided, with performance when an easy goal and feedback were provided. Only the group assigned a difficult goal with feedback achieved significant performance increases in comparison to the control group (no goal and no feedback). In the current study, a significant difference in performance was found between the feedback and the no feedback groups who received the high goal first. The first goal condition for this group was
either a high goal with feedback or a high goal without feedback. The initial combination of a high goal with feedback may have increased performance further in this group than in the low goal first group. Performance for the low goal first with feedback group did not significantly differ from the low goal first without feedback group. From a behavioural perspective, this increase in performance is in line with O’Hora and Maglieri’s (2006) model. According to the model, high goals will result in greater performance as participants work to reduce ‘less than’ comparison relations between the goal statement and current performance. Feedback leads to self-statements about current level of performance, thus a high goal with feedback will lead to greater levels of performance due to the derived reinforcing function of feedback.

Each participant’s data were examined at a single case level in an effort to determine patterns of behaviour across participants. Analyses revealed that for twenty-two participants, performance did not increase throughout the study. This suggests that the goal statements may not have affected performance for these individuals. The relationship between group (feedback or no feedback) and an overall increase in performance was not significant; however it is worth noting that performance increased throughout the study for more participants in the feedback group (86%) than in the no feedback group (75%), lending support to the hypothesis that feedback increases performance. Additionally, a significant association was found between feedback group and overall low levels of performance. Performance was lower than the low goal level of 20 data entries for a higher proportion of participants in the no feedback group (20%) than in the feedback group (5%). This further supports the group findings that feedback led to an overall increased level of performance throughout the study, despite no apparent goal effect for a number of participants. The overall increase in performance may have occurred due to a practice effect; however, this increase in performance was evident with more participants in the feedback group, suggesting that feedback may have enhanced the practice effect over time.

Although the majority of goal setting interventions report positive effects of difficult goals on performance, a number of studies have revealed negative effects. Locke, Shaw, Saari, and Latham (1981) conducted a review of goal setting interventions, and reported nine laboratory studies that failed to support the hypothesis that higher goals lead to greater increases in performance. Locke et al.
provided possible explanations for no significant relationship; unrealistic difficult goals, goal difficulty varying on too few dimensions, and task complexity. The authors reported that feedback was not provided for a number of studies, and suggested this as a reason for a lack of goal effect. In the current study, the performance of a number of participants (14%) who received feedback remained stable or decreased throughout the study. That is, neither goals nor exposure to the experimental contingencies increased their rate of responding. There are a number of possible reasons for this. A parsimonious explanation is that participants were unmotivated to follow the goal, possibly due to a poor history of rule following. An alternative explanation is that neither feedback nor goals affected performance because of the absence of any additional tangible reinforcement contingent upon performance.

Neither group reliably demonstrated a decrease in performance during a return to baseline. This can be interpreted in a number of ways. Participants in the current study were exposed to a goal condition immediately prior to the second baseline condition, and may have set their own standards based on the previous goal condition. That is, participants may have self-set goals in the absence of an assigned goal. Research has shown that participants who have been assigned a goal level will set goals for themselves in subsequent sessions (Locke, Frederick, Buckner, & Bobko, 1984; Locke, Frederick, Lee, & Bobko, 1984). An alternative explanation is that the absence of a withdrawal effect may have been observed due to the setting in which the study took place. Locke et al. (1981) asserted that in a laboratory paradigm, participants typically do not differ in their performance between a no goal condition and a loose “do your best” goal condition, as participants in a laboratory setting tend to try to perform ‘at their best’ in the absence of a goal. Participants in the current study may have simply continued to try to perform at their best in the laboratory setting.

To investigate persistence, trend was established across sessions within a condition using least squares analysis. A decreasing trend in performance was evident within the high, unattainable goal condition for a minority of participants (33% of the feedback group, and 35% of the no feedback group). Prior research has demonstrated that feedback assists with persistence (e.g. Medway & Venino, 1982); however, an interaction effect between condition and group (feedback) was only evident for the low goal first group. Participants in the low goal first group
demonstrated increased persistence in the high goal condition when feedback was present, suggesting a positive effect of feedback on persistence for this group.

A greater number of participants displayed a decreasing trend in the high goal condition when this was the second goal condition, for both the feedback group and the no feedback group. This suggests that time on task may affect levels of persistence with a task; the longer an individual spends on a task, the more likely they are to reduce responding with the provision of an unattainable goal. Alternatively, the group who received the high goal as their second goal condition may have ascertained from the previous low goal condition that this new higher goal was unattainable and therefore were less likely to persist. Garland (1983) suggested that participants in a laboratory setting may work toward an unattainable goal to please the experimenter, despite being subjected to repeated failure. This may have been the case for some participants in the current study. Garland advised that employees within an organisation may perform similarly in the presence of an unattainable goal in order to please their supervisor, thus, this pattern of persistence may not be an artefact of the laboratory setting. Future studies may benefit from manipulating goal level such that a percentage of baseline performance is assigned. If goal level is based on a percentage of baseline performance, difficult goal level can be determined for each individual. If this goal level is systematically increased, a percentage of baseline performance can be determined, that results in the highest level of performance before deterioration. Study 4 will utilize an unattainable goal based on baseline performance and sessions will be lengthened in order to investigate the effect of lengthened work periods on performance. Limited research has examined the effect of feedback on persistence and Study 4 will investigate whether extinction effects occur in the presence or absence of feedback in a lengthened work session.

In the fifth condition of the study, 32% of participants chose the high goal. No significant association was found between the presence or absence of feedback and goal choice, and choice was not significantly related to the goal level that was presented immediately prior to the choice condition. Provided that goal attainment serves as a generalised or derived reinforcer (Fellner & Sulzer-Azaroff, 1984; O’Hora & Maglieri, 2006), it was predicted that participants would choose the low goal; however, this was not the case for thirty-seven participants. There is some evidence that participants will choose to persist with an unattainable goal despite
being unable to reach the goal. Garland (1983) found that when subjects were offered the choice to continue with an unattainable task or stop the task, more than half of the participants chose to continue, despite contacting repeated failure throughout the experiment. For Study 3, a post-study questionnaire will be administered to determine participants’ opinions about the high goal (whether or not it is attainable) and why they choose this goal.

For both the high goal first group and the low goal first group who chose the high goal, a significant difference was found between performance in the high goal condition and the choice condition. Interestingly this difference was in opposite directions for each group. For the high goal first group, performance was significantly higher in the choice condition than in the high goal condition. For the low goal first group, performance was significantly higher in the high goal condition than in the choice condition. Comparisons of performance when goals have been assigned and self-selected, have yielded mixed results, and considering the choice condition in the current study as a participative condition, current results are also inconsistent. The relationship between goal choice and goal acceptance has been well established (Earley, 1985, Erez & Kanfer, 1983); however, the relationship between goal choice and performance is less clear.

The current group analyses demonstrated the overall effect of feedback, in line with previous studies; however, an examination of individual differences demonstrated variance in performance over time and between groups. Kluger and DeNisi (1996) conducted a review of feedback interventions, and found that over one third of the interventions reviewed reported decreases in performance, and feedback had highly variable effects on performance depending upon the conditions in which it was introduced. Kluger and DeNisi asserted that no consistent pattern of results have emerged from previous studies, and the current study aimed to supplement group findings with single case analyses in order to account for performance variance.

5.6.1 Considerations

In the current study, two types of feedback were provided continuously to the feedback group. Time feedback and amount correct feedback were provided simultaneously. It is unclear if one type of feedback affected performance more than the other. It is also unclear from the current study whether or not participants attended to the feedback, as it was presented passively. In organisational settings,
individuals often actively seek feedback rather than passively receive it (Ashford & Cummings, 1983; Morrison, 2002; VandeWalle & Cummings, 1997). If feedback is actively sought, an individual may be more likely to perform in line with the feedback than if the feedback was provided at the discretion of others (Ashford & Cummings, 1983). The design for Study 3 will be modified to examine feedback seeking in the presence of a high goal and a low goal in order to investigate whether or not participants choose to view feedback. A design which requires participants to seek feedback will provide a demonstration of the type of feedback that is preferred (time or score), and will provide an indication of the type of feedback that may function as a reinforcer for goal-directed behaviour. Additionally, this design will present a measure of participant’s attention to feedback.

A limitation of the current study was that it was unclear whether or not participants were following the assigned goals throughout the study. For Study 3, a series of post-study questions will be added to determine whether or not participants set their own goals during the study. Latham and Locke (1991) suggested that the basic test for goal commitment is performance; however, responses to a questionnaire examining goal-following and self-setting may provide further information to explain individual variation in performance. Additionally, questions will be included to determine participant’s opinions about their choice in the fifth phase of the study. Participants will be required to provide a reason for choosing either the high or low goal level in the final phase. This may aid in explaining why some participants choose a high goal over a low goal.
Chapter 6 (Study 3): The Effects of Goal Level on Feedback Requests

Results of Study 2 demonstrated the overall positive effect of feedback on performance in the presence of a goal, in addition to highlighting individual differences in performance. The design for Study 2 allowed for a comparison between continuous feedback and no feedback; however, when feedback is passively presented to a participant, it is unclear whether or not the participant is attending to the feedback. The aim of Study 3 was to investigate self-solicited feedback under a number of goal conditions, to examine whether participants would seek feedback when given the option. The overall aims were, a) to examine whether participants would choose to receive feedback, b) to investigate whether feedback-seeking responses would be affected by goal level, c) to investigate whether participants would choose ‘knowledge of score’ feedback or ‘time remaining’ feedback, and d) to analyse the effects of the option to choose feedback on performance in a high goal condition and a low goal condition. A series of post-study questions were included, to assess participants’ opinions concerning why they chose one type of feedback over another. Additionally, participants were asked why they chose the high or low goal in the final condition of the study.

Much of the feedback literature portrays feedback as a passive event, delivered at the discretion of others. However, in organisations, constraints exist that may lead a supervisor to deliver an inadequate amount of feedback, particularly if the feedback is negative. As a result, feedback seeking has received much attention in the research literature, and the importance of feedback seeking has been well established (Ashford & Cummings, 1983; Krasman, 2011; Larson, 1989). Feedback seeking has been defined as a “conscious devotion of effort toward determining the correctness and adequacy of behaviours for attaining valued end states” (Ashford, 1986, p.466), and is regarded as a valuable tool to reduce ambiguity around performance standards, while leading to increased job performance (Morrison, 2002). If feedback is actively sought, an individual may be more likely to perform in line with the feedback than if the feedback was provided passively, or at the discretion of others (Ashford & Cummings, 1983).
6.1 Feedback Seeking Context

Levy, Albright, Cawley, and Williams (1995) examined feedback-seeking behaviour over time in three contexts: public, semi-private, and private. Feedback seeking increased over time in the semi-private and private conditions, and decreased over time in the public condition. Studies have revealed that individuals will seek or not seek feedback because of the impression that feedback seeking will have on others (Ashford & Cummings, 1983; Morrison & Bies, 1991). The use of private, computer-generated feedback may buffer against possible negative supervisor-employee interactions, and in turn may lead to increased feedback-seeking behaviour. Organisations increasingly use technology as a resource for the delivery of feedback, and studies have demonstrated the utility of technology as a source of private performance feedback, or self-solicited feedback. As a result of this, Morrison and Weldon (1990) suggested that there be a distinction in the literature between human and non-human sources of feedback.

Earley (1988) examined the delivery of computer-generated feedback, assessing the relationship between feedback and performance. Self-generated feedback (directly from a performance-tracking system) was compared to supervisor feedback, when a specific goal had been assigned. Performance was significantly higher in the self-generated condition. Northcraft and Earley (1989) found similar results when self-generated feedback, either with or without a computer, was compared to organisational and supervisor feedback. Participants were exposed to a stock market simulation in which they were required to make decisions concerning the purchase and sale of stocks. Feedback credibility, task strategy and task performance were measured. In the organisation feedback condition, participants were given feedback through a piece of paper slipped under the door before each trading period (trial), whereas in the supervisor feedback condition, a professor provided verbal and written feedback. In the computer-generated and self-generated conditions, participants received general information about new prices and recommendations, and were required to generate a record of previous transactions and a table of correct predictions, thus generating their own feedback. Participants generated feedback either on a detailed worksheet (self-generated) or on a computer (computer-generated). Self-generated and computer-generated feedback produced higher levels of performance than external feedback, along with higher levels of credibility of feedback and strategy acquisition.
6.2 Goals and Feedback Seeking

According to Ashford and Cummings (1983), individuals who have not been assigned a goal should not seek feedback, as without a goal, feedback has little value. From this perspective, it would be expected that the introduction of a goal would increase self-solicited feedback responses. Morrison and Weldon (1990) compared the effects of a difficult attainable performance goal and no goal, on feedback-seeking behaviour. Feedback seeking occurred significantly more in the presence of a goal than in its absence. Additionally, participants who sought feedback were more likely to attain their goal than those who did not seek feedback. While studies have investigated self-generated feedback (e.g., Earley, 1988; Northcraft & Earley, 1989), previous research has failed to examine factors that may lead a person to self-solicit performance feedback (Slowiak, 2008), such as differing goal levels. Additionally, few studies have examined the cost (e.g., time or effort costs) of seeking feedback (Ashford & Cummings, 1983). The conditions under which individuals will seek feedback are important processes to study in order to provide a more precise explanation of the function of feedback (Ashford & Cummings, 1983).

In particular, an examination of the effect of goal level on feedback-seeking responses may have implications for the assignment of stretch goals. Stretch goals are typically described as goals with an unknown probability of attainment, or goals that are seemingly impossible (Sitkin, See, Miller, Lawless, & Carton, 2011). In the current study, the high goal level presented was an unattainable goal, and it was expected that feedback-seeking responses would reduce in this condition. According to O’Hora and Maglieri (2006), feedback leads to self-statements regarding current level of performance. These self-statements are compared to the initial goal statement, and as the individual works towards the goal, these comparison relations or ‘less than’ relations decrease, functioning as derived reinforcement for goal-directed behaviour. In an unattainable goal condition, feedback may signal that the participant is not moving sufficiently closer to the goal, thus the ‘less than’ comparison relations do not decrease, and reinforcement does not occur. Consequently, based on this account of goal-direct behaviour, in the current study it was expected that feedback-seeking responses would reduce in an unattainable goal condition.
6.3 Feedback Form

While feedback is understood to facilitate performance, the content of feedback can vary, resulting in differing effects on performance. In certain work situations, feedback about current level of performance (how many sales) may be important, but in other situations, feedback about the quality of output may be important (how many errors per hour). Jacoby, Mazursky, Troutman, and Kuss (1984) examined the frequency of choosing outcome feedback in a decision making task. Outcome feedback is information about accuracy of a response, whereas cognitive feedback is information about processes underlying this accuracy (process feedback). Outcome feedback was provided to stock analysts in a simulated task, in which strategy and processes were key. The feedback provided no information about why the performer was at the current performance level, and was not predictive of future performance; it simply gave information about the correctness of a response. Five of the seventeen participants chose not to view feedback throughout the study, and those who accessed feedback did not do so consistently. The authors concluded that the better performers (in this task, better decision makers) were less likely to access outcome-only feedback information. With this decision making task, participants may have benefitted from explanatory or predictive feedback, and the authors suggested that outcome feedback may not effectively reinforce behaviour during complex tasks. In the current study, participants were given the option to complete the task without soliciting feedback, as they would not receive feedback until they pressed a button on the task screen. Ashford and Cummings (1983) proposed that individuals will adopt strategies to receive feedback in situations where feedback is more valuable. That is, participants will seek feedback provided that feedback is functioning as a reinforcer for task-relevant behaviour. Additionally, when there are a variety of forms of feedback available, feedback seeking may provide an index of which of these forms of feedback may be more likely to reinforce behaviour, acting somewhat as a reinforcer assessment.

Ilgen and Moore (1987) compared quality (knowledge of score) and quantity (time on task) feedback, when a difficult attainable goal was set that specified both a specific level of performance and a time constraint (i.e., to achieve a final score of 35 in 22.5 minutes). Participants in the knowledge of score feedback group completed their task with a higher degree of accuracy than other groups, and participants in the time on task feedback group completed their task more rapidly than other groups.
Interestingly, those who received knowledge of score feedback and time on task feedback completed the task more rapidly, without a reduction in accuracy. In a secondary analysis, these authors also presented participants with a choice of whether or not to choose feedback. Participants with the option to choose feedback completed the task significantly more quickly than those who received continuous feedback; however, there were no other significant performance differences (e.g., accuracy). The authors suggested that type of feedback should match the goal that has been set. If a goal incorporating level and time is set, then feedback information should be provided on performance level and time on task.

The current study examined the effect of goal level on self-solicited feedback. Research within the cognitive literature has focused on antecedents to feedback seeking such as individual dispositions, perceptions about ego costs and context of feedback, for example, public or private feedback (VandeWalle, Ganesan, Challagalla, & Brown, 2000). Slowiak (2008) suggested that researchers have failed to examine situational factors that may lead a person to solicit feedback. Environmental factors such as goal setting-participation effects or goal level effects have largely been ignored in the literature. The first aim of Study 3 was to investigate whether participants would choose to receive feedback during a no goal condition, a low goal condition, and a high goal condition. It was proposed that if participants chose to receive feedback, this would give further insight into the role of feedback throughout the study, as it relates to goal-directed behaviour. Computer-generated feedback was utilised in the current study, thus the context was private, and participants had the option to choose feedback at any point throughout the task.

Specific outcome feedback was available in the form of ‘knowledge of score’, and general feedback was available in the form of ‘time remaining’. The study investigated whether participants would choose to view how much time they had remaining in the study or how many data entries they had inputted correctly (knowledge of score). Analysis of the form of feedback that participants choose may provide further information about the effect of feedback on goal-directed behaviour. According to O’Hora and Maglieri’s (2006) model, it was proposed that if participants chose knowledge of score feedback, this would allow for reliable reinforcement of goal-directed behaviour when relations between current performance and goal level decrease. That is, seeking knowledge of score feedback would indicate goal-directed behaviour, as the goal statement assigned was stated in
terms of the expected number of data entries. If participants chose ‘time remaining’ feedback, this would only offer information about how long they have left in the experiment, and not information related to the goal. As with Study 2, the research design included a fifth phase, in which participants had the option to choose between a high or a low goal. This was retained for the current study as an unexpected 32% of participants in Study 2 chose the high goal. A series of post-study questions were included in the current study, in order to determine whether or not participants were aware that they were choosing either the high or the low goal, and to determine participants’ reasons for their choice.

6.4 Method

6.4.1 Participants

Sixty participants, ranging in age from 17 to 63 years ($M_{\text{age}} = 22.84$) took part in the study; 50 females and 10 males. Participants were first and second year undergraduate psychology students at the National University of Ireland Galway, recruited through an online university system. Participants earned course credit for taking part in the study, and ethical approval for the study was obtained through the University.

6.4.2 Apparatus and setting

The apparatus and setting were identical to those used in Study 1. See page 39 for a detailed description.

6.4.3 Design

The sequence of phases was the same as Study 1 (see page 39 for a description).

Independent variables. The independent variable was goal level, and was presented in three levels: (a) no goal, (b) low (attainable) goal, and (c) high (unattainable) goal.

Dependent measures. Feedback solicitation constituted the first dependent measure. This was measured in two ways. Score feedback was defined as the total number of times the participant chose the “amount correct” button on the task screen, and time feedback was defined as the total number of times the participant chose the “time remaining” button on the task screen (Figure 6.1 shows the task screen). Task performance was the second dependent measure, and was defined as the mean number of correct responses per condition.
6.4.4 Procedure

The task used was similar to the one used in Study 1 and 2, with modifications to the task screen. Feedback was not present on the screen; however, two buttons were present labelled ‘show score’ and ‘show time’. Figure 6.1 shows the work task screen. The labels ‘1’ and ‘2’ indicate the ‘show score’ button (1) and the ‘show time’ button (2). A box was situated below each of these buttons, and when the button was pressed by clicking on it with the mouse, the corresponding feedback would appear in the box. When the ‘show score’ button was pressed, the amount of correctly inputted patients in that session appeared in the box for two seconds. When the ‘show time’ button was pressed, the countdown timer displayed the time remaining in the session for two seconds.

![Figure 6.1. Work task screen in the baseline condition. The numbers in the figure illustrate the ‘show score’ button (1) and the ‘show time’ button (2).](image)

As in Study 1 and 2, at the end of each work session, feedback was presented to the participant indicating how many patients were entered correctly during that work session, and how many were entered incorrectly.
**Training.** Training was carried out as in Study 1 (see page 41 for a detailed description), with some exceptions. The training session consisted of two 30-second conditions. Both conditions were reduced-length versions of the baseline condition, in which no manager was present. The ‘show score’ and ‘show time’ buttons were present on the task screen instead of continuous feedback. In the first session of training, after the participant had successfully submitted the first patient’s data, the participant was instructed to click on the ‘show score’ button to observe that the patient’s data had been successfully submitted. The participant was then instructed to click on the ‘show time’ button to examine how many seconds were remaining in the session. If the participant did not correctly input the first patient’s data, the experimenter waited until the first correct submission before drawing attention to the ‘show score’ and ‘show time’ buttons.

**Testing.** Testing lasted a total of 60 minutes, with five 12-minute conditions. Each condition consisted of three 4-minute work sessions. Conditions were identical to Study 1 with the exception that ongoing feedback was not present (see page 42 for a description).

**Self-solicited feedback.** All participants were exposed to the conditions as described in Study 1. Additionally, throughout all conditions, participants had the opportunity to view ‘time remaining’ feedback or ‘score’ feedback by pressing the corresponding button on the task screen. Feedback remained on the screen for two seconds, and participants could press either button at any point throughout the testing. The computer programme recorded feedback-soliciting responses.

**Post-study questions.** Upon completion of the study, the experimenter administered a series of post-study questions to the participant, in order to gauge participants’ opinions about why they chose a particular type of feedback and why they chose either the high or low goal level in the choice condition. The post-study questions were as follows:

1. How many patients did Bob ask you to input?
2. How many patients did Todd ask you to input?
3. Which manager did you choose?
4. Why did you choose that manager?
5. What type of feedback did you pick the most?
6. Why did you choose that type of feedback?
7. Did you follow the goals given to you or did you set your own goals?
8. Did you read the instructions presented to you from each manager?
9. Did you refer to the yellow part at the top of the task screen to find out whether there was a manager present or absent?

These questions were presented to address some concerns from Study 2. For example, the participant was asked if he/she had referred to the yellow part at the top of the screen, to provide an indication that the participant was aware that a goal had been assigned in that condition. Additionally, participants were asked if they had set their own goals during the study, to determine whether participants were following the assigned goals.

6.5 Results

6.5.1 Performance

An initial investigation was conducted to examine whether performance differed across conditions when the option to choose feedback was present. One participant was removed as this participant’s scores exceeded the high goal of 40. A 2 (order) x 4 (phase) mixed ANOVA was conducted to examine whether performance differed between the high goal first group and the low goal first group, and across the first four phases. There was no significant difference in overall performance between the two groups, \( F(1,57) = 2.78, p = 0.10, \eta_p^2 = 0.05 \). A main effect of phase was observed, \( F(2.43, 138.41) = 93.45, p < 0.001, \eta_p^2 = 0.62 \), indicating that performance was significantly different across phases. Mean performance was highest in the fourth phase (second goal condition; \( M = 25.03, SD = 6.38 \)) and lowest in the first phase (baseline; \( M = 19.86, SD = 4.34 \)). Although not reaching significance at the .05 level, a trend was observed for the order x phase interaction, indicating that the effect of the goal on performance depended upon the order in which the goal was presented, \( F(2.43, 138.41) = 2.49, p = 0.08, \eta_p^2 = 0.04 \). Figure 6.2 displays average performance across the first four phases by the high goal first group and the low goal first group.
Figure 6.2. Average performance for both the high goal first group and the low goal first group. The horizontal dashed line represents the low goal level. The high goal level (40) is not depicted on the scale. Error bars represent standard error of the mean.

Visual inspection of Figure 6.2 indicates that baseline performance for the low goal first group was higher than that of the high goal first group. Although this trend was evident, it was not significant, $t(57) = -1.94, p = 0.06$. Figure 6.3 displays average performance across conditions, when scores in each condition were divided by the baseline score for each participant. This figure displays performance increases in each goal condition as they relate to baseline levels of performance. Figure 6.3 reveals that when baseline scores were taken into account, performance increased to a greater extent for the high goal first group. For the high goal first group, performance increased upon introduction of the high goal (Phase 2); however, performance continued to increase throughout second baseline (Phase 3) and the low goal condition (Phase 4). For the low goal first group, performance increased in Phase 2, and increased again when participants were presented with the high goal in Phase 4.
Correct Responses
Baseline
Goal 1
Baseline
Goal 2
0.9
1.0
1.1
1.2
1.3
High goal first
Low goal first

Figure 6.3. Average performance for the high goal first group and the low goal first group when scores in each condition were divided by baseline scores for each participant.

6.5.2 Feedback

Participants’ results were examined for frequency of feedback solicitation throughout the first four goal conditions. Participants who did not choose feedback, or those who chose feedback less than four times in the entire testing period, were counted as a no feedback group. Feedback was measured in two ways: ‘time remaining’ and ‘score’ feedback. The feedback ($n = 33$) and no feedback ($n = 26$) groups were examined separately in order to investigate the effect of order of goal presentation on performance over time for both those who chose feedback and those who did not.

Feedback group. A 2 (order) x 4 (phase) ANOVA was conducted to examine differences in performance between the high goal first group and the low goal first group, and across the first four phases. There was no significant difference in overall performance between the two groups, $F(1,31) = 2.19, p = 0.15, \eta^2_p = 0.07$. A main effect of phase was observed, $F(3,93) = 46.56, p < 0.001, \eta^2_p = 0.60$, indicating that performance was significantly different across phases. Mean performance was highest in the fourth phase (second goal condition; $M = 25.28, SD = 6.38$) and lowest in the first phase (baseline; $M = 20.03, SD = 4.27$). A significant order x phase interaction was observed, $F(3,93) = 3.44, p = 0.02, \eta^2_p = 0.10$. Mean
performance was higher in the low goal first group than the high goal first group across phases, and in particular, performance in Phase 4 was significantly higher for the low goal first group than for the high goal first group, \( t(31) = -2.05, p = 0.049 \). Figure 6.4 displays average performance across the first four phases for the high goal first and low goal first groups who chose feedback.

Figure 6.4. Performance for the high goal first group and the low goal first group, who chose feedback four times or more throughout the study.

Figure 6.5 displays performance across conditions, when condition scores were divided by the baseline score for each participant. Examination of this figure allows for a clearer description of the effect of goal level on performance over time. For the high goal first group, performance increased in Phase 2 (high goal), and remained stable throughout the study. For the low goal first group, performance increased in Phase 2 (low goal), and increased again when participants were presented with the high goal in Phase 4. In Phase 2, performance was higher for the group in the high goal condition (high goal first group) than for the group in the low goal condition (low goal first group). In Phase 4, performance was higher for the group in the high goal condition (low goal first group) than for the group in the low goal condition (high goal first group).
Figure 6.5. Performance for the high goal first group and the low goal first group who chose feedback, when mean condition scores were divided by the mean baseline score for each participant.

**No feedback group.** A 2 (order) x 4 (phase) ANOVA was conducted to examine differences in performance between the high goal first group and the low goal first group, and across the first four phases. There was no significant difference in overall performance between the two groups, $F(1,24) = 0.72, p = 0.41, \eta_p^2 = 0.03$. A main effect of phase was observed, $F(1.96, 46.99) = 50.73, p < 0.001, \eta_p^2 = 0.68$. Mean performance was highest in the fourth phase (second goal condition; $M = 24.71, SD = 6.55$) and lowest in the first phase (baseline; $M = 19.65, SD = 4.50$). There was no order x phase interaction observed, $F(1.96, 46.99) = 0.24, p = 0.78, \eta_p^2 = 0.01$. Figure 6.6 displays the average performance across the first four phases by the high goal first and the low goal first groups who did not choose feedback. Both groups displayed a similar pattern of responding, with an increase in performance upon introduction of the first goal and a further increase when the second goal was introduced.
Figure 6.6. Performance for the high goal first group and the low goal first group who chose feedback less than four times.

When scores in each condition were divided by baseline scores for each participant, performance increased for the low goal first group in Phase 2, and increased again in Phase 4. For the high goal first group, performance increased in Phase 2, and increased again in the second baseline (Phase 3) and in Phase 4. Figure 6.7 displays scores in each condition when divided by the baseline score.
Chapter 6 Study 3

Figure 6.7. Performance for the high goal first group and low goal first group who chose feedback less than four times, when condition scores were divided by the baseline score.

6.5.3 Feedback solicitation

Overall, 56% of participants chose feedback four times or more, and 44% did not choose feedback or chose feedback less than four times throughout the study. The group who chose feedback were examined in more detail, to determine patterns in feedback-solicitation responses. Two repeated measures multivariate analyses of variance (MANOVA) were conducted to determine whether there were significant differences in score or time feedback solicitation across phases, for both the high goal first group and the low goal first group. For the high goal first group, significant differences were found among phases on the dependent measures of score and time feedback, Wilk’s $\Lambda = 0.23, F(6,11) = 6.22, p = 0.01, \eta_p^2 = 0.77$. No main effect was found for score feedback, $F(1.26, 20.23) = 1.28, p = 0.28, \eta_p^2 = 0.07$; however, descriptive statistics show that score feedback was chosen most often in the low goal condition ($M = 8.65, SD = 13.74$) and least often in the high goal condition ($M = 4.94, SD = 11.85$). A significant effect of phase was observed for time feedback, $F(1.92, 30.68) = 3.70, p = 0.04, \eta_p^2 = 0.19$. Frequency of time feedback was highest in the low goal condition ($M = 3.24, SD = 4.06$), and lowest in the high goal condition ($M = 1.35, SD = 1.94$). Figure 6.8 displays the mean
frequency of feedback solicitation for score feedback and time feedback in each goal condition, for the high goal first group.

For the low goal first group, significant differences were found among phases on the dependent measures, Wilk’s $\Lambda = 0.26$, $F(6,10) = 4.70$, $p = 0.02$, $\eta^2_p = 0.74$. Individually, no significant differences were found across phases with score feedback, $F(1.28, 28.33) = 1.53$, $p = 0.24$, $\eta^2_p = 0.09$. With time feedback solicitation, although not reaching significance at the .05 level, a trend was observed indicating differences across phases, $F(1.89, 19.33) = 3.29$, $p = 0.054$, $\eta^2_p = 0.18$. Figure 6.9 displays the mean frequency of feedback solicitation for both score feedback and time feedback in each goal condition, for the low goal first group. As with the previous group, frequency of score feedback was highest in the low goal condition ($M = 6.56$, $SD = 7.28$), and lowest in the high goal condition ($M = 4.06$, $SD = 6.46$). Similarly, frequency of time feedback was highest in the low goal condition ($M = 4.44$, $SD = 3.39$) and lowest in the high goal condition ($M = 2.44$, $SD = 2.58$).
6.5.4 Score feedback and performance

It was expected that a greater number of participants would choose score feedback over time feedback, as score feedback was specific and provided information that could allow for a comparison between performance and the goal level. Of the participants who chose feedback, 73% chose score feedback more than time feedback, 21% chose time feedback more than score feedback, and 6% of participants chose score and time feedback an equal number of times. A series of Pearson’s Product-Moment correlations were conducted to examine correlations between performance, score feedback, and time feedback in each condition, in addition to total score feedback and total time feedback. Table 6.1 presents results for the high goal first group and Table 6.2 presents results for the low goal first group. It was expected that positive correlations would be observed between performance and score feedback, as score feedback was considered goal-directed, specific feedback. For the high goal first group, no significant correlations were observed between performance and score feedback. For the low goal first group, significant negative relationships were observed between Baseline 1 score feedback and Baseline 1 performance, $r(16) = -.73, p = 0.001$, between Baseline 1 score feedback and Baseline 2 performance, $r(16) = -.54, p = .03$, and between Baseline 1 score feedback and performance in the high goal condition, $r(16) = -.51, p = .04$, suggesting either that as score feedback solicitation increased, performance
decreased, or increased performance was associated with decreased feedback solicitation.

6.5.5 Post-study questions

Analysis of post-study questions revealed a number of notable results. When participants were asked which manager had assigned the high and low goals (either Todd or Bob), 22% answered incorrectly. Twelve percent of the overall sample reported the managers in the opposite order. That is, these participants reported that Bob administered the high goal when it was Todd who delivered the high goal. This has implications for the choice condition, as participants were asked to choose the high or low goal level based on the managers name. If Bob was the manager in the high goal condition, then choosing Bob in the choice condition would ensure that the participant was presented with the high goal for this condition. In addition to this, 7% of participants incorrectly reported the goal level assigned to each manager. For example, when asked “how many patients did Bob ask you to input?”, one participant reported a goal level of 70. Three percent of participants reported that they did not remember either the high or the low goal level.

Eighteen participants (31%) chose the high goal condition. Of the participants who chose the high goal condition, 56% stated that they wanted to try to reach the goal level of 40. Seventeen percent stated that they thought they were choosing the low goal, and 17% stated that they could not remember which was the high goal and which was the low goal. Ten percent of participants stated other reasons for choosing the high goal; one participant stated that the curser on the screen was closer to the high goal manager, and one participant preferred the high goal manager’s name. This suggests that for 44% of the group who chose the high goal, the challenge of reaching a high goal did not function as a reason for choosing the goal.
Table 6.1

*Correlations Between Performance, Score Feedback, Time Feedback, Total Score and Total Time Feedback for the High Goal First Group (participants who chose feedback)*

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** Significant at 0.01 level
* Significant at 0.05 level
### Table 6.2

Correlations Between Performance, Score Feedback, Time Feedback, Total Score and Total Time Feedback for the Low Goal First Group (participants who chose feedback)

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<td>.05</td>
<td>.40</td>
<td>.14</td>
<td>.97**</td>
<td>.58*</td>
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<td>13. HG Time FB</td>
<td>-.74**</td>
<td>-.69**</td>
<td>-.68**</td>
<td>-.75**</td>
<td>-.67**</td>
<td>.61*</td>
<td>.37</td>
<td>.47</td>
<td>.82**</td>
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<td>14. Choice Score FB</td>
<td>-.29</td>
<td>-.23</td>
<td>-.33</td>
<td>-.39</td>
<td>-.32</td>
<td>.30</td>
<td>.06</td>
<td>.79**</td>
<td>.55*</td>
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<td>15. Choice Time FB</td>
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<td>-.48</td>
<td>-.62*</td>
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<td>16. Total Score FB</td>
<td>-.35</td>
<td>-.12</td>
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<td>.61*</td>
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<td>17. Total Time FB</td>
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** Significant at 0.01 level
* Significant at 0.05 level
Participants were asked what type of feedback they chose most, along with the reason for their choice. Of the 59 participants in the study, 20% incorrectly reported the feedback that they had chosen the most. For example, a participant reported that he chose time feedback more; however, the data indicated that he chose score feedback more. When participants who reported choosing score feedback more were asked their reason, 55% of this group reported that they wanted to see if they were reaching their goal, and 18% reported that they wanted to see how many patients they had inputted. The remaining 27% of participants reported other reasons, such as, one participant stated that she could control her score but not the time left, one participant stated that time feedback was a waste of time, and one participant wanted to see if the previous response had been correct. Of the participants who reported seeking time feedback more than score feedback, 67% reported that they wanted to see how long they had left in the experiment, while the remaining 33% reported various reasons, such as one participant reported counting in his mind, thus no need for score feedback, one participant stated that she did not need score feedback as it was presented at the end of the session, and one participant reported wanting to finish the study. Ten percent of the overall sample reported choosing time and score feedback equally. The reason given for this was that these participants wanted to see how many patients they had left to input, along with the time remaining in which to input. Twenty-seven percent of the overall sample reported not seeking feedback. Of these participants, 31% reported that they did not have time to seek feedback, 63% did not report a reason for not seeking feedback and 6% reported wanting to concentrate on data input.

Participants were asked whether they followed the assigned goals or whether they set their own goals throughout the study. Only 44% of participants reported that they followed the assigned goals; however, an additional 27% of participants reported a combination of self-setting and following the assigned goals. These participants reported either setting their own lower goal in the high goal condition, setting higher goals in the low goal condition, or beating their last score in the baseline condition. The remaining 29% of participants reported setting their own goals throughout the study. The majority of these participants reported goals of beating their previous score, improving accuracy (less errors), or setting loose “do your best” goals. Of the participants who reported following the goals, 59% chose feedback four times or more throughout the study, while 41% chose feedback less
than four times. Of the group who reported combining goal setting with following goals, 50% chose feedback, and 50% did not. Of the group who reported setting their own goals, 53% chose feedback four times or more and 47% did not choose feedback.

A 3 (group) x 4 (phase) ANOVA was conducted to investigate for differences in performance across phases for the group who reported following the goal, those who reported setting their own goals, and those who reported a combination. No main effects were observed for following, self-setting or combining goals, $F(1,56) = 1.33, p = 0.27, \eta_p^2 = 0.05$. A main effect of phase was observed, $F(2.43, 135.96) = 87.79, p < 0.001, \eta_p^2 = 0.61$; however, no phase x group interaction was observed, $F(4.86, 135.96) = 0.74, p = 0.59, \eta_p^2 = 0.03$. Inspection of mean performance for each group revealed that performance was highest across phases in the group who combined following a goal with self-setting (highest in the second goal condition; $M = 27.02$, $SD = 6.54$), and performance was lowest across conditions in the group who exclusively set their own goals (highest in the second goal condition; $M = 23.96$, $SD = 6.20$); however, these differences were not significant.

### 6.6 Discussion

The primary aim of the current study was to examine the effect of goal level on self-solicited feedback. The study investigated whether participants would choose to receive feedback during a no goal condition, a low goal condition, and a high goal condition. It was proposed that if participants chose to receive feedback, this would give further insight into the role of feedback throughout the study, as it relates to goal-directed behaviour, and an unexpected 44% of participants chose feedback less than four times throughout the study. For those participants who chose feedback, significant differences in feedback-solicitation responses were observed across phases. As expected, feedback was solicited to a greater extent in the low goal condition than in the high goal condition. Additionally, the study investigated whether participants would choose to view how much time they had remaining in the study or how many data entries they had inputted correctly (knowledge of score). As expected, a greater number of participants (73%) chose score feedback more than time feedback. These participants primarily reported choosing feedback to compare their current performance to the goal level.
In the current study, only 56% of participants chose feedback four or more times throughout the study. Ashford and Cummings (1983) suggested that with performance goals, an individual is less likely to seek feedback, as the feedback information does not add to what is already known about the task. This may explain why almost half of the participants chose not to view feedback in the current task. Participants may not have required feedback, as progressing towards the goal may have functioned as more potent reinforcement than viewing feedback. In behavioural terms, if seeking feedback involves an effort cost and the derived reinforcing function of feedback statements does not outweigh this cost, then an individual may not seek feedback. Upon completion of the study, participants were asked which type of feedback they chose more frequently and their reason for this. Of the participants who reported not choosing feedback, 31% reported that they did not have time to seek feedback, and 6% reported wanting to concentrate on the data input, suggesting that there may have been a perceived time or effort cost involved. More than half of participants failed to report a reason for not seeking feedback, and a limitation of the post-study questionnaire was that a follow-up question was not administered to those participants who did not offer a reason.

Analysis of overall performance revealed no significant difference in performance between the high goal first group and the low goal first group. When the group who chose feedback and the group who did not choose feedback were analysed separately, mean performance in the feedback group did not differ from mean performance in the no feedback group. Although the effect of self-solicited feedback on performance was not the primary goal of the current study, it is interesting to note that no differences in mean performance were observed.

The current study investigated whether goal level would affect feedback-solicitation responses. For both the high goal first group and the low goal first group, significant main effects of feedback solicitation were found across phases, however individual differences were found with each dependent measure (score and time feedback). Overall, feedback-soliciting responses were most frequent during the low goal condition and least frequent during the high goal condition. Ashford (1986) proposed that the processes involved in feedback seeking are goal-specific. That is, individuals seek feedback about behaviours that are specifically related to a goal. Feedback was chosen more frequently in the low goal condition than in the baseline condition, providing support for the relationship between feedback seeking
and goal-directed behaviour. However, as goal level increased, feedback seeking decreased, thus if feedback seeking is goal-directed, there may be a goal level point at which feedback seeking reduces. Ashford (1986) proposed that actively seeking feedback requires energy, and that seeking feedback will depend on the store of energy that the participant has on hand. In the current study, participants may have chosen feedback more frequently during the low goal condition as the goal level was such that the participant had energy to spend on soliciting feedback.

Analysis of mean feedback-soliciting responses revealed that feedback was chosen least often in the high goal condition. Researchers have suggested that individuals are less likely to seek feedback when they believe that they are performing poorly (Ashford & Tsui, 1991; Morrison & Cummings, 1992; Northcraft & Ashford, 1990). Ashford (1986) suggested that one cost to seeking feedback is the chance that the individual may hear something that they do not want to know. In the high goal condition, participants may have reduced their feedback-soliciting responding as feedback signalled that participants were not progressing sufficiently closer to the goal level. From a behavioural perspective, according to O’Hora and Maglieri’s (2006) model, provided that feedback is leading to self-statements about current performance, feedback seeking may reduce in the high goal condition. If ‘less than’ comparison relations between current performance and the goal level are not sufficiently decreasing to function as derived reinforcement for goal-directed behaviour, performers may reduce their feedback-soliciting responses that lead to self-statements. That is, self-statements that describe current level of performance as not moving closer to a goal level may not function as reinforcement, thus feedback seeking will reduce. Furthermore, if it is assumed that the cost (e.g., energy, time) of seeking feedback results in a gain for participants, for example information about moving closer to the goal, then when the gain is lost or reduces, feedback seeking may be punished because the cost of seeking feedback is no longer outweighed by the gain.

Slowiak, Dickinson, and Huitema (2011) examined self-solicited feedback during monetary incentive and hourly pay conditions. Monetary incentives did not increase self-solicited feedback in comparison to hourly pay, even though participants performed at a higher rate during the monetary incentive condition. Slowiak et al. suggested that the time cost of viewing feedback may have been too high for the incentive condition, as participants could not work while viewing
feedback. This may be true for the current study. It is possible that the time cost of viewing feedback may have suppressed feedback solicitation in the high, unattainable goal condition. Analysis of correlations between feedback and performance revealed that for the low goal first group, negative correlations were observed between score feedback solicitation in the first baseline condition and performance in the first baseline, performance in the second baseline and performance in the high goal condition. This suggests that increased performance was associated with decreased feedback seeking. This may be further evidence that the time cost of viewing feedback negatively impacted performance. Much of the research on feedback seeking has investigated the effect of learning goals on feedback seeking. Generally, there is a positive linear trend (VandeWalle & Cummings, 1997). Despite this, when faced with a typical performance goal, feedback seeking may be negatively related to goal level. That is, as the goal level becomes increasingly difficult, employees may find feedback less valuable or progressively more costly, and therefore seek it less.

It was expected that a greater number of participants would choose score feedback over time feedback, as score feedback offered specific information relative to the goal level, and seeking it may be viewed as an indicator of goal-directed behaviour. Of the participants who chose feedback, the majority (73%) chose score feedback more than time feedback. These participants primarily reported choosing feedback to determine if they were reaching their goal, or to establish how many patients they had inputted. This provides support for the assumption that participants who choose knowledge of score feedback are using this outcome feedback to compare to a goal level. According to the O’Hora and Maglieri (2006) model, score feedback would have a greater reinforcing function than time feedback, as it relates directly to goal-directed behaviour. Consequently, the cost of viewing score feedback may be outweighed by the gain of receiving goal-directed information. Conversely, choosing time feedback results in information not directly related to the goal, thus the cost of viewing this feedback may have been too high for participants to choose it. The primary reason provided by participants for choosing more time feedback than score feedback was to see how long was left in the experiment. These participants neglected to discuss the goal level or their performance throughout the task.
The fifth choice condition was included in the current study in an attempt to gain participant’s opinions about why they chose either the high or the low goal. In the current study, 31% of participants chose the high goal condition; however, only half of the participants who chose the high goal stated that they wished to try to reach the goal. Reasons provided were that the participants had not reached the high goal level and wanted to try again, and participants liked the challenge. The remaining 44% chose the high goal for reasons such as mistakenly mixing up the goal levels or not recalling which manager was associated with the high and low goals. This suggests that just under half of the participants who chose the high goal did not intend to choose it. This has implications for the results of Study 1 and Study 2. In those studies, and in the current study, an unexpected number of participants chose the high goal, and the current results indicate that perhaps fewer people intended to choose the high goal.

The majority of studies examining feedback-seeking behaviour have employed either self-report accounts or other’s accounts of feedback seeking (Levy et al., 1995). Few studies have examined the feedback-seeking process using behavioural measures. The current study directly measured self-solicited feedback, allowing an examination of how often, and under which goal conditions a participant chooses feedback. Results of the present study highlighted the possible negative effect of goal difficulty on feedback-seeking responses, in the presence of a performance goal. Frequency of feedback-solicitation responses was lowest in the high goal condition, suggesting that with an unattainable goal, participants chose to work instead of seeking feedback. A number of disruptive effects of stretch goals have been documented in the research literature. Sitkin, See, Miller, Lawless, and Carton (2011) suggested that when a stretch goal has been assigned, a number of simultaneous behaviours may occur in an attempt to reach the goal, and it may not be possible to determine which behaviour changes are effective. In the absence of performance feedback, this inability to identify effective behaviour change would be exacerbated. In the presence of a high goal, an individual may reduce their feedback-seeking behaviour, and in turn may continue to exhibit ineffective performance behaviours.

6.6.1 Considerations
Few studies have examined effort cost; however, Ashford (1986) found a negative relationship between the effort required to obtain feedback and the
frequency of feedback-seeking responses. In the current study, effort may have been perceived as higher in the high feedback condition due to the high goal and time limitation. A future study might test effort or time costs by varying the cost of seeking feedback in terms of the time it takes to access the feedback, or the number of responses required to receive the feedback. Additionally, results or gains of feedback seeking could be manipulated in terms of additional information for longer periods of time or less information for less time. In the current study, two goal levels were presented. Assigning a range of goal levels may assist in pinpointing a goal level at which participants reduce or stop seeking feedback. If goal level is determined by baseline performance, the goal level can be systematically increased, for example, 150% of baseline performance, and then 160% of baseline performance, to investigate the level at which feedback-seeking decreases or ceases. Study 5 will investigate feedback-soliciting responses in the presence of unattainable goals presented in ascending order (e.g., 150%, 160% and 170% of baseline performance) and in descending order. By identifying a point at which feedback-seeking ceases, a goal level can be determined that is challenging, yet allows for time to receive feedback.
Chapter 7 (Study 4): Analysis of Productivity and Persistence over Time in a Lengthened Laboratory Task

Studies 1 and 2 investigated the effects of an unattainable goal on productivity and persistence over time. It was expected that performance would deteriorate in an unattainable goal condition; however, a decreasing trend in performance was evident for only 33% of participants in the feedback group, and 36% of participants in the no feedback group. Conditions within Studies 1 and 2 consisted of three 4-minute work sessions. It was suggested that the length of these sessions may not have been sufficient for participants to determine that the high goal level was unattainable. As a result, the current study employed extended work sessions in order to test for persistence or resistance to extinction in the presence of an unattainable goal, with a lengthened work task. Feedback was present for half of the participants, in order to investigate whether feedback would affect persistence when lengthened goal conditions were prescribed. Additionally, the current study employed a goal that was set at 160% of each participant’s baseline performance. This was introduced to account for differing levels of baseline responding, and individual differences in ability, thus ensuring that the goal level was high for all participants. Study 4 was conducted, a) to examine the effect of an unattainable goal on productivity and persistence over time in lengthened work sessions, and b) to investigate the effect of feedback on productivity and persistence over time in lengthened work sessions. A series of post-study questions were included in the study to determine participants’ opinions about the assigned goal level, and to determine whether participants followed the assigned goals or set their own.

7.1 Goal Level and Persistence

The effectiveness of challenging goals has been well documented; however, it is unclear how hard a goal should be to result in maximum performance (Locke & Latham, 1990). An empirical question that has yet to be reliably answered is how far a goal can be stretched before performance begins to deteriorate. See, Heath and Fox (2006) argued that ‘stretch’ goals may improve mean performance, yet, for some individuals the introduction of a stretch goal may lead to a reduction in performance. These authors asserted that it is necessary to examine individual variance in
performance to examine the effect of unattainable goals. In a study investigating effort and persistence in the presence of a marginally unattainable goal and an extremely unattainable goal, See et al. found that participants exerted greater effort, and persisted longer, with a marginally unattainable goal. These authors argued that an extremely unattainable goal will not motivate persistence. Moreover, results of the See et al. study illustrated that examination of individual-level performance can supplement group results. In the extremely unattainable goal condition, the lower performance of the majority of participants was offset by the high performance of the top 15% of the distribution. They suggested that average performance for difficult goals may sometimes be a result of a small proportion of high performing individuals, even though the majority of individuals are performing poorly with higher goals.

Prior studies have employed difficult goals that have been determined either arbitrarily, or from supervisor’s and employee’s perceptions of goal difficulty (e.g., Steers & Porter, 1974). Ordonez, Schweitzer, Galinsky, and Bazerman (2009) claimed that one of the difficulties with goal setting is that a standard goal for a group of people will have varying difficulty for individuals. These authors warned that caution is required when deciding a ‘specific difficult’ goal. Fellner and Sulzer-Azaroff (1984) suggested that an alternative approach is to relate goal level to baseline performance. This ensures that a ‘difficult goal’ is one that is difficult in comparison to baseline performance for each individual. Few studies have examined baseline performance prior to the assignment of goals; however, Latham and Baldes (1975) recorded and utilised baseline performance in order to set a difficult goal to increase the weight of loaded trucks, with a group of loggers. The loggers were instructed to “do their best” for a period of three months, and a goal was chosen based on this data, to increase from an average of 60% net weight to 94%. Performance improved in the specific difficult goal condition when compared to the “do your best” condition. Although studies have reliably shown a significant improvement in performance in the presence of a high goal compared to a low goal, examining the effect of a high goal in comparison to baseline performance allows for prescription of a goal level directly related to baseline levels of performance. Additionally, this design allows for manipulation of goal level based on baseline performance, and may provide a point at which performance begins to deteriorate in the presence of a goal that is too high.
According to Fellner and Sulzer-Azaroff (1984), goals function as antecedent stimuli and meeting a goal can function as reinforcement. These authors suggested that goals should not be impossible to attain. When an employee repeatedly fails to meet a goal (i.e. does not contact reinforcement), the goal may signal non-reinforcement and extinction of the goal-directed behaviour may occur. This account fails to explain why in the cognitive literature, higher goals have been found to lead to higher levels of performance. O’Hora and Maglieri (2006) proposed that achieving goal levels periodically is necessary in order to maintain performance. According to this RFT model, the more difficult a goal is, the longer and harder an employee will work to decrease ‘less than’ comparison relations between self-statements about current performance, and the goal statement. However, O’Hora and Maglieri suggested that the ‘less than’ relations between current level of performance and the goal statement must decrease “predictably and to a sufficient degree contingent upon task-relevant behaviour” (p. 152). If an unattainable goal has been assigned that is beyond the reach of the employee (no matter how ‘well’ the employee performs he will not meet the goal), the ‘less than’ relations between current performance and the goal level will not sufficiently decrease contingent upon task behaviour. O’Hora and Maglieri argued that in this case, the goal statement will not establish control over the employee’s behaviour. Unattainable goals may give rise to high levels of performance, but the level of behaviour should decrease over time because reinforcement cannot be obtained. The aim of the current study was to investigate this possible extinction of goal-directed behaviour in the presence of an unattainable goal.

7.2 Feedback and Persistence

Among goal setting theory the assumption is that feedback directs behaviour towards the goal and therefore motivates persistence (Early, Northcraft, Lee, & Lituchy, 1990). Vance and Colella (1990) examined the effects of two types of feedback, goal-discrepancy feedback and performance-discrepancy feedback on a number of goal setting variables, including goal acceptance, setting of personal goals, and performance. Before beginning each trial, participants were asked to record their goal-discrepancy feedback, by subtracting their performance level from the assigned goal level, and their performance-discrepancy feedback, by subtracting their performance on the current trial from performance on the previous trial.
Results revealed that as goal difficulty increased, the effect of goal-discrepancy feedback on acceptance decreased, while the effect of performance-discrepancy feedback on acceptance increased. Participants who received larger goal-discrepancy feedback were more likely to reject assigned goals than participants who received smaller discrepancies. This has implications for the study of persistence. If a participant ‘rejects’ a goal, then it is likely that responding will decrease. Zetik and Stuhlmacher (2002) have highlighted that goal abandonment should be a primary focus when attempting to pinpoint an optimal goal level for greater performance.

Medway and Venino (1982) examined the effect of performance feedback on persistence with children, using a cognitive string design task. Participants in the feedback group exhibited higher levels of persistence than participants in the no feedback group, completing more tasks and spending more time on task. The goal assigned in this study was a loose “do your best” goal, rather than a specific unattainable goal. Schunk (1983) investigated the effects of ability feedback and effort feedback on performance and persistence with children on a subtraction task. Schunk proposed that delivering feedback on past failures (effort feedback) should motivate higher performance and persistence. Results showed that both ability and effort feedback improved performance in comparison to a no feedback group; however, no significant effects of feedback were found for persistence scores. This study demonstrated that feedback did not significantly affect persistence with a moderately difficult, non-specific, attainable goal. Research investigating the effects of feedback on persistence has generated conflicting results, and a primary aim of the current study was to add to the limited research, and extend the research with the addition of a specific unattainable goal.

According to O’Hora and Maglieri’s (2006) model, goal setting transforms the function of feedback statements such that feedback statements reinforce higher levels of performance. Feedback in relation to task performance can be self-stated or externally provided. Externally provided feedback leads to self-statements about current level of performance, and performance and persistence are increased due to the derived reinforcing functions of feedback. In this case, if a challenging goal is provided, and participants are moving sufficiently closer to the goal level, feedback will lead to increased self-statements about current performance, and performance will persist or increase. However, in the presence of an unattainable goal, feedback may lead to self-statements that highlight inadequate progress, such that comparison
relations between current performance level and the goal statement may not sufficiently decrease. As such, feedback may not function as derived reinforcement, and decreased persistence may be observed with participants who receive feedback in the presence of an unattainable goal. That is, if an individual is not making sufficient progress towards a goal, knowledge of performance might encourage the individual to give up as that individual is not “making it” towards the goal.

7.3 Persistence over Time

Typically, when goal setting interventions are introduced to a workplace they are intended to be in place for an extended period of time. However, the vast majority of laboratory research on goal-directed behaviour has examined the effects of goal statements on a single task, and mean performance is usually reported (Austin & Vancouver, 1996; Latham, 2003; Latham & Locke, 1979). Such research neglects the dynamic nature of goal-directed behaviour because productivity in work settings requires persistence both within and across work sessions. Laboratory studies investigating persistence with an unattainable goal tend to take place over short periods of time, thus possible extinction effects resulting from the provision of unattainable goals cannot be observed. For example, Garland (1982), in a replication of Locke’s (1964; as cited in Garland, 1982) study, manipulated goal level in 1-minute sessions in order to compare performance differences between goal levels. Performance was highest in the high goal condition, and Garland suggested that participants persisted, as the highest performance difference was observed in the final trial. However, the study consisted of fifteen 1-minute trials, so participants were expected to persist for no longer than fifteen minutes. It is difficult to generalise results of these studies to field settings, when the majority of laboratory studies involve such short sessions. On the other hand, the majority of field studies that have taken place over longer time periods have utilised difficult but attainable goals (Garland, 1983), thus the effect of unattainable goals on performance has not been observed in field studies. Provided that goal attainment serves as derived reinforcement, it is unlikely that extinction effects will be observed when difficult but attainable goals have been assigned.

Researchers have investigated the relationship between goals and time in relation to strategy search (Earley, Connolly, & Ekegren, 1989) and information seeking (Durham, Locke, Poon, & McLeod, 2000), yet few studies have examined
the effect of an unattainable performance goal on persistence over time. A number of studies support the assertion that challenging goals lead to employees working longer and harder on a task (Locke & Latham, 1990). However, as noted earlier, field studies typically employ challenging yet attainable goals, and few studies have investigated whether following challenging goals will ‘seem beneficial’ or lead to persistence over time (Fried & Slowik, 2004). Bar-Eli, Tenenbaum, Pie, Btesh, and Almog (1997) suggested that within the area of sports research, time periods employed to examine the effect of unattainable goals on performance have been too short. Fried and Slowik (2004) suggested that the role of time should be incorporated into goal setting theory, and suggested that laboratory studies should focus on how long a challenging task remains challenging to an individual. In this way, it might be possible to match challenging tasks to particular performers, resulting in maximum persistence. These authors suggested that performance will deteriorate over time if the individual is engaged in a challenging goal over an extended period of time, without a break period. Similarly, Bar-Eli et al. suggested that the time period necessary to attain a difficult goal has yet to be investigated, and differing goal levels may interact with the time required for goal attainment, to affect performance.

The aim of the current study was to examine persistence in the presence of an unattainable goal over time. Sessions were lengthened in order to investigate the effect of a high unattainable goal on persistence in an extended work interval. Additionally, the effect of feedback on both performance and persistence over a longer work session was investigated. In the current study, goals were assigned contingent upon baseline levels of performance. If participants performed at a high level in baseline, then they were assigned a goal level that would not be attainable in the time allotted for the task. Goal setting researchers have predicted that performance will ‘level off’ as the limit of ability, or performance ceiling has been reached (Locke & Latham, 1990), and it was anticipated that this would be observed for individuals who displayed high rates of responding in baseline.

7.4 Method

7.4.1 Participants

Sixty participants, ranging in age from 16 to 53 years (M age = 20.12) took part in the study; 43 females and 17 males. Participants were first year and second
year undergraduate psychology students at the National University of Ireland Galway, recruited through an online university system. Participants earned course credit for participating in the study.

7.4.2 Apparatus and setting

The apparatus and setting were identical to those used in Study 1. See page 39 for a detailed description.

7.4.3 Design

The experiment tested the effects of an unattainable goal on task performance over time. A single subject AB design was used, which consisted of a baseline condition in which no goal was assigned, and four goal conditions, in which an unattainable goal was assigned. The goal level was chosen for each participant based on baseline performance, and the same goal level was assigned for each of the four goal conditions. A reversal design was not employed in this study, as reversal effects were not observed in Studies 1, 2 and 3, and repeated exposure to the high goal level without removal of the goal was a necessary component of the current design.

Dependent variables. Task performance was measured in two ways. Productivity, defined as increases in performance relative to baseline performance, was calculated by dividing each participant’s goal condition performance by baseline performance, for each goal condition. Persistence, defined as trend across goal conditions, was measured by calculating slope value across goal conditions for each participant. A negative slope was indicative of a decreasing trend, and a positive slope or slope of 0 indicated persistence.

Independent variables. There were two independent variables in the study. Goal constituted the first independent variable, and was presented in two levels: (a) no goal, and (b) high (unattainable) goal. For each participant, the high goal level was set at 160% of baseline performance. In order to calculate this goal level, the mean correct response per minute was calculated for the last five minutes of baseline. This score (mean response per minute) was multiplied by 1.6 in order to determine a goal level per minute and then multiplied by twelve in order to calculate a goal level for the twelve minute goal sessions. The goal of 160% was chosen following a pilot study (36% of the piloted participants attained a goal of 150%). Feedback, the second independent variable, was present for 30 participants (feedback) and absent for 30 participants (no feedback). Feedback was provided in
two forms. Similar to previous studies, a count-down timer on the task screen provided ongoing feedback about time remaining in the session and a counter displayed the cumulative amount of patient data they had inputted correctly in that session.

**7.4.4 Procedure**

The task used was identical to the one used in Studies 1 and 2. The screen contained fictional medical information related to an ECG reading, and participants were required to examine the data provided for each patient and decide whether it was within range or out of range for each patient. Figure 7.1 shows the work task screen. The labels ‘1’ and ‘2’ indicate where the feedback was present on the screen for the feedback group. The screen was blank at the labelled points for the no feedback group.

![Figure 7.1](image.png)

*Figure 7.1. Work task screen. The numbers in the figure indicate the two forms of feedback presented to the feedback group.*

For the feedback group, if the patient’s data was entered correctly the number at the bottom of the screen increased by one (labelled ‘1’ in Figure 7.1), in the ‘total
correct in this period’ box. Additionally, for the feedback group, a countdown clock was visible on screen throughout each work period (2). These sources of feedback were absent for the no feedback group.

As with previous studies, at the end of each condition, feedback was presented to the participant indicating how many patients were entered correctly during that condition, and how many were entered incorrectly. Participants in both the feedback group and the no feedback group were presented with this screen.

**Training.** Training was carried out as in Study 1 (see page 41 for a detailed description), with two exceptions. Training consisted of two 30-second sessions identical to the baseline condition. Additionally, for the no feedback group, feedback was not present on the task screen during training.

**Testing.** Testing lasted a total of 60 minutes, and consisted of a 12-minute baseline condition and four 12-minute goal conditions. For both the feedback group and the no feedback group, conditions proceeded as follows:

**Baseline.** Participants classified the data as stated previously (see page 42 for description). At the end of the baseline condition, feedback was provided on the number of correct and incorrect entries in the condition.

**High goal.** When presented with the goal, participants were given instructions from a virtual manager, Bob, who asked participants to input a certain number of patients’ data. This number was determined from the participant’s baseline performance, and was calculated at 160% of baseline performance. The manager’s instruction was given via a pop-up window on the screen, and the instruction remained on the task screen throughout the condition. Feedback on number of correct and incorrect entries was presented at the end of each goal condition. The 12-minute goal condition was presented four consecutive times to the participant (48 minutes in total).

A series of post-study questions were administered at the end of the study to determine whether participants followed the assigned goals, and whether or not participants felt they could reach their assigned goal (Appendix E). Participants had the option to take a break between conditions. The experimenter remained outside the room for the duration of the testing, and at the conclusion of the study, the experimenter debriefed the participant on the goal of the study, and thanked the participant for taking part.
7.5 Group Results

Ten participants were removed from the study. Eight of these met the assigned goal and two participants exhibited such low baseline scores that they were assigned the lowest goal level. The lowest goal level was removed entirely as four out of six participants in the group met the goal. As expected, mean performance was significantly higher in the first goal condition than in the baseline condition, $t(49) = -12.18$, $p < 0.001$, indicating that the provision of a goal significantly increased performance. To calculate performance increases as they related to baseline levels of performance, scores in each goal condition were divided by the baseline score for each participant. This allowed for a comparison of performance while accounting for variability in baseline performance, and subsequent differing goal levels across participants. Table 7.1 displays mean performance increases from baseline, for the feedback group and the no feedback group. For the feedback group, mean performance increased further from baseline levels in each progressive goal condition. For the no feedback group, mean performance increase was lower in the third goal condition than in the second goal condition, and increased again in the fourth goal condition.

<table>
<thead>
<tr>
<th>Goal</th>
<th>Feedback Group</th>
<th>No Feedback Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$ $(SD)$</td>
<td>$M$ $(SD)$</td>
</tr>
<tr>
<td>Goal 1</td>
<td>1.18 (0.12)</td>
<td>1.17 (0.10)</td>
</tr>
<tr>
<td>Goal 2</td>
<td>1.23 (0.15)</td>
<td>1.26 (0.17)</td>
</tr>
<tr>
<td>Goal 3</td>
<td>1.27 (0.20)</td>
<td>1.22 (0.18)</td>
</tr>
<tr>
<td>Goal 4</td>
<td>1.30 (0.19)</td>
<td>1.29 (0.16)</td>
</tr>
</tbody>
</table>

Baseline performance did not significantly differ between the feedback group and the no feedback group, $t(48) = -1.13$, $p = 0.27$. A 2 (feedback group) x 4 (phase) mixed ANOVA was conducted to examine differences in performance between the feedback group and the no feedback group across the four goal conditions. Again, goal condition scores were divided by the baseline score for each participant, to determine performance increases as they related to baseline performance. Results showed no significant difference in performance between the feedback group and the
no feedback group, $F(1,48) = 0.03, p = 0.87, \eta^2_p = 0.001$. As expected, a main effect of phase was observed, $F(2.41,115.63) = 13.71, p < 0.001, \eta^2_p = 0.22$, indicating that performance was significantly different across phases. No group x phase interaction was observed, $F(2.41,115.63) = 1.62, p = 0.20, \eta^2_p = 0.03$. Figure 7.2 displays mean percentage of performance for each condition relative to baseline performance.

Baseline performance is represented in the figure as 100%, and condition scores are the percentage increase from baseline (condition score divided by baseline score and multiplied by 100).

![Figure 7.2](image.png)

*Figure 7.2.* Performance per condition represented in percentage increase from baseline performance (100%). The goal of 160% of baseline is not depicted on the scale. Error bars represent standard error of the mean.

As can be seen in the figure, performance increased throughout the goal conditions for the feedback group. For the no feedback group, performance increased in Goal 1 and Goal 2; however, performance decreased in Goal 3 for this group, before increasing again in Goal 4.

Paired samples *t*-tests were conducted for each group, to investigate significant differences in performance between conditions, for both the feedback group and the no feedback group, in order to investigate for persistence. Hochberg’s (1988) procedure for multiple tests of significance was used for both the feedback and the no feedback group, and the most conservative *p*-value (found in the no
feedback group) was adopted for both groups. Table 7.2 displays results of paired samples t-tests for the feedback group (critical p-value = 0.01).

Table 7.2

<table>
<thead>
<tr>
<th>Goal 1</th>
<th>Goal 2</th>
<th>Goal 3</th>
<th>Goal 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2.55</td>
<td>-2.87*</td>
<td>-4.18*</td>
<td>-1.75</td>
</tr>
<tr>
<td></td>
<td>(p = 0.017)</td>
<td>(p = 0.008)</td>
<td>(p &lt; 0.001)</td>
</tr>
</tbody>
</table>

Goal 2 | Goal 3 | Goal 4 |
-------|--------|--------|
-1.75  | -3.24* | -2.20  |
| (p = 0.09) | (p = 0.003) | (p = 0.04) |

Note. Hochberg’s (1988) procedure for multiple tests of significance was used to control for multiple comparisons (each for 25 degrees of freedom, critical p-value = 0.01).

* p < 0.01

For the feedback group, performance did not significantly increase between consecutive goal conditions; however, significant increases were observed between the first goal condition and the third goal condition, between the first goal condition and the fourth goal condition and between the second goal condition and the fourth goal condition. This indicates that mean performance increased throughout the study.

Table 7.2 displays the t-values for the no feedback group (critical p-value = 0.01). Significant differences in performance were observed between Goal 1 and Goal 2, and Goal 1 and Goal 4; however, no further significant differences were observed. As can be seen in Figure 7.2, performance was higher for this group in the second goal condition than in the third goal condition. This may indicate a decrease in persistence in the third goal condition.
Table 7.3

*t-values Obtained in Planned Comparison t-tests, Comparing Performance
Increases in Each Goal Condition as they Related to Baseline Levels, for the No
Feedback Group

<table>
<thead>
<tr>
<th></th>
<th>Goal 2</th>
<th>Goal 3</th>
<th>Goal 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal 1</td>
<td>-3.99* (p = 0.001)</td>
<td>-1.52 (p = 0.14)</td>
<td>-4.24* (p &lt; 0.001)</td>
</tr>
<tr>
<td>Goal 2</td>
<td>2.00 (p = 0.06)</td>
<td>-0.81 (p = 0.43)</td>
<td></td>
</tr>
<tr>
<td>Goal 3</td>
<td></td>
<td>-2.19 (p = 0.04)</td>
<td></td>
</tr>
</tbody>
</table>

* *p < 0.01

Note. Hochberg’s (1988) procedure for multiple tests of significance was used to control for multiple comparisons (each for 23 degrees of freedom, critical *p*-value = 0.01).

To further investigate persistence between the feedback group and the no feedback group, slope values were calculated for each participant. Overall, ten participants (20%) demonstrated a negative slope across the goal conditions; 15% of the feedback group and 25% of the no feedback group demonstrated this decreasing trend. An independent samples *t*-test was conducted to examine differences in mean slope between the feedback group and the no feedback group. No significant difference was observed, *t*(48) = -0.76, *p* = 0.45, suggesting that mean slope did not significantly differ between the feedback group and the no feedback group throughout the study.

One difficulty with investigating group results in the current study was that the assigned goal level was chosen dependent upon baseline performance. For this reason, it was expected that performance variance would be evident between each goal level group. Single case analyses were conducted to investigate performance and persistence in each goal group.

7.6 Single Case Results

Contingent upon rate of baseline performance, participants were assigned one of six possible goal levels. Those assigned the lowest goal level of 58 were removed from the study due to low levels of baseline responding, and four out of six participants in this group met the assigned goal. Additionally, two participants from
the 77 goal group and two participants from the 96 goal group were removed as they met the assigned goal. Table 7.4 displays mean performance for each goal level group, along with standard deviation (SD), and the sample size (n) for each group.

Table 7.4

Mean Performance (standard deviation in parenthesis) per Goal Condition, for Each of Five Assigned Goal Levels

<table>
<thead>
<tr>
<th>Goal Level</th>
<th>n</th>
<th>Baseline M (SD)</th>
<th>Goal 1 M (SD)</th>
<th>Goal 2 M (SD)</th>
<th>Goal 3 M (SD)</th>
<th>Goal 4 M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>77</td>
<td>17</td>
<td>47.12 (3.20)</td>
<td>56.47 (5.70)</td>
<td>60.65 (6.60)</td>
<td>58.53 (7.63)</td>
<td>60.82 (8.59)</td>
</tr>
<tr>
<td>96</td>
<td>20</td>
<td>58.35 (4.75)</td>
<td>69.90 (7.57)</td>
<td>73.45 (10.60)</td>
<td>74.40 (12.60)</td>
<td>78.25 (11.07)</td>
</tr>
<tr>
<td>115</td>
<td>7</td>
<td>70.43 (4.39)</td>
<td>77.57 (2.94)</td>
<td>82.43 (5.91)</td>
<td>82.29 (10.69)</td>
<td>89.86 (8.01)</td>
</tr>
<tr>
<td>134</td>
<td>3</td>
<td>75.00 (1.00)</td>
<td>82.33 (4.04)</td>
<td>84.67 (13.01)</td>
<td>93.67 (12.50)</td>
<td>93.67 (12.66)</td>
</tr>
<tr>
<td>154</td>
<td>3</td>
<td>91.00 (1.00)</td>
<td>101.33 (2.08)</td>
<td>103.00 (2.65)</td>
<td>101.00 (9.17)</td>
<td>100.67 (11.02)</td>
</tr>
</tbody>
</table>

Each goal level was examined separately in order to investigate performance and persistence per goal level, accounting for baseline performance. Performance plots for participants in each goal group are presented in Figure 7.3. Data paths with filled circle data points represent participants who received feedback, and paths with filled square data points represent participants who did not receive feedback. To examine trend, slope values across goal conditions were examined to determine progress or deterioration of performance throughout the study. Negative slope values were indicative of deterioration of performance, while positive slope values and slope values of 0 were indicative of persistence. Maximum score was pinpointed for each participant to determine in which condition the highest level of responding occurred. Low sample size in each goal group did not allow for Chi Square analyses. Finally, participants were issued a series of questions following the study, and responses were reported in the analyses of each group level.
7.6.1 Goal level 77

Seventeen participants were assigned the goal level of 77; seven from the feedback group and ten from the no feedback group (Figure 7.3, plot a). For six participants (35%), a decreasing trend was observed across goal conditions. This decreasing trend was evident for two participants in the feedback group and four in the no feedback group. An increasing trend was observed for ten participants (59%), and trend was stable for one participant (6%). Observation of maximum score indicated that for 47% of this group, maximum score was evident earlier in the study and decreases in performance were evident in subsequent conditions. The remaining 53% of participants either obtained maximum score in the final goal condition, or obtained maximum score prior to the final goal condition and maintained this score for the final goal condition. In response to post-study questions, 76% of participants reported either following the assigned goals or combining assigned goals with self-setting. Thirty-eight percent of these participants were in the feedback group and 62% were in the no feedback group. Fifty-three percent of participants reported that they felt they could reach the goal. Of the participants who reported this, 33% were from the feedback group and 67% were from the no feedback group.
Figure 7.3. Plots displaying individual performance per goal level, when goal condition performance was divided by baseline performance. Filled circle data points represent participants in the feedback group, and filled square data points represent participants in the no feedback group.
7.6.2 Goal level 96

Twenty participants were assigned the goal level of 96; eleven from the feedback group, and nine from the no feedback group (Figure 7.3, plot b). For this group, only two participants (10%) demonstrated a decreasing trend throughout the goal conditions; one from the feedback group and one from the no feedback group. For the remaining eighteen participants (90%), an increasing trend was observed, indicating that the majority of participants in this group persisted across conditions. Overall, for eight participants (40%), maximum performance was achieved before the final goal condition and decreases in performance were observed subsequently. For the remaining twelve participants (60%), maximum performance was reached in the final goal condition, or before the final goal condition and maintained through subsequent conditions. When asked whether they followed the assigned goal, 40% of participants reported that they did (or a combination). Thirty-eight percent of these participants were from the feedback group and 62% were from the no feedback group. Fifty percent of participants stated that they felt they could reach the goal; 40% of this group were from the feedback group, and 60% from the no feedback group.

7.6.3 Goal level 115

Seven participants were assigned the goal level of 115; three from the feedback group and four from the no feedback group (Figure 7.3, plot c). A decreasing trend in performance was observed for only one participant in this group (14%). This participant was in the no feedback group. For the remaining six participants (86%), an increasing trend was observed. Maximum score was observed in the final goal condition for six participants (86%), and in the second goal condition for the remaining participant (14%). Review of slope values and maximum score indicates that performance was consistently high for this group, and consistently increased for the majority of participants. Participants in this group exhibited high rates of baseline performance, leading to assignment of the high goal of 115; and for 86% of this group, the assignment of an unattainable goal did not negatively affect performance. For this group, 71% reported following the assigned goal, or employing a combination of goal following and self-setting; 40% of this group were from the feedback group and 60% from the no feedback group. In keeping with high levels of performance with this group, 29% of participants reported that they believed they could reach the goal.
7.6.4 Goal level 134

Only three participants were assigned the goal level of 134 (Figure 7.3, plot d). The participants in this group were all from the feedback group. Participants in this group displayed high rates of responding during baseline, and it was expected that a ceiling would be reached early in the goal conditions. That is, it was expected that performance would increase upon introduction of the goal, but would either remain stable or decrease in subsequent conditions as participants could not improve upon their high rate of responding. However, all participants in this group displayed an increasing trend across goal conditions. Participants persisted, even when assigned a goal level that was substantially greater than baseline performance. Maximum score was obtained in the final condition for one participant (33%) and in the third goal condition for two participants (67%). Interestingly, only one participant (33%) in this group reported following the assigned goal. The remaining two participants (67%) reported setting their own goals throughout the study. Additionally, two participants (67%) reported believing that they could reach the goal. This is in keeping with high levels of persistence; however, mean performance for this group did not approach goal level (see Table 7.4), thus it is surprising that two of the three participants reported feeling that they could reach the goal.

7.6.5 Goal level 154

Three participants were assigned the highest goal level of 154 (Figure 7.3, plot e). Again, it was expected that these participants would reach a ceiling of responding due to high rates of baseline responding. Two of these participants were from the feedback group and one was from the no feedback group. One participant (33%) displayed a negative trend across goal conditions. For this participant, maximum score was observed in the first goal condition, and maintained for the second goal condition; however, scores decreased in subsequent goal conditions. Interestingly, this participant is the only participant in this group who reported following the assigned goal, and this participant reported that he did not believe he would reach the goal. For the remaining two participants (67%) a positive trend was observed throughout the goal conditions. Maximum score was observed in the third goal condition for one participant, and in the final goal condition for the remaining participant. Both of these participants reported setting their own goals throughout the study, and one of the participants (in the feedback group) reported that she believed that she could reach the goal level.
7.6.6 Performance variance

Researchers have proposed that as goal difficulty increases, so too does performance variance; however, at some point a performance ceiling will be reached and variance should be less obvious. Participant’s data were plotted according to goal level to examine performance variance per goal level (Figure 7.3). The range of performance increase for the goal level 77 group was from 0.82 to 1.63. That is, the lowest point of performance was 0.82 and the highest was 1.63 (Figure 7.3, plot a). For the goal level 96 group (plot b), performance ranged from 0.71 to 1.72. This responding was similar to the 77 goal group; however, a slightly larger range indicates slightly more variance in performance for this group. For the 77 and 96 groups, range of performance was overall similar, with a high degree of performance variance. As goal level increased, performance variance increased slightly, with a range of 0.81 in the goal level 77 group and 1.01 in the goal level 96 group. As can be seen in Figure 7.3, within both groups, one participant exhibited low levels of responding throughout the study. When this participant was removed for each group, range continued to be higher in the 96 goal group than in the 77 goal group.

It was expected that for the higher goal levels, due to high levels of baseline performance, a ceiling on performance would be reached, thus less performance variance would be observed for these groups. For the goal level 115 group, performance ranged from 0.92 to 1.47, indicating less performance variance than previous groups, and less increase from baseline performance. The three participants in this group who received feedback displayed greater increases in performance than the participants who did not receive feedback (see plot c). For the 134 group, performance ranged from 0.96 to 1.46, similar to the 115 group. All participants in the 134 group received feedback, suggesting that feedback during baseline may have enhanced performance resulting in the assignment of a high goal level. For the 154 group, performance ranged from 0.98 to 1.18, the overall lowest range of performance variance across all groups. It appears that for these participants, high levels of performance were reached in baseline, resulting in an inability to increase performance above these levels. Reduced observed variance in these higher goal groups may be a result of sample size. Only three participants were assigned the 134 goal and only three were assigned the 154 goal.
7.7 Discussion

Findings from the current study highlighted variability in responding with the provision of high goals that were prescribed dependent upon baseline performance. Initial evidence of the variability of responding was observed with the prescription of six goal levels (one of these was removed from the analyses). Goal level was calculated at 160% of baseline performance, and variability in baseline responding across participants resulted in the prescription of six differing goal levels. Investigation of slope values provided evidence that participants persisted with the task over time. Overall, only a minority of participants (20%) demonstrated a negative trend in performance throughout the study. It was suggested that lengthening the work sessions would result in a decrease in persistence; however, results demonstrated that the majority of participants persisted despite the lengthened sessions. Analyses of participants in each goal level revealed differing patterns of performance that were inconsistent with group results.

Results revealed that no significant differences were found in performance or persistence between the feedback and no feedback groups, suggesting that feedback did not significantly affect persistence when an unattainable goal was assigned. However, individual analyses revealed differing patterns of persistence across groups. For the feedback group, performance increased across conditions; significant increases were observed between the first goal condition and the third goal condition, between the first goal condition and the fourth goal condition and between the second goal condition and the fourth goal condition. For the no feedback group, significant differences in performance were observed between the first goal condition and the second goal condition, and the first goal condition and the fourth goal condition. O’Hora and Maglieri (2006) suggested that feedback may function to maintain goal-directed behaviour. Figure 7.2 provides some evidence in support of this position. As can be seen in the figure, in the third of the four goal conditions, performance dropped noticeably in the no feedback group relative to the feedback group. In the fourth goal condition, performance in the no feedback group increased again. This unusual pattern may have been due to the fact that participants were aware that the fourth condition was the last one and that they had one final opportunity to attempt to reach the goal. That is, understanding that the fourth phase was the last phase, may have functioned as an establishing operation (EO) that
increased the reinforcing functions of self-generated feedback or completing the study, thus increasing performance.

Previous studies investigating the effects of feedback on persistence have produced inconsistent findings. Medway and Venino (1982) assigned a non-specific or “do your best” goal, and found that feedback significantly affected persistence, whereas Schunk (1983) assigned a challenging but attainable goal, and found that feedback did not affect persistence. The current study adds to the empirical research by utilizing a specific, unattainable goal, and counter to studies utilizing loose goals, the group results that emerged from the current study demonstrated that feedback did not significantly affect persistence with a specific unattainable goal. Overall, 58% of participants reported following the assigned goal or combining goal following with self-setting. The majority of these participants were from the no feedback group (62%), suggesting that participants in the no feedback group were more likely to follow the assigned goal. Similarly, participants in the feedback group were less likely to follow the assigned goals. According to O’Hora and Maglieri (2006), feedback statements can reinforce goal-directed behaviour in the presence of goal statements (through transformation of function). If the participant in the feedback group was not working towards the goal statement (i.e. they set their own goal), feedback may not have functioned as derived reinforcement for goal-directed behaviour, resulting in no performance difference between the feedback and no feedback groups. A limitation of the post-study questionnaire is that a follow-up question was not administered to determine what type of goals participants were setting. It may have been the case that ongoing feedback prompted participants to set higher or lower goals depending on the goal condition and on goal attainment.

The current results highlight the necessity to examine baseline performance when assigning a high goal level. All participants were assigned a goal level based on 160% of baseline performance; however, participants who exhibited low levels of baseline responding persisted less with a high goal than participants who exhibited high levels of baseline responding. This result warrants discussion for two reasons. First, it was expected that high performers would reach a performance ceiling more rapidly than low performers, thus increases in performance would be observed less with participants in the higher goal levels. This was not evident, as high performers continued to progress throughout the study, and lower performers demonstrated decreased persistence. In the low goal level of 77, 35% of participants demonstrated
a decreasing trend. These participants exhibited relatively low rates of responding during baseline, hence were assigned a low goal level. As baseline performance increased (and thus higher goals were assigned), persistence appeared to increase. In the 96 goal group, almost all participants demonstrated persistence despite not attaining the goal. Interestingly, half of this group reported that they believed they could reach the goal, in line with the increased persistence. In the 115 goal group, only 14% of participants demonstrated a decreasing trend in performance, and maximum score was obtained by the majority of participants in the final goal condition. This is evidence that participants who were assigned this high goal level persisted, despite the unattainability of the goal. It may be the case that participants who exhibit high rates of baseline responding, are more likely to persist in the face of an unattainable goal. In the higher goal groups of 134 and 154, participants demonstrated persistence throughout; only one participant in the 154 group demonstrated a decreasing trend in performance. This suggests that, even if a performance ceiling had been reached, participants continued to work towards the goal. Interestingly, in the two highest goal level groups, only 33% of participants reported following the assigned goals, and one of these participants demonstrated a decreasing trend in performance.

A second reason for the importance of baseline measures of responding can be seen when the current results are examined in light of those of See et al. (2006). In the current study, a comparison of slope values across goal conditions illustrated that a higher percentage of participants exhibited decreasing trends in performance in the low 77 goal group. This suggests that participants who exhibited moderate to high levels of baseline performance, thus were assigned a moderate to high goal level, persisted to a greater extent than participants who exhibited low levels of baseline responding. See et al. found that participants persisted further in a marginally unattainable goal condition than in an extremely unattainable goal condition. In the current study, participants persisted less in lower unattainable goal conditions differing somewhat from the See et al. study. However, in the See et al. study, participants were assigned to one of two arbitrarily chosen unattainable goals, whereas in the current study, baseline performance dictated the goal level that was presented. It may be the case that low performance during baseline was an indicator that participants would persist less when assigned an unattainable goal.
Analysis of performance variance in each goal level group further reveal results that differ somewhat from previous studies. See et al. (2006) found greater performance variance among participants who were assigned an extremely unattainable goal than among those who were assigned a marginally unattainable goal. With the current study, it is suggested that prescribing a goal level based on baseline performance is a parsimonious explanation for the performance variance observed. Analysis of Figure 7.3 revealed that performance variance was more evident in the lower goal level groups (77 and 96) than in the higher goal level groups (115, 134, 154). A possible reason for this is that participants who received the lower goal levels exhibited relatively low levels of responding during the baseline condition, and there was room in the goal conditions to significantly improve performance. Similarly, overall low performers were assigned to a low goal level, and for some of these participants progress towards a goal may not have functioned as derived reinforcement for goal-directed behaviour, resulting in overall low levels of responding throughout the study. Participants in the high goal levels exhibited high levels of responding in baseline, and a performance ceiling may have been reached in the goal condition in which it was not possible to respond at higher levels, thus less evidence of performance variance.

Analysis of maximum score for each participant in each goal level revealed that for 42% of participants, maximum score was obtained before the final goal condition, and performance decreased in subsequent conditions. That is, for these participants, the highest level of performance occurred prior to the final goal condition. This highlights the importance of conducting individual analyses. See et al. (2006) found that individual effects of goal level on performance were masked in group analyses, and analyses of the current results support this. See et al. suggested that results of their study add support to cautions against the use of stretch goals in organisations. They suggested that as goal difficulty increases, variance in performance increases, due to variability in ability. Results of the current study add a further caution. Overall results revealed that a measure of baseline ability may be a necessary component in choosing a high goal that will result in maximum performance.

7.7.1 Considerations

Work sessions were lengthened in the current study to examine persistence over extended periods of time. Studies 1, 2 and 3 incorporated 4-minute work
sessions, whereas sessions in the current study were 12-minutes in length. Lengthening the work sessions did not appear to significantly affect persistence, and sessions that are extended further may be necessary. The importance of determining a point in time when performance deteriorates in the presence of an unattainable goal has implications for work settings, and has been discussed in the literature (Fried & Slowik, 2004; See et al., 2006); however, empirical research has yet to successfully pinpoint an optimal goal level. Fried and Slowik (2004) suggested that laboratory studies should focus on how long a challenging task remains challenging to an individual. Extending work sessions further, along with manipulating goal level, may provide further insight into how an optimal goal level can be determined.

In the current study, feedback did not significantly affect performance or persistence. Prior research has demonstrated the beneficial effects of feedback on performance when a goal has been set (e.g. Becker, 1978; Erez, 1977; Locke, 1967; Reber, Wallin, & Chhokar, 1990). In the current study, the unattainable goal may have been so high that participants were unable to attend to feedback, and therefore no significant affect on performance was observed. Study 5 will investigate a feedback seeking condition in which participants are actively required to seek feedback throughout the work session, while an unattainable goal is systematically increased. This will provide evidence that participants are attending to the feedback, or that feedback is functioning as a reinforcer for goal-directed behaviour. Additionally, the current study demonstrates that single case analysis is beneficial in the examination of the effects of an unattainable goal on persistence. Future studies might benefit from supplementing group results with single case analyses. Findings within the feedback literature have been conflicting (Kluger & DeNisi, 1996), and additional individual-level analyses may provide clarification for inconsistent group results.
Chapter 8 (Study 5): An Investigation of Performance, Persistence and Feedback Solicitation in the Presence of Ascending and Descending Unattainable Goals

Results of Study 3 revealed that when provided with a choice to seek feedback throughout a task, only 56% of participants chose to view feedback four times or more. Additionally, participants sought feedback more frequently in a low goal condition and in a no goal condition, than in a high goal condition. The first aim of Study 5 was to manipulate a high, unattainable goal level in order to examine the effect of increasingly unattainable goals and decreasingly unattainable goals on feedback solicitation. Study 3 examined feedback solicitation responses in the presence of a high goal that was based on pilot studies, and not on baseline performance. In the current study, the goal level was set at 150%, 160%, and 170% of baseline performance, for each participant. This allowed for an examination of differing unattainable goal levels on feedback solicitation. Results of Study 4 revealed that 80% of participants persisted when presented with a goal of 160% of baseline performance, over four 12-minute conditions. The second aim of the current study was to investigate the effect of an increasing sequence and a decreasing sequence of unattainable goal levels on productivity and persistence over time. Goal conditions were presented in this way in order to examine for extinction effects when an initially ‘extremely high’ unattainable goal was provided or when an initially ‘just out of reach’ goal was provided. If a goal is almost attainable, participants may persist in the presence of a subsequent higher goal due to a history of performing in line with the goal statement, whereas if a goal is initially extremely unattainable participants may not persist even when subsequent goal levels are less high but still unattainable. That is, reinforcement for progressing closer to the goal level may maintain goal-directed behaviour in a subsequent more difficult goal session, and the absence of reinforcement in an initially extremely high goal level may suppress responding in subsequent sessions. Work sessions were extended to 15 minutes, in order to examine the effect of unattainable goals on performance over extended work sessions.
8.1 Feedback Seeking

Study 3 demonstrated that participants chose feedback least often in a high goal condition, and most often in a low goal condition. Researchers have suggested that individuals are less likely to seek feedback when they believe that they are performing poorly, as the individual may not want to hear negative information around goal attainment (Ashford, 1986; Ashford & Tsui, 1991; Morrison & Cummings, 1992, Northcraft & Ashford, 1990). In contrast, Tuckey, Brewer, and Williamson (2002) found that participants reported that poor performance would lead to greater feedback seeking. Similarly, Ashford (1986) found that participants sought feedback to a greater extent following poor performance. Slowiak, Dickinson, and Huijema (2011) found no significant difference in feedback solicitation between an incentive condition and an hourly pay condition, despite the expectation that an incentive condition would lead to higher levels of feedback solicitation. These authors proposed that the cost of viewing feedback was higher in the incentive condition than in the hourly pay condition. From the perspective of O’Hora and Maglieri’s (2006) model, when a participant’s performance is not progressing sufficiently closer to a goal, feedback seeking may reduce. In the presence of an unattainable goal, ‘less than’ comparison relations between current performance and the goal level may not sufficiently decrease to function as derived reinforcement of goal-directed behaviour. In this case, participants may not choose to view feedback, as feedback statements signal that the participant is not progressing sufficiently toward the goal.

Ashford and Cummings (1983) proposed that an individual’s desire to reduce uncertainty is the primary determinant of feedback seeking. Typically, in the feedback seeking literature, it has been suggested that feedback is sought in situations in which an individual is uncertain about their role or work-related contingencies (Ashford & Cummings, 1985). Anseel and Lievens (2007) examined the effect of perceived uncertainty on desire for feedback using a self-report measure, and found a curvilinear relationship in which high and low reported levels of uncertainty led to increased desire for feedback seeking, when compared to moderate levels of uncertainty. The authors suggested that individuals seek to reduce uncertainty in situations in which there are high levels of uncertainty, and also to ‘self-verify’ that they are performing correctly in situations in which there are
low levels of uncertainty. From a behavioural perspective, when an individual has the option of a number of competing responses in which that individual can engage that may result in reinforcement (i.e. goal attainment), and feedback provides information about the correct response or the response that will result in greater reinforcement, then feedback-seeking behaviour should increase (as it will reduce ‘uncertainty’).

Results of Study 3 revealed that 73% of the participants who chose feedback chose score feedback more than time feedback. Self-reports indicated that participants chose feedback in order to determine whether or not they were reaching their goal, or to establish how many patients they had inputted. It was suggested that this provided provisional support for the assumption that participants who chose knowledge of score feedback were using this outcome feedback to compare performance to the goal level. The option to choose both score and time feedback was retained in Study 5 to examine whether participants would choose score feedback more than time feedback, in a longer work session, and with a sequence of increasing or decreasing unattainable goals. It was proposed that if participants chose to view knowledge of their score, this feedback would allow for reliable reinforcement of goal-directed behaviour when relations between current performance and goal level decrease. Ilgen and Moore (1987) suggested that the form of feedback presented should be equivalent to the goal, hence in a task in which a goal level has been prescribed, then feedback around number correct is more beneficial to participants than time remaining. However, results of self-reported data for Study 3 revealed that participants who reported choosing score and time feedback equally stated that they wanted to establish how many patients they had left to input, along with the time remaining in which to input. This suggests that these participants were relating both forms of feedback to the goal, as participants were required to attain the goal in a discrete time period, thus both forms of feedback may have operated as reinforcement. As a result, both forms of feedback were retained for the current study in order to investigate further whether participants would choose score and time feedback equally.

8.2 Performance and Persistence

Bar-Eli, Tenenbaum, Pie, Btesh, and Almog (1997) examined the effect of differing levels of goal difficulty on performance over time, with a sit-up task. The
differing goal conditions were classified as easy goals (10% improvement on baseline scores), difficult/realistic goals (20% improvement), unattainable goals (40% improvement), and “do your best” goals. Time periods were manipulated by assigning groups to four, six, and eight week practice trials. Results showed that the greatest performance gains were found in the difficult/realistic goal group, followed by the easy goal group. The authors noted that across all durations of trials, the difficult/realistic goal resulted in the highest level of performance gains when compared with the unattainable goal group. This study illustrated the positive effects of difficult/realistic goals on performance, and across the study, unattainable goals resulted in less performance gains than difficult/realistic goals.

Fellner and Sulzer-Azaroff (1984) suggested that goals should be reasonable enough for participants to come into contact with reinforcement, and once the goal has acquired discriminative and reinforcing properties, the goal level should be gradually and systematically increased. In the current study, goals were presented in ascending order of goal difficulty and descending order of goal difficulty in order to assess order of presentation on performance and persistence. According to the O’Hora and Maglieri (2006) model, provided that comparison relations between self-statements about performance and the goal level are decreasing sufficiently this will function as derived reinforcement for goal-direct behaviour. If an extremely unattainable goal is presented first, this derived reinforcement may not occur, resulting in reduced responding in that goal condition and possibly in subsequent ‘less unattainable’ conditions. In accordance with this model, the aim was to examine whether the presentation of unattainable goal levels in ascending or descending order would result in possible extinction of goal-directed behaviour. As with previous studies, a series of post-study questions were included to examine whether participants set their own goals, and to assess whether they found the goals challenging. Similar post-study questions have been utilised to assess whether participants ‘accept’ assigned goals (e.g., Bar-Eli et al., 1997).

8.3 Method

8.3.1 Participants

Thirty-five participants, ranging in age from 17 to 27 years ($M$ age = 19.00) took part in the study; 21 females and 14 males. Participants were first and second year undergraduate psychology students at the National University of Ireland.
Galway, recruited through an online university system. Participants earned course credit for taking part in the study, and ethical approval for the study was obtained through the University.

8.3.2 Apparatus and setting

The apparatus and setting were identical to those used in Study 1. See page 39 for a detailed description.

8.3.3 Design

The experiment tested the effects of goals on task performance and feedback solicitation over time, with the option to choose feedback. A single subject design (ABCD) was used, which consisted of a 15-minute baseline condition (A), followed by three 15-minute goal conditions (B, C and D). The order of presentation of goal levels was counterbalanced such that eighteen participants received the goal levels in ascending order (150%, 160%, 170%), and seventeen participants received the goal levels in descending order (170%, 160%, 150%).

Independent variables. The independent variable was goal, and was presented in four levels: (a) no goal, (b) 150% goal, (c) 160% goal, and (d) 170% goal. For each participant, each goal level was set at a percentage of baseline performance. In order to calculate this goal level, the mean correct response per minute was calculated for the last five minutes of baseline. For the 150% goal, this score (mean response per minute) was multiplied by 1.5 in order to determine a goal level per minute and then multiplied by fifteen in order to calculate a goal level for the fifteen minute goal session. The same calculation was used for the 160% goal and 170% goal except that mean response per minute was multiplied by 1.6 and 1.7 respectively. Goal levels were chosen at 150%, 160% and 170%, as previous studies revealed that 150% and 160% may be met by some participants who initially exhibited low rates of baseline responding; however, 170% should be unattainable for all participants.

Dependent measures. Feedback solicitation constituted the first dependent measure, and was measured in two ways. Score feedback was defined as the total number of times the participant chose the ‘amount correct’ button on the task screen, and time feedback was defined as the total number of times the participant chose the ‘time remaining’ button on the task screen (Figure 8.1 shows the task screen). Task performance was the second dependent measure, and was measured in two ways. Productivity, defined as increases in performance relative to baseline performance,
was calculated by dividing each participant’s goal condition performance by baseline performance, for each goal condition. Persistence, defined as trend across goal conditions, was measured by calculating slope value across goal conditions for each participant. A negative slope was indicative of a decreasing trend, and a positive slope or slope of 0 indicated persistence.

### 8.3.4 Procedure

The task was identical to the task used in Study 3. Figure 8.1 shows the work task screen. The labels ‘1’ and ‘2’ indicate the ‘show score’ button (1) and the ‘show time’ button (2). A box was situated below each of these buttons, and when the button was pressed by clicking on it with the mouse, the corresponding feedback appeared in the box. When the ‘show score’ button was pressed, the amount of correctly inputted patients in that session appeared in the box for two seconds. When the ‘show time’ button was pressed, the countdown timer displaying time remaining in the session in seconds appeared for two seconds.

![Figure 8.1](image)

*Figure 8.1.* Work task screen in a goal condition. The numbers in the figure illustrate the ‘show score’ button (1) and the ‘show time’ button (2).
As in Studies 1 to 4, at the end of each condition, feedback was presented to the participant indicating how many patients were entered correctly during that condition, and how many were entered incorrectly.

**Training.** Training was carried out as in Study 1 (see page 41 for a detailed description), with some exceptions. Training sessions consisted of two 30-second sessions with no manager present. The ‘show score’ and ‘show time’ buttons were present on the task screen. In the first session of training, after the participant had successfully submitted the first patient’s data, the participant was instructed to click on the ‘show score’ button to observe that the patient’s data had been successfully submitted. The participant was then instructed to click on the ‘show time’ button to examine how many seconds were remaining in the session. If the participant did not correctly input the first patient’s data, the experimenter waited until the first correct submission before drawing attention to the ‘show score’ and ‘show time’ buttons. At the end of training, participants were instructed that the ‘show score’ and ‘show time’ buttons would not be present on the task screen for the baseline condition; however, they would be present when the manager assigns a goal.

**Testing.** Testing lasted a total of 60 minutes, with four 15-minute conditions. Conditions proceeded as follows:

**Baseline.** Participants classified the data as stated previously (see page 41 for description). The ‘show score’ and ‘show time’ buttons were absent from the task screen during baseline, thus participants did not have access to ongoing feedback. At the end of the baseline condition, feedback was provided on the number of correct and incorrect entries in the condition.

**150% goal.** When presented with the goal, participants were provided instructions from a virtual manager, Bob, who asked participants to input a certain number of patients’ data. This number was determined from the participant’s baseline performance, and was calculated at 150% of baseline performance. The manager’s instruction was given via a pop-up window on the screen, and the instruction remained on the task screen throughout the condition. The ‘show score’ and ‘show time’ buttons were displayed on the task screen for this goal condition, and for all subsequent conditions. Feedback on number of correct and incorrect entries was presented at the end of the goal condition.

**160% goal.** This condition was identical to the previous goal condition, with the exception that the goal level was altered. Participants were presented with
instructions from a manager, Bob, who asked for a goal level that was equal to 160% of baseline performance.

170% goal. This condition was identical to the previous goal condition; however, participants were presented with instructions from a manager, Bob, who asked for a goal level that was equal to 170% of baseline performance.

Half of the participants received the goal conditions in the order described, and half received the goal conditions in the reverse order (170%, 160%, and 150%). Throughout all goal conditions, participants had the option to view ‘time remaining’ feedback or ‘score’ feedback by pressing the corresponding button on the task screen. Feedback remained on the screen for two seconds, and participants could press either button at any point throughout the testing. The computer programme recorded feedback-soliciting responses. A series of post-study questions were administered at the end of the study to determine whether participants followed the assigned goals, and whether or not participants felt they could reach their assigned goal (Appendix F). Participants had the option to take a break between conditions. The experimenter remained outside the room for the duration of the testing, and at the conclusion of the study, the experimenter debriefed the participant on the goal of the study, and thanked the participant for taking part.

8.4 Results

Data were initially inspected for mean frequency of feedback solicitation to address the primary research question, to examine whether goal level affects feedback-solicitation responses. To investigate the second research question, performance and persistence were examined over time.

8.4.1 Feedback solicitation

Participants’ results were examined for frequency of feedback solicitation across the goal conditions. Participants who did not choose feedback, or those who chose feedback less than four times in the entire testing period, were counted as the ‘no feedback’ group, and the participants who chose feedback four times or more were counted as the feedback group. Overall, 77% of participants chose feedback four times or more (n = 27) and 23% chose feedback less than four times (n = 8). Participants had the option to choose score feedback and time remaining feedback. It was expected that participants would choose score feedback more frequently, as this form of feedback relates directly to the goal level. Additionally, it was expected
that more participants would choose a combination of score and time feedback equally, than time feedback alone. Of the twenty-seven participants who chose feedback, ten participants (37%) chose score feedback more than time feedback, eight participants (30%) chose time feedback more than score feedback, and nine participants (33%) chose both forms of feedback equally. However, when individual frequencies were examined, four of the eight participants who chose more time feedback, only chose this type of feedback one more time than score. For the majority of goal conditions these participants chose an equal amount of score and time feedback. Of the ten participants who chose more score feedback, one participant chose score once more than time, suggesting that time and score feedback were almost equal for this participant. This suggests that a large number of participants requested score and time feedback equally, possibly because these participants related both forms of feedback to the goal.

At the conclusion of the study, participants were asked if they followed the assigned goals, set their own goals, or combined self-setting with following the goal. Interestingly, 90% of the participants who chose score feedback more than time feedback reported that they followed the assigned goals (one of these participants combined following the goal with self-setting). Reports from the participants who chose time feedback more than score feedback revealed that 63% followed the assigned goals, and for those who chose score and time equally, 67% followed the assigned goals. Score feedback provides information directly related to the goal and allows a comparison between current performance and the goal level. As such, it was expected that participants who chose score feedback more than time feedback would report following the assigned goal, and the current results reflect this.

The ascending goal and descending goal groups were examined separately to account for order of goal presentation in the investigation of feedback-seeking responses over time. The ascending goal group were those participants who received the goal levels in order of lowest to highest, thus 150%, 160% and then 170% of baseline performance, whereas the descending goal group were those who received the goal levels from highest to lowest. Two repeated measures multivariate analyses of variance (MANOVA) were conducted to determine whether there were significant differences in score or time feedback solicitation across phases, for both the ascending goal group and the descending goal group. Feedback seeking was not presented as an option during baseline, so only the goal conditions were analysed.
**Ascending goal group.** For the ascending goal group, no significant differences were found among phases on the dependent measures of score and time feedback, Wilk’s $\Lambda = 0.51$, $F(4,8) = 1.96$, $p = 0.20$, $\eta^2_p = 0.49$, indicating that neither score feedback nor time feedback significantly differed across phases. Figure 8.2 displays the mean frequency of feedback solicitation for score feedback and time feedback in each goal condition, for the ascending goal group.

![Figure 8.2](image)

*Figure 8.2.* Mean frequency of time and score feedback solicitation in each condition, for the ascending goal group.

It was expected that as goal level increased, feedback solicitation would decrease; however, this was not the case. Score feedback was chosen most frequently in the 170% goal condition ($M = 7.67$, $SD = 8.86$), and least frequently in the 150% goal condition ($M = 4.83$, $SD = 5.70$). Similarly, time feedback was chosen most frequently in the 170% goal condition ($M = 5.67$, $SD = 4.29$) and least frequently in the 150% goal condition ($M = 3.83$, $SD = 3.97$). Exploration of the data revealed two outliers at high frequencies; however, removal of these outliers did not affect the pattern of results. Mean frequency of feedback solicitation increased as goal level increased, in direct contrast to the expected pattern. Analysis of post-study data revealed that, of the participants in the ascending group who chose score feedback more than time feedback, 100% reported following the assigned goals (or a combination). Of the participants who chose time feedback more, 60% reported following the assigned goals, and of the participants who chose both forms of feedback equally, 50% reported following the assigned goals.
**Descending goal group.** For the descending goal group, no significant differences were found among phases on the dependent measures of score and time feedback, Wilk’s Λ = 0.75, $F(4,11) = 0.91$, $p = 0.49$, $\eta_p^2 = 0.25$, indicating that neither score feedback nor time feedback significantly differed across phases. Figure 8.3 displays mean frequency of feedback solicitation for the descending goal group.

![Figure 8.3](image)

**Figure 8.3.** Mean frequency of time and score feedback solicitation in each condition, for the descending goal group.

Mean feedback solicitation was lower in the descending goal group than in the ascending goal group. For the descending group, score feedback was chosen most frequently in the 170% goal condition ($M = 4.20$, $SD = 1.94$), and least frequently in the 160% goal condition ($M = 3.87$, $SD = 2.10$). Again, this was not expected, as it was anticipated that feedback would be solicited least frequently in the highest goal condition. Post-study data revealed that 86% of participants who chose score feedback more than time feedback reported that they were following the assigned goal. Time feedback was chosen most frequently in the 150% goal condition ($M = 3.27$, $SD = 2.46$) and least frequently in the 170% goal condition ($M = 2.93$, $SD = 2.02$). The pattern for time feedback solicitation reflected the expected pattern of feedback-seeking behaviour over goal levels. Eighty percent of this group reported following the assigned goals (or setting a combination), while 80% of the participants who chose score and time feedback equally reported following the assigned goals.
8.4.2 Performance and persistence

Scores were examined to investigate differences in performance and persistence across the three goal conditions and between the ascending goal group and the descending goal group. Scores for each goal condition were divided by baseline scores in order to observe changes in performance while accounting for baseline performance. A 2 (order) x 3 (phase) mixed ANOVA was conducted to examine differences in performance between the participants who received the goals in ascending order and those who received them in descending order, over the three goal phases. No main effect of order of goal presentation was observed, $F(1,33) = 0.80, p = 0.38, \eta^2_p = 0.24$. No main effect of phase was observed, $F(2,66) = 1.60, p = 0.21, \eta^2_p = 0.05$; however, a significant phase x order interaction was observed $F(2,66) = 4.57, p = 0.01, \eta^2_p = 0.12$, indicating that performance differed across phases depending upon order of goal presentation. In the ascending goal group, performance was highest in the second goal condition ($M = 1.29, SD = 0.20$) and lowest in the first goal condition ($M = 1.20, SD = 0.14$). In the descending goal group, performance was highest in the first goal condition ($M = 1.23, SD = 0.16$) and lowest in the third goal condition ($M = 1.18, SD = 0.22$).

In order to examine persistence, slope values were obtained across goal conditions, using least squares regression. Slope values in the ascending group and descending group were compared, and a significant difference was observed between the groups, $t(33) = 2.76, p = 0.009$. Mean slope was positive in the ascending group ($M = 3.42, SD = 4.99$) and negative in the descending group ($M = -1.59, SD = 5.71$), indicating that mean performance increased across goal conditions in the ascending goal group, and decreased across goal conditions in the descending goal group. This result suggests that participants in the ascending goal group persisted significantly more than participants in the descending goal group. Figure 8.4 displays mean performance when each goal condition was divided by baseline performance, for each participant. The figure highlights decreases in performance for the descending goal group in the second and third goal conditions. Interestingly, in Goal 2, both groups were assigned a goal level of 160% of baseline performance, and participants in the ascending goal group performed at a higher level than participants in the descending goal group; however this difference was not significant, $t(33) = 1.09, p = 0.29$. 

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Figure 8.4. Mean performance for the ascending goal group and the descending goal group, when goal condition performance was divided by baseline performance for each participant. The ascending group received the 150% goal first, while the descending group received the 170% goal first. Error bars represent standard error of the mean.

In order to examine further the significant effect of order of goal presentation on persistence, the participants who chose feedback and those who did not choose feedback were examined separately. For the group who chose feedback, a significant difference in slope was observed between the ascending and the descending group, $t(25) = 2.31$, $p = 0.03$. For this group, mean slope was strongly positive in the ascending goal group ($M = 3.75$, $SD = 5.42$) and negative in the descending goal group ($M = -1.43$, $SD = 6.06$). Figure 8.5 displays mean performance across goal conditions for the group who chose feedback, when goal condition scores were divided by baseline scores for each participant. As can be seen in the figure, performance across goal conditions was increasing for the ascending goal group, indicating persistence, until the third goal condition in which a decrease was observed. Performance across goal conditions was decreasing for the descending goal group, indicating a reduction in persistence.
Only eight participants chose feedback less than four times. As such, only mean performance is presented. Figure 8.6 displays mean performance for the no feedback group, when condition scores were divided by baseline scores for each participant. For this group, mean slope was positive in the ascending goal group ($M$
= 2.75, $SD = 4.39$) and negative in the descending goal group ($M = -2.75, SD = 2.47$).

### 8.4.3 Single case analyses

Individual-level performance was examined to determine variability in patterns of performance for participants, and to analyse results of the post-study questions. Two participants met the assigned goals; however due to the constraints of a small sample size these participants were not removed. Single case plots presented in terms of performance increase from baseline levels allow for a comparison of performance across participants who received differing goal levels. Participants who chose feedback four times or more are represent by filled circle data points, and participants who chose feedback less than four times are represented by filled square data points. Grey lines on each plot represent slope across goal conditions, established through least squares regression. Figures are separated into two figures for each group, for ease of presentation. Participants are displayed on the plot in order of lowest goal group to highest.

**Ascending goal group.** Single case plots for the ascending goal group are presented in Figure 8.7 and Figure 8.8. Analysis of slope values revealed that thirteen participants (72%) in the ascending goal group demonstrated an increase in performance over time, and five participants demonstrated a decrease in performance (28%). These results illustrate that the majority of participants who received a series of unattainable goals in order from low to high persisted over time. Of the participants who demonstrated an increasing trend, 54% chose feedback four times or more, and 46% chose feedback less than four times. Of the participants who demonstrated a decreasing trend, 60% chose feedback and 40% did not. This suggests that feedback did not present a notable affect on persistence with an unattainable goal. One participant in the ascending goal group met the assigned goals (participant 96; Figure 8.7). Interestingly, this participant demonstrated a decreasing trend throughout the goal conditions. This participant’s highest level of performance was in the first goal condition (150% goal), and performance decreased in the remaining two conditions. This participant was the only participant to be assigned the lowest goal levels of 68 (150%), 72 (160%) and 76 (170%), thus this participant exhibited the lowest levels of baseline responding in the study. An additional two participants reached or exceeded the low goal level of 150%; however, this occurred in higher goal levels, and not in the 150% goal level. Both of
these participants demonstrated an increasing trend in performance over time. For the remaining fifteen participants in this group, the level of 150% of baseline performance was not reached throughout the conditions. Participants were asked if they felt that they could reach the goal, and 33% reported that they could reach the goal. Of this group, 67% demonstrated an increase in performance over time, while 33% demonstrated a decrease in performance.

The five highest performing participants were examined to determine whether a performance ceiling was met, as these participants were assigned high goal levels based on high levels of baseline performance. Participants 77, 83, 101, 108, and 111 displayed the highest level of baseline performance, thus were assigned the highest goal levels. As can be seen in Figure 8.8, all of these participants demonstrated an increasing trend across goal conditions, suggesting that these high performing individuals displayed continued performance increases as higher, unattainable goals were assigned. Interestingly, all of these participants reported the belief that they could not reach the goal. Performance variance was large across these five participants, and appeared to reflect the increasing goal level assigned to each participant. That is, participants 77 and 101 were assigned an initial goal level of 135 (150%), and demonstrated performance increases up to 130% and 161% respectively. Participant 111 was assigned the initial goal level of 158, and demonstrated increases in performance to 120%. Participant 108 was assigned the initial goal level of 180, and demonstrated increases to 109%, and participant 83 was initially assigned the highest goal level of 225, and demonstrated only a 104% increase in performance. This provides evidence of a possible performance ceiling, as participants who received the higher goal levels may have been performing at or close to their limit in the baseline condition.
Figure 8.7. Single case plots for participants in the ascending goal group. Participants who chose feedback are represented by filled circle data points, and participants who chose feedback less than four times are represented by filled square data points. Goal condition performance was divided by baseline performance, thus baseline performance is represented as 1. Trendlines were established using least squares regression. Numbers above each plot denote the participant number.
### Table 8.5

<table>
<thead>
<tr>
<th>Condition</th>
<th>Performance increase</th>
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<tr>
<td>Baseline</td>
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</tr>
<tr>
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<tr>
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<td>2.0</td>
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**Figure 8.8.** Single case plots for participants in the ascending goal group.
**Descending goal group.** Single case plots for participants in the descending goal group are presented in Figure 8.9 and Figure 8.10. For the descending goal group, six participants (35%) demonstrated an increasing trend while eleven participants (65%) demonstrated a decreasing trend. As assigned goal level decreased, performance decreased. This finding was interesting, considering only one participant met all goal conditions throughout the study. Of the participants who demonstrated an increasing trend in performance, 67% chose feedback throughout the study, and 33% did not. Of the participants who demonstrated a decreasing trend throughout the goal conditions, 82% chose feedback throughout the study and 18% did not. One participant (participant 87) met the goals throughout. This participant demonstrated a decreasing trend across goal conditions. One participant (participant 110) met the goal of 150% of baseline performance, but did not meet the two higher goals. This participant demonstrated an increasing trend across goal conditions. One additional participant met the low goal level of 150%; however, this was during a higher goal level, and this participant demonstrated a decreasing trend in performance over time. The remaining fourteen participants did not reach the level of 150% of baseline performance throughout the goal conditions. Participants were asked whether they believed they could reach the goal, and 53% of the descending goal group reported that they could reach the goal. Of the participants who reported this, 56% demonstrated a decrease in performance throughout the goal conditions and 44% demonstrated an increase in performance. This result was surprising, as despite decreases in performance over time, over half of the participants reported that they could reach the goal.

The five highest performing participants were examined to determine whether a performance ceiling was met, as these participants were assigned high goal levels based on high levels of baseline performance. Participants 78, 79, 91, 92, and 104 displayed the highest level of baseline performance, thus were assigned the highest goal levels. As can be seen in Figure 8.9, four of the five highest performing participants demonstrated a decrease in performance over time. This may be evidence that the participants had reached a performance ceiling; however, rather than performance ‘levelling off’ for these individuals, decreases in performance were evident. For, participants 79, 92 and 104 the first goal level was 153 (170% goal) and these participants increased performance to 109%, 115% and 137% of baseline performance respectively across goal conditions. Participant 91 was assigned the
initial goal level of 178 (170%), and increased performance to 111%. Participant 78 received the highest initial goal level of 230 (170%) and increased performance to 108% of baseline levels across all conditions. For each participant in the descending goal group the initial goal level was the highest goal that the participant was assigned. Receiving an unattainable goal of 170% in the first goal condition may have been so unattainable that it suppressed responding, resulting in decreasing trends over time for four of the five participants. Interestingly, three of the five highest performing participants reported the belief that they could reach the goal.
Figure 8.9. Single case plots for participants in the descending goal group.
Participants who chose feedback are represented by filled circle data points, and participants who chose feedback less than four times are represented by filled square data points. Trendlines were established using least squares regression.
Figure 8.10. Single case plots for participants in the descending goal group.
8.5 Discussion

The first aim of the study was to examine feedback-seeking responses in the presence of ascending and descending unattainable goals. The current results are in contrast to the results found in Study 3, in which feedback solicitation was lower in a high goal condition than in a low goal condition. In the current study, the mean frequencies of both score and time feedback solicitation were not significantly different across phases, suggesting that goal level did not significantly affect feedback solicitation. A second aim of the current study was to examine performance and persistence over lengthened work sessions in the presence of increasingly or decreasingly unattainable goals. Analysis of group results revealed that performance differed across goal conditions depending upon the order of presentation of goals. Additionally, examination of slope values across goal conditions revealed that persistence significantly differed between the ascending goal group and the descending goal group. Mean performance increased across goal conditions in the ascending goal group, and decreased across goal conditions in the descending goal group, suggesting that participants in the ascending goal group persisted significantly more than participants in the descending goal group.

It was expected that feedback solicitation would significantly differ across goal conditions; however, this was not observed. In Study 3, the high goal level was double the value of the low goal level. In the current study there were only 10% increments for each goal level, thus the increments may not have been large enough to observe a significant difference. Additionally, it may be the case that the frequency of feedback solicitation was considerably less overall for the current study, as only high, unattainable goals were provided. According to O’Hora and Maglieri’s (2006) model, feedback seeking may reduce in an unattainable goal condition, as feedback will lead to self-statements that describe progress as not moving sufficiently closer to the goal. As such, feedback may not function as derived reinforcement in the presence of an unattainable goal. According to the model, this may have resulted in an overall low frequency of feedback seeking throughout the goal conditions. In the ascending goal group, feedback solicitation increased as goal level increased. In this case, it is difficult to distinguish between an effect of goal level and an effect of time. Feedback solicitation may have increased as participants progressed through the study, and as participants were reaching the end of the study, they may have sought feedback more frequently.
It was expected that a greater number of participants would choose score feedback over time feedback, and that a greater number of participants would choose both forms equally over more time feedback. This was anticipated since score feedback relays information that allows a comparison of current performance to the goal level, and a combination of score and time feedback allows a comparison, and a prediction of future data entries in the allocated time. Of the participants who chose feedback, ten participants (37%) chose score feedback more than time feedback, eight participants (30%) chose time feedback more than score feedback, and nine participants (33%) chose both forms of feedback equally. However, when individual frequencies were examined, four of the eight participants who chose time feedback more chose this type of feedback only one more time than score, and one of the ten participants who chose score feedback more chose score once more than time, suggesting that time and score feedback were chosen almost equally for these participants. This suggests that the pattern of responding for four participants who chose time more, and for one participant who chose score more, were similar to the pattern of responding for participants who chose equal amounts of feedback. Ilgen and Moore (1987) asserted that in order for outcome feedback to maximally affect performance it must provide information relevant to the goal. As the majority of participants chose both forms of feedback almost equally, this suggests that a combination of score and time feedback provided necessary information to participants. That is, both forms of feedback functioned as derived reinforcement for goal-directed behaviour for these participants, resulting in an equal number of requests for score and time.

The second aim of the study was to examine the effect of a variety of unattainable goals on performance and persistence in a lengthened work task. Analysis of group results revealed that performance differed across goal conditions depending upon the order of presentation of goals. Participants in the ascending goal group demonstrated an increase in mean performance over time, whereas participants in the descending goal group demonstrated a decrease in performance. For the ascending goal group, mean performance reached 130% of baseline performance in the second goal condition, and performance did not increase further in the third (and final) goal condition. A possible reason for this is that participants reached a performance ceiling. The descending goal group reached only 123% of baseline performance in the first goal condition, and mean performance decreased in
subsequent conditions, indicating a reduction in persistence for this group. Mean performance for this group decreased as goal level decreased, although participants did not reach the assigned goal level. This suggests that an initial extremely high goal level affected performance or persistence to a greater extent than a marginally unattainable goal level. This result is in line with the work of See, Heath, & Fox (2006), who found that participants persisted to a greater extent in a marginally unattainable goal condition than in an extremely unattainable goal condition. The current study may add support to this. Assigning a lower unattainable goal level and subsequently increasing the level, led to performance increases throughout the study; whereas, beginning the goal conditions with an extremely unattainable goal level, and then decreasing the level resulted in a negative effect on persistence.

Performance for the five highest performers in each group was analysed to assess whether participants met a limit on responding, or a performance ceiling. In the descending goal group, four out of the top five performers demonstrated a decreasing trend in performance. It has been suggested that performance ‘levels off’ when a participant meets a ceiling on performance (Locke & Latham, 1990); however, for these participants a decrease in performance and consequently persistence was observed. According to O’Hora and Maglieri’s (2006) model, the introduction of such a high goal may result in an absence of derived reinforcement, as the participant does not move closer to the goal. This may serve as an explanation for decreased persistence in the subsequent conditions. For the ascending goal group, the five highest performers demonstrated increasing performance throughout the goal conditions. Jones, Rock, Shaver, Goethals, and Ward (1968) asserted that performance patterns affect effort with a task. These authors suggested that participants with ascending patterns of success over trials believe that they have exerted greater effort than participants with variable or descending patterns of successes. Medway and Venino (1982) suggested that participants who are led to believe that their performance is improving over time will demonstrate greater task persistence than participants who receive information about variable patterns of performance. From a behavioural perspective, participants in the ascending goal group may have been progressing adequately towards the goal level, as the goal level initially seemed within reach. In terms of the O’Hora and Maglieri model, relations between self-statements about current performance and the goal level may have decreased sufficiently to function as derived reinforcement of goal-directed
behaviour. When the goal level increased, participants continued to perform due to derived reinforcement in the previous goal level, and participants persisted, as the newer goal level was only 10% higher than the previous goal level.

The current study highlighted that differences in feedback seeking were not observed across phases when three levels of an unattainable goal were assigned. The goal levels either increased or decreased by 10% of baseline performance in each goal condition, depending on the group to which a participant was assigned. It is possible that overall feedback seeking was suppressed due to the unattainability of all goal levels, thus no observed significant difference between phases. Future studies might benefit from a systematic examination of a variety of unattainable goal levels in addition to a variety of lower goal levels, in an effort to determine at what point seeking feedback reduces, or becomes too costly. If a goal level is too high, and thus feedback seeking is suppressed, an individual may exhibit behaviours that are not goal-directed, and in the absence of feedback these behaviours may not be corrected. Consequently, the importance of determining a high goal level that allows for feedback seeking is clear, and has implications within organisations. Additionally, the current study investigated the effects of increasingly unattainable goals and decreasingly unattainable goals on performance and persistence. Participants persisted to a greater extent in an ascending goal group than in a descending goal group. This result has implications for the use of stretch goals in organisations. If an extremely high unattainable goal is assigned, this may result in reduced persistence across subsequent goals; whereas if an initially low unattainable goal is introduced and then subsequently increased, this goal may lead to performance increases.

8.5.1 Considerations

VandeWalle and Cummings (1997) investigated the influence of goal orientation on feedback seeking and found a negative relationship between performance goal orientation and feedback seeking. Moreover, greater learning goal orientation led to a greater likelihood of feedback seeking. The current study did not measure goal orientation, and this may be an important factor in feedback seeking. A performance goal was assigned, and an individual’s goal orientation may have affected whether or not they required feedback. Additionally, post-study questions did not include questions about possible ego costs to seeking feedback. Although this may not be of importance in a private setting, it is worth inquiring, as ego costs
may stem to seeking feedback in the presence of an experimenter. A key limitation of the current study was the small sample size. Only thirty-five participants took part in the study and as such, group statistical analyses must be interpreted with caution.
Chapter 9: Discussion

The current programme of research investigated the dynamics of goal-directed behaviour. By experimentally manipulating goal and feedback variables, this work explored the effects of unattainable goals on performance, in an attempt to evaluate and supplement current behavioural theories of the processes that underlie goal-directed behaviour as it changes over time. Over the course of a series of studies, the effects of goal level and feedback on performance were examined, in addition to the effects of goal level on feedback seeking. Results demonstrated a positive effect of high, unattainable goals on performance, and participants demonstrated a resistance to extinction in the presence of an unattainable goal (Study 1). Additionally, the enhancing effect of feedback on goal-directed behaviour was demonstrated; however, feedback did not significantly affect persistence in the presence of an unattainable goal (Study 2). In Study 3, a relationship between goal level and feedback seeking was observed. Feedback seeking was significantly lower in an unattainable goal condition when compared to a low goal or a no goal condition. When work sessions were lengthened, participants continued to persist in the presence of an unattainable goal. In this lengthened session, feedback did not significantly affect performance or persistence (Study 4). In the final study, evidence of extinction of goal-directed behaviour was observed in a group of participants who received an extremely unattainable goal that was reduced in subsequent goal conditions.

Studies were discussed individually in each experimental chapter, thus the current chapter will provide a brief overview of findings as they relate to behavioural theory. Inherent in the discussion of all studies was that O’Hora and Maglieri’s (2006) RFT model of goal setting may provide a comprehensive behavioural explanation of the results of the current research. As outlined in Chapter 3, this RFT approach attempts to account for the processes underlying goal setting and feedback, focusing on a functional explanation to a greater extent than previous behavioural accounts. One advantage of the O’Hora and Maglieri model is that it explains how specifying a goal level can change behaviour, an explanation that is lacking in earlier accounts. That is, this model accounts for the verbal content of goal statements. Limitations were discussed briefly in each experimental chapter; however, a number
of broad limitations will be presented in the current chapter. Additionally, applied implications of the current series of studies will be discussed, along with suggestions for future research.

9.1 Overview of Findings

A consistent theme throughout the current research programme was the empirical examination of the effects of unattainable goals on performance, a research area that has produced inconsistent findings in the past. In addition, a principal aim of the thesis was to evaluate and supplement current behavioural theories of the processes underlying goal setting and feedback. Consequently, the findings of each empirical study will be presented as they relate to previous research, and these findings will be discussed in terms of their contribution to a behavioural account of goal setting.

9.1.1 Study 1

The aim of Study 1 (Chapter 4), the first empirical study in the current programme of research, was to replicate previous findings that high specific goals lead to greater performance than no goals or low goals (Jackson & Zedeck, 1982; Locke & Latham, 2002; Steers & Porter, 1974). The objectives were to test whether the introduction of a goal would significantly affect productivity, and specifically to investigate persistence within a high, unattainable goal condition. It was proposed that at some point, in the absence of goal attainment, goal-directed behaviour would extinguish. The provision of a goal (either high or low) resulted in a significant increase in performance. Additionally, the provision of a high goal increased performance to a greater extent than the provision of a low goal, replicating previous findings (Latham & Locke, 1979; Locke & Bryan, 1967; Locke & Latham, 2002; Steers & Porter, 1974). According to cognitive goal setting theory, goals serve an energising purpose, thus high goals lead to higher levels of performance (Locke & Latham, 2002). This theory has difficulty explaining how goals serve to energise individuals. Similarly, early behavioural accounts of goal setting that describe goals in terms of discriminative stimuli, establishing operations, or rules (e.g., Agnew, 1997; Fellner & Sulzer-Azaroff, 1984; Malott, 1993), fail to describe how goals establish reinforcing functions. O’Hora and Maglieri’s (2006) model of goal setting describes the effects seen in Study 1 in terms of decreasing comparison relations between self-statements about current level of performance and the goal statement.
According to this behavioural model, high goals will lead to higher levels of performance, as individuals will continue to work to decrease comparison relations between current performance and the goal level.

A primary aim of Study 1 was to examine persistence in the presence of an unattainable goal. According to O’Hora and Maglieri (2006), initial high levels of performance will be observed upon introduction of a goal; however, as participants do not progress towards the goal, derived reinforcement will be undermined. That is, comparison relations between the goal statement and current self-statements about performance will not decrease sufficiently to serve as derived reinforcement. This extinction effect was not reliably observed; a negative trend in performance was observed within the high goal condition for only one-third of participants. However, when the high goal was presented as the second goal condition, a negative trend was observed for more participants than when it was presented as the first condition, suggesting that time on task may have affected persistence. The observed variability in persistence may have been due to participants’ differing behavioural histories with respect to goal-directed behaviour, which gave rise to goal-directed behaviour that was more or less resistant to extinction. Short session length or insufficient exposure to the high goal condition might also have contributed to variability in persistence. In order to examine this further, Study 4 incorporated longer work sessions with a single unattainable goal level.

An additional aim of Study 1 was to examine whether participants would choose a low or a high goal when provided with a choice between the two. Results showed that seventeen out of fifty-seven participants chose the high goal. When given a choice, people allocate their behaviour in a way that maximises reinforcement (Mawhinney, 1982). Accordingly, when given a choice between the high and the low goal, people should choose the low goal because the goal signals the availability of more reinforcement than the high goal. Huber (1986) suggested that when the magnitude of reinforcement is not sufficiently higher than the amount of effort required to contact the reinforcement, the offer of reinforcement may not evoke the desired behaviour. That is, the participants who chose the low goal may have chosen it as comparative rate of reinforcement for responses in the low goal condition was greater than in the high goal condition. However, for the participants who chose the high goal, the challenge of attaining a difficult goal may have functioned as a potentially more potent form of reinforcement than attainment of an
easy goal. The result that seventeen participants chose the high goal was unexpected, and this choice condition was retained for further studies (Studies 2 and 3) for additional investigation.

9.1.2 Study 2

The research design for Study 1 included ongoing feedback in the form of knowledge of score and time remaining in the session, as is typical with goal setting interventions. The design for Study 2 (Chapter 5) was identical to Study 1 with the exception that feedback was removed. The sixty participants from Study 1 (feedback group) were compared with those from Study 2 (no feedback group) in order to examine the effect of feedback on performance and persistence in the presence of a low and a high goal. Overall performance was significantly higher in the feedback group than in the no feedback group, providing additional support for prior research demonstrating that feedback increases performance significantly further than goal setting alone (Cameron & Duff, 2007; Erez, 1977; Reber & Wallin, 1984).

As outlined in Chapter 2, the effect of feedback on persistence in the presence of an unattainable goal has not been reported in the literature. Group results of Study 2 demonstrated that feedback did not significantly affect persistence; a decreasing trend in performance was evident within the high, unattainable goal condition for 33% of participants in the feedback group, and 36% of participants in the no feedback group. When the low goal first group and the high goal first group were analysed separately, an interaction effect between condition and group (feedback) was evident for the low goal first group. Participants in the low goal first group demonstrated increased persistence in the high goal condition when feedback was present. These results indicated that further single case analyses were warranted in order to determine patterns of performance variance. Results of individual-level analyses revealed that a greater number of participants displayed a decreasing trend in performance (negative slope) in the high goal condition when this was the second goal condition, for both the feedback group and the no feedback group. As with Study 1, this suggests that time on task may affect levels of persistence with a task; the longer an individual spends on a task, the more likely they are to reduce responding with the provision of an unattainable goal. Fried and Slowik (2004) suggested that laboratory studies should focus on how long a challenging task remains challenging to an individual. The results of Studies 1 and 2 provisionally
suggest that time should be incorporated into laboratory studies in order to examine the effect of repeatedly failing to attain a goal over time on performance. The primary aim of Study 4 was to investigate patterns of persistence in the presence of an unattainable goal over a lengthened work period.

A detailed single case analysis was included in Study 2 in order to examine variability in performance. Results of the analyses are detailed in Chapter 5. Differing patterns of behaviour were highlighted and an emphasis was placed on the necessity to include individual-level analyses in an investigation of goal setting and feedback effects across participants. For example, despite an overall positive effect of feedback, individual-level analyses revealed that 14% of the feedback group did not display an increase in performance throughout the study. In a review of feedback interventions, Kluger and DeNisi (1996) concluded that no consistent pattern of results has emerged from previous studies. The single case analyses in Study 2 demonstrated patterns of behaviour that were masked by group results.

O'Hora and Maglieri’s (2006) model may provide an explanation for those instances in which the introduction of a goal or feedback does not affect performance. In some cases, the goal statement that has been issued may not set up relations between current progress and the goal level. In this case, feedback may lead to self-statements that do not participate in comparison relations and reducing these ‘less than’ relations will not function as derived reinforcement for goal-direct behaviour. That is, the goal did not establish control over performance behaviour. Discriminative stimulus accounts of the role of feedback on goal-directed behaviour provide similar explanations; in this case, feedback is not functioning as a reinforcer. However, these accounts state that prior pairing of the goal as the antecedent stimulus and feedback as a reinforcer is necessary, and if this prior pairing has not occurred, feedback will not affect performance. In the current experimental paradigm, no prior pairing of the goal and feedback was evident. The task and goals were novel to the participant, thus an account explaining feedback in terms of its derived reinforcing function provides a more comprehensive account than a direct-contingency account.

As with Study 1, an unexpected number of participants chose the high goal when provided with a choice between a high and a low goal, and no significant association was found between the presence or absence of feedback and goal choice.
A series of post-study questions were added to the design for Study 3 in order to ascertain participant’s opinions about their goal choice.

9.1.3 Study 3

Results of Study 2 demonstrated an increase in performance in a feedback group when compared to a no feedback group; however, individual-level performance variability was observed, and it was unclear whether or not participants in the feedback group were attending to the feedback. As a result, feedback seeking was the focus of Study 3 (Chapter 6), primarily to test for possible reinforcing functions of feedback. Prior research on feedback seeking has neglected to address effort costs (Ashford, Blatt, & VandeWalle, 2003; VandeWalle, 2003), and generally indirect measures of behaviour have been employed (Levy, Albright, Cawley, & Williams, 1995). Study 3 sought to directly examine the effect of goal level on frequency of feedback seeking. Participants were exposed to the same goal phases as in Studies 1 and 2; however, feedback was not present unless participants clicked a button on the task screen. The primary aim of the study was to examine the effect of goal level on feedback seeking, and an interesting finding was that only 56% of participants chose feedback more than four times throughout the study. O’Hora and Maglieri’s (2006) model can provide a behavioural explanation for this result in terms of effort cost. If seeking feedback requires response effort and the result outweighs the effort, in that the result leads to feedback that reinforces goal-directed behaviour, then participants will choose feedback. However, if the cost of seeking feedback is higher than the derived reinforcing function of feedback, then participants will choose to work instead of stopping to choose feedback.

Participants solicited feedback more frequently in the low goal condition and less frequently in the high goal condition. Cognitive researchers have suggested that individuals allocate resources (Kanfer & Ackerman, 1989), and in a simple repetitive task, participants may have chosen not to allocate resources to seeking feedback. Similarly, Slowiak, Dickinson, and Huitema (2011) suggested that there is a time cost involved in seeking feedback that may result in reduced feedback seeking depending upon conditions. According to O’Hora and Maglieri’s (2006) model, results of Study 3 can be explained in terms of the derived reinforcing function of feedback statements. Provided that feedback is leading to self-statements about current performance, feedback seeking may reduce in an unattainable goal condition. If ‘less than’ comparison relations between current performance and the goal level
are not sufficiently decreasing to function as derived reinforcement of goal-directed behaviour, performers may reduce their feedback-soliciting responses that lead to self-statements. That is, self-statements that describe current level of performance as *not* moving closer to a goal level may not function as reinforcement, thus feedback seeking will reduce. The principal aim of Study 5 was to investigate the effects of a series of unattainable goals on feedback solicitation, in order to determine at what point feedback seeking ceases, possibly due to feedback statements losing their derived reinforcing function.

Results of Study 3 revealed that when provided with a choice between a high and a low goal, again, almost one-third of participants chose the high goal condition. In a series of post-study questions, participants were asked why they chose either the high or the low goal, and just over half of the participants who chose the high goal stated that they wished to try to reach the goal. The remaining participants who chose the high goal reported reasons such as mistakenly mixing up the goal levels or not recalling which manager was associated with the high and low goals, indicating that just under half of the participants who chose the high goal did not intend to choose it. This has implications for the results of Study 1 and Study 2 in addition to Study 3. In all three studies, an unexpected number of participants chose the high goal, and the results indicate that perhaps fewer people intended to choose the high goal. This suggests that for further research investigating goal choice, the research design should be altered to minimally remind participants which manager requested the high goal and which manager requested the low goal.

Participants were asked whether they followed the assigned goals or whether they set their own goals throughout the study. Less than half of participants reported that they followed the assigned goals. The remaining participants reported either combining self-set goals and goal-following or setting their own goals throughout the study. The majority of these participants reported goals of beating their previous score, improving accuracy (less errors), or setting loose “do your best” goals. Similar post-study questions have been utilised in prior research in order to provide a measure of goal commitment. From an RFT perspective, a goal may not be followed because the target behaviour is not within the individual’s repertoire, such as in the case of an unattainable goal. Relevant to the current series of studies, a rule may not be followed due to the plausibility of the rule itself. If a rule seems implausible, an individual may derive relations of distinction or opposition between the relational
network constituted in the rule, and other available relational networks (Stewart, Barnes-Holmes, Barnes-Holmes, Bond, & Hayes 2006). For example, if working according to a given goal causes disruption or lower levels of performance, an individual may derive a frame of distinction between the goal (rule) and previous effective behaviour, which in turn may weaken rule following. If this occurs, it is possible that participants generate their own rules (self-set goals).

9.1.4 Study 4

The primary focus of Study 4 (Chapter 7) was to examine persistence over a lengthened work period. Baseline performance was calculated for each individual participant and a goal level was assigned based upon 160% of baseline performance. Participants were exposed to four 12-minute goal sessions, and feedback was present for half of the participants in order to investigate whether feedback would affect persistence when longer goal conditions were prescribed. Overall, only 20% of participants demonstrated a decreasing trend in performance throughout the study. It was suggested that lengthening the work sessions would result in a decrease in persistence; however, the majority of participants persisted despite the lengthened sessions. Huber (1986) suggested that the success of contingency-specifying stimuli depends upon a number of factors. The first of these factors is the availability of alternative discriminative stimuli. The rate of response to reinforcement depends upon the availability of alternative sources of reinforcement (Herrnstein, 1961; Mawhinney, 1982). In a laboratory setting, there are few competing responses with which the participant can engage, thus the goal statement may function as the only discriminative stimulus, and is likely to evoke task behaviour. This may serve as a reason for increased persistence in the current study despite repeated failure to attain the goal.

Ability limits the goal-performance relationship at high goal levels, because the goals exceed the reach of the individual (Locke, 1982), and it was expected that high performers would reach a ceiling on performance more rapidly than low performers, thus increases in performance would be observed less with participants in the higher goal levels. This was not evident, as high performers continued to progress throughout the study. In the low goal level 77 group, 35% of participants demonstrated a decreasing trend in performance over time. These participants exhibited relatively low rates of responding during baseline, hence were assigned a low goal level. As baseline performance increased and higher goals were assigned,
participants demonstrated increased persistence. For example in the goal level 115 group, only 14% of participants demonstrated a decreasing trend. According to O’Hora and Maglieri’s (2006) model, self-statements around current level of progress are necessary in order for a decrease in comparison relations to function as derived reinforcement. Participants who exhibited higher rates of baseline performance may have issued their own goal statement in baseline, and progress towards this goal may have functioned as reinforcement for goal directed behaviour. When these participants were assigned a goal, reduction of comparison relations may have maintained performance at a high level, or even increased performance. For participants who exhibited low baseline levels of responding, the assignment of an unattainable goal did not result in adequate progress towards the goal. In this case, reduction of ‘less than’ comparison relations was not sufficient to function as derived reinforcement of goal-directed behaviour and an extinction effect was observed for some participants.

Study 4 revealed no significant differences in performance or persistence between the feedback group and the no feedback group, suggesting that feedback did not significantly affect persistence when an unattainable goal was assigned. Bucklin, McGee, and Dickinson (2003) reported on a number of studies in which feedback did not significantly increase performance when monetary incentives were prescribed. One reason suggested for this was that the incentive criterion may have been too high, making it too difficult to earn incentives, thus feedback would not increase performance. That is, a performance ceiling had been met prior to the introduction of feedback. In Study 4, in the presence of an unattainable goal, participants may have reached a performance ceiling in which feedback would not be capable of leading to increased performance. However, when the feedback and no feedback groups were examined separately, a decrease in persistence was observed in the third goal condition for the no feedback group. This suggests reduced persistence in this group over time. Performance increased again in the final goal condition; however, as discussed in Chapter 7, the indication that participants were in the final phase may have operated as an EO, increasing the reinforcing function of self-generated feedback or goal attainment. This finding warrants further investigation, as the finding suggests that feedback may affect persistence over time.
9.1.5 Study 5

Study 5 (Chapter 8) was conducted to investigate further the results that emerged from Study 3. Feedback seeking was the primary dependent variable; however, performance and persistence were also under investigation. A high, unattainable goal was manipulated such that participants were exposed to a 15-minute condition in which a goal based on 150% of baseline performance was assigned, followed by a 15-minute session of 160% of baseline, and then 170% of baseline. The presentation of goals was counterbalanced in ascending and descending order of presentation, in order to examine the effect of an initial marginally unattainable goal compared to an initial extremely unattainable goal. Study 3 revealed that participants chose feedback less often in an unattainable goal condition, and more often in a low goal condition. In Study 5, the mean frequencies of both score and time feedback solicitation were not significantly different across phases, suggesting that differing unattainable goal levels did not significantly affect feedback solicitation. However, in Study 3, the high goal level was double the value of the low goal level, whereas in Study 5, there were only 10% increments for each goal level. Although goal level differed across conditions, all goal levels were unattainable, thus feedback-solicitation responses may have been suppressed throughout the study. Smoot and Duncan (1997) noted that feedback can have a negative effect on performance, and suggested that the effort involved to obtain feedback takes time away from the task. This is in line with O’Hora and Maglieri’s (2006) model in that the cost of seeking feedback may not have resulted in a reinforcing consequence that was potent enough to outweigh the effort cost. The results of Study 3 and Study 5 add to the model. According to the model, feedback leads to self-statements that result in comparison relations and the reduction of these comparison relations functions as derived reinforcement of goal-directed behaviour. However, according to the results of Study 3 and Study 5, there may be times when the cost of seeking feedback outweighs the reinforcing function of feedback, and consequently feedback seeking reduces, such as in the presence of an unattainable goal.

A second aim of Study 5 was to examine performance and persistence over lengthened work sessions in the presence of increasingly and decreasingly unattainable goals. Performance differed across goal conditions depending upon the order of presentation of goals, and persistence significantly differed between the
ascending goal group and the descending goal group. Mean performance increased across goal conditions in the ascending goal group, and decreased across goal conditions in the descending goal group, indicating that participants in the ascending goal group persisted significantly more than participants in the descending goal group. This suggests that an initial extremely high goal level may have negatively affected performance or persistence to a greater extent than a marginally unattainable goal level. This result is in line with the work of See, Heath, and Fox (2006), who found that participants persisted more in a marginally unattainable goal condition than in an extremely unattainable goal condition. The current study may add support to this. Assigning a lower unattainable goal level and subsequently increasing the level, resulted in performance increases throughout the study; whereas, beginning the goal conditions with an extremely unattainable goal level and then decreasing the level resulted in a negative effect on persistence. The results of the current study provide further support for the O’Hora and Maglieri (2006) model. When the initial goal was extremely unattainable it is possible that comparison relations did not significantly reduce to function as derived reinforcement, thus an extinction effect was observed. When the initial goal was only marginally unattainable, participants may have persisted because ‘less than’ comparisons were decreasing sufficiently, despite failure to attain the goal. That is, although the goal level was high, participants were progressing sufficiently towards the goal to maintain goal-directed behaviour.

9.2 Implications for Behavioural Theory

Within the field of OBM, there has been a history of difficulty in adopting behavioural theory to explain the processes that underlie feedback and goal setting. Duncan and Bruwelheide (1985) proposed that behavioural researchers should discuss the behavioural mechanisms most likely to have affected behaviour rather than simply providing evidence that feedback has affected behaviour. Behavioural mechanisms have been discussed in previous chapters; however, this section will provide a more comprehensive discussion of the major findings from the current research in terms of behavioural theory.

9.2.1 Increased goal level leads to increased performance

Results from Study 1 and Study 2 demonstrated that the provision of high goals resulted in higher levels of performance when compared to low goals or no
goals. This result replicated an abundance of prior research (Latham & Locke, 1979; Locke & Latham, 2002; Steers & Porter, 1974); however, early behavioural accounts have failed to explain why high goals lead to increased performance. Discriminative stimulus and EO accounts explain the effects of goals in terms of direct contingencies and a history of pairing a goal statement with reinforcement. Fellner and Sulzer-Azaroff (1984) proposed that goals should be initially attainable and then gradually increased in order for high goals to lead to increases in behaviour. For the majority of participants in the current programme of research an unattainable goal was provided in the absence of prior goal attainment. It is more likely that behaviour came under the control of rules describing contingencies rather than direct-acting contingencies.

Malott’s (1993) rule-governed behaviour account of goal setting better explains instances in which goals affect behaviour in the absence of direct contingencies. However, this account cannot explain why people performed better in an indirect and less probable contingency (high goal). Malott proposed that given sizable and probable outcomes, people will follow rules even though those outcomes are delayed. This suggests that individuals will increase performance when presented with a contingency that is more sizeable and probable (low goal) than when presented with a contingency that is less sizeable and less probable (high goal); however, this was not the case. Thus, earlier accounts do not sufficiently explain the effects of high goals observed in the current research.

While addressing the concern that behavioural accounts do not sufficiently explain complex verbal human behaviour, Hayes (2004) suggested that either additional behavioural principles need to be explored or more creative applications of behavioural principles need to be developed. An explanation of the current empirical research in terms of O’Hora and Maglieri’s (2006) model adds to a discussion of the behavioural mechanisms underlying goal setting and feedback, and removes the focus from mere topographical explanations of goals and feedback. According to O’Hora and Maglieri’s model, goals pinpoint behaviours that will lead to goal attainment. Such behaviours come under the control of environmental stimuli and therefore are more likely to occur. The verbal content of a goal statement affects behaviour; if a participant is assigned a difficult goal, the participant will work harder to reduce ‘less than’ comparisons between current performance levels and the goal level, resulting in higher levels of performance in
the presence of a high goal. For the participant in the current study, derived reinforcement was conditional upon inputting patient’s data, thus behaviours that led to inputting data increased.

**9.2.2 Feedback increased goal-directed performance**

Results of Study 2 demonstrated that performance was significantly greater for a feedback group when compared to a no feedback group. Early behavioural accounts have described feedback as a form of reinforcement or as a discriminative stimulus depending on the situation in which it occurs (Duncan & Bruwelheide, 1985). According to Fellner and Sulzer-Azaroff (1984), feedback will enhance the effectiveness of goal setting provided that the feedback itself is functioning as a conditioned reinforcer. They proposed that if feedback is specifically related to meeting the goal and is paired with a reinforcer (e.g., praise), the goal will occasion similar behaviour in the future. The goal and feedback occasion behaviour under stimulus control; however, as noted in Chapter 3, this account assumes that prior pairing has occurred in order to establish stimulus control.

Agnew and Redmon (1993) argued against earlier discriminative stimulus accounts of feedback, stating that if feedback functioned as a discriminative stimulus, then it would be consistently paired with a reinforcer, and would be delivered immediately. If feedback functioned as a reinforcer, it would be delivered immediately and contingently, and would reliably increase the behaviour in the future. Agnew and Redmon argued that these observations rarely occur within organisations, and that in the absence of observing these contingencies it is likely that rules are involved. Prue and Fairbank (1981) suggested that feedback functions as a discriminative stimulus operating through rule-governed behaviour. Accordingly, the effectiveness of feedback will depend upon prior reinforcement for changes in behaviour contingent upon previous feedback interventions. If behaviour was not reinforced in previous feedback interventions, then it is likely that the current feedback intervention will not have the desired effect (Prue & Fairbank, 1981). As with the early accounts of goal setting, these accounts explaining the effects of feedback on behaviour assume prior contact with feedback contingencies. These accounts are unable to explain the positive effects of a high goal combined with feedback when both the goal and the feedback are novel.

As the task and goals were novel to the participant, an account explaining feedback in terms of its *derived* reinforcing function may provide a more
comprehensive account. According to O’Hora and Maglieri’s (2006) model, feedback leads to self-statements around current levels of performance. The provision of feedback statements signals current performance levels to participants, and reducing the comparison relations between statements about current performance and the goal level functions as derived reinforcement for goal-directed behaviour. Performance increases due to the derived reinforcing functions of feedback, so participants who receive ongoing feedback will work harder to reduce ‘less than’ relations than participants who do not receive ongoing feedback statements. The combination of a high goal and feedback results in greater performance because the high goal results in an individual working harder to decrease ‘less than’ relations and the addition of feedback leads to increased statements about current level of progress.

9.2.3 Participants demonstrated resistance to extinction

The majority of participants in the current programme of research demonstrated resistance to extinction. A possible explanation for this is that participants displayed rule-governed insensitivities to contingencies. Kaufman, Baron, and Kopp (1966) demonstrated the effectiveness of instructional control when instructions were inconsistent with scheduled reinforcement contingencies. In the current research, the goal (rule) may have controlled the response rate in the absence of goal attainability. Similarly, goal setting is typically implemented on an intermittent schedule of reinforcement in real-world settings. This could explain an insensitivity to extinction.

According to earlier behavioural accounts, goal attainment is necessary in order to increase performance (Fellner & Sulzer-Azaroff, 1984). Similarly, according to O’Hora and Maglieri’s (2006) model, if comparison relations between current progress and the goal level are not reducing sufficiently to function as derived reinforcement, an extinction effect should be observed. Consequently, it was anticipated that in the presence of an unattainable goal, participants would reduce responding or demonstrate a decrease in persistence as performance was not moving them sufficiently closer to the goal level. This was not reliably shown in the current series of studies; however, some results suggest a possible extinction effect.

Results of Study 4 indicated that participants who demonstrated lower levels of baseline responding demonstrated less resistance to extinction. In this study, participants were assigned a goal level based on baseline performance, thus
participants who exhibited low levels of baseline responding were assigned relatively low goal levels. However, despite the low goals assigned, participants in the lower goal level group demonstrated less resistance to extinction than participants who demonstrated higher rates of baseline responding. According to O’Hora and Maglieri’s (2006) model, for these participants, when an unattainable goal was assigned, the reduction of ‘less than’ comparison relations may not have been sufficient to function as derived reinforcement of goal-directed behaviour, and an extinction effect was observed. That is, these participants exhibited such low rates of performance in baseline that when an unattainable goal was assigned, performance did not increase sufficiently to progress the participant towards the goal, thus derived reinforcement was undermined.

Results of Study 5 demonstrated reduced persistence for participants who were assigned an extremely unattainable goal initially, followed by less unattainable goals. This effect can be described in terms of O’Hora and Maglieri’s (2006) prediction that behaviour will contact extinction as self-statements around current performance no longer function as derived reinforcement. The initial goal level may have been so unattainable that ‘less than’ relations did not decrease sufficiently to function as derived reinforcement. Conversely, when participants were assigned an initial marginally unattainable goal followed by more difficult goals, participants demonstrated persistence. O’Hora and Maglieri suggested that participants must be moving sufficiently towards a goal in order for reduction of comparison relations to reinforce performance, and performance for the ascending goal group in Study 5 could be explained in these terms. Although these participants failed to attain the goal, comparison relations between current level of performance and the goal statement may have reduced sufficiently to function as derived reinforcement for goal-directed behaviour.

9.2.4 Feedback seeking reduced as goal level increased

Study 3 revealed that frequency of feedback seeking was reduced in a high goal condition when compared to a low goal condition. It may be the case that participants realised that a strategy of seeking feedback was counter-productive in a high goal level, as resources were better allocated to seeking feedback. According to O’Hora and Maglieri’s (2006) model, feedback leads to self-statements that result in comparison relations and the reduction of these comparison relations functions as derived reinforcement of goal-directed behaviour. Consequently, individuals will
seek feedback due to the derived reinforcing function of feedback statements. However, according to the results of Study 3 and Study 5, there may be times when the cost of seeking feedback outweighs the reinforcing function of feedback. From the perspective of O’Hora and Maglieri’s model, seeking feedback in the presence of an unattainable goal will result in self-statements about current progress that highlight performance as not moving sufficiently closer to the goal, thus feedback statements no longer function as derived reinforcement. Consequently, participants reduce their feedback-seeking responses, adjusting their strategy to attain the goal. Furthermore, if the cost of seeking feedback previously resulted in a gain (e.g., information) and now the gain is lost, feedback seeking may be punished because the gain no longer outweighs the cost.

9.3 Applied Implications

Goal setting interventions that increase productivity and persistence have obvious economic benefits; however, few laboratory studies have investigated the dynamics of goal-directed behaviour, or demonstrated prediction and control of such behaviour. Several findings from the current programme of research may inform organisational interventions. Results from Studies 1 and 2 supported prior research that high goals lead to higher levels of performance, and the addition of feedback increases performance further than goal setting alone. Of particular interest to organisational settings are the results from Study 3, indicating that as goal level increases, feedback seeking decreases. This suggests that implementing a stretch goal may result in reduced feedback seeking. Researchers have suggested that assigning a stretch goal may prompt an individual to engage in a number of simultaneous behaviours in order to reach the unattainable goal (See et al., 2011). In the absence of feedback, it may not be possible to determine which behaviours are effective goal-directed behaviour. This trade-off may lead to dysfunctional performance, as individuals may exhibit behaviours that are not goal-directed, and in the absence of feedback, they may continue to engage in dysfunctional behaviours instead of adjusting to meet the goal.

Setting stretch goals can also result in unethical behaviour such as cheating or lying to attain the goal (Ordonez, Schweitzer, Galinsky, & Bazerman, 2009), and in the absence of feedback, this unethical behaviour may continue to occur over time. In a review of the effects of stretch goals in organisations, Ordonez, Schweitzer,
Galinsky, and Bazerman, (2009) reported on a number of instances of unethical behaviour. For example, in the 1980’s Miniscribe employees mailed bricks to customers instead of disk drives in order to meet shipping targets. If the provision of an unattainable goal reduces feedback seeking, then dysfunctional or unethical behaviours may occur at a higher rate and for a prolonged period of time.

See et al. (2006) suggested that when choosing difficult goals, organisations should consider the trade-off between high and low performers. Performance may increase or ‘level off’ for high performers; however, performance may reduce for lower performers as they do not reach their goal. These authors suggested that goals that are marginally unattainable and tailored for each individual will produce the highest levels of performance. Study 5 provided support for this. A reduction in persistence was observed when an initial goal was extremely unattainable and then reduced, whereas, when an initial goal was marginally unattainable and then increased, participants persisted. From a behavioural perspective, when the goal was only marginally unattainable, progress towards the goal may have been sufficiently reinforcing, whereas when the goal was extremely unattainable, comparison relations between current performance and the goal level did not decrease sufficiently to function as derived reinforcement. This suggests that if unattainable goals are to be prescribed, ensuring that the goal is marginally unattainable and not extremely unattainable may result in greater productivity and persistence.

Furthermore, Sitkin, See, Miller, Lawless, and Carton (2011) suggested that recent performance will affect how an individual reacts to an unattainable goal. Strong performers will benefit to a greater extent from unattainable goals than weak performers, as stronger performers are less likely to perceive a stretch goal as a potential threat. Weaker performers, because they are in a state of compromise due to recent losses (low levels of performance), are less equipped (attentionally) to tackle an unattainable goal. Results of the current series of studies appear to provide evidence of this (Study 4). Participants who exhibited low rates of baseline responding demonstrated decreased persistence in the presence of an unattainable goal when compared to participants who exhibited higher rates of baseline responding. This suggests that baseline performance should be observed in organisational settings in order to inform a goal level, and the goal level should be adjusted based on relative ability of the performer.
9.4 Limitations

A number of limitations warrant discussion. The first three studies in the thesis employed a reversal design, and in the second baseline condition, a reduction in performance was not reliably observed. From a behavioural perspective, the derived reinforcing function of goal attainment, or progress towards a goal may have maintained throughout the second baseline. Bucklin et al. (2003) examined the effect of incentives on performance with and without feedback, using a reversal design. When feedback was removed, a reversal effect was not observed. The authors proposed that as larger incentives were provided contingent upon performance, feedback may have increased performance or evoked more effective performance, resulting in additional incentives. When feedback was removed, contact with these larger incentives may have maintained performance at this higher level. They suggested that when higher levels of performance are achieved through the introduction of feedback, and reinforced (in their case through money), performance may persist even in the absence of feedback. This could be true for the current research. Goal attainment, or significant progress towards the goal through higher levels of performance may have served as reinforcement for goal-directed behaviour, resulting in increased persistence even in the absence of a goal. The withdrawal design was retained for Studies 2 and 3 in order to assess whether or not the variables manipulated in these studies (feedback and feedback seeking) would result in differing withdrawal effects.

Bucklin et al. (2003) noted that in a number of laboratory studies alternative activities are not presented. When this is the case, participants may engage in the task regardless of the contingencies in place, i.e., goals. The absence of a withdrawal effect may have been due to a lack of competing responses in which the participant could engage. In a typical work environment there are many stimuli present (e.g., internet, concurrent goals, unplanned interruptions), which may evoke competing responses that result in higher levels of reinforcement than achieving the task at hand. These stimuli may function as establishing operations, motivating escape behaviours that are incompatible with the targeted work behaviour (Olson, Laraway, & Austin, 2001). Additional stimuli were not included in the current research as the focus of the research was a direct experimental manipulation of goal and feedback variables. As these were not present, participants may have continued
to work towards a higher level of data input, despite reaching the goal or even when the goal was removed.

Within the current series of studies, an unattainable goal was considered a goal that was unattainable for each individual. This resulted in the removal of participants who met the assigned goal. For the first three studies an arbitrary high goal level was chosen based on pilot studies, and a number of participants met this seemingly ‘unattainable’ goal. In order to account for differing abilities, the high goal level for studies 4 and 5 were chosen based on baseline performance. However, if a participant exhibited a low level of responding in baseline that participant’s goal level was considerably low and within the participant’s ability to reach. As such, the unattainable goal level for these individuals was not unattainable and the participant’s data were removed from analysis. The decision to remove data was based on the examination of unattainable goals and not attainable goals; however the removal of data highlights the difficulty faced when addressing unattainable goals. The unattainability of a goal differs between individuals. Thus attempting to create one overarching definition of a challenging or unattainable goal for the purpose of group analyses is a difficult task.

A compromise with laboratory studies is that it is difficult to generalise results. The sample employed were students, and the laboratory setting did not allow for a true measurement of work behaviour or the work environment. However, the studies in the current programme were aimed to provide a micro-level analysis of particular variables that affect behaviour in order to inform a comprehensive behavioural account of goal setting. It is difficult to generalise the current results to an organisational setting because of the brevity of the sessions; however, the study provides material for planning future studies that would be better designed to answer the question of persistence with an unattainable goal. The limitations highlighted above should drive future studies, particularly investigations of persistence or deterioration of goal-directed behaviour over time when an unattainable goal has been assigned.

**9.5 Directions for Future Research**

Agnew and Redmon (1993) suggested that research within OBM will benefit from the addition of post-study interviews specifically to determine types of rules used by participants, to supplement results found in the study. Few studies have
examined measures of participant’s responses such as their own private verbal behaviour, when explaining overt behaviour. In three of the current studies, participants were asked a series of questions at the conclusion of the study in order to examine a number of concerns such as whether or not participants set their own goals throughout the study. However, in the current series of studies, it emerged that several participants incorrectly reported on their behaviour at the end of the study. For example, participants reported seeking time feedback to a greater extent when data revealed that they chose score feedback more frequently. Although this was a secondary analysis in the thesis, as performance was the primary dependent variable, it is suggested that an analysis of participant’s verbal behaviour may provide support for a functional explanation of goal setting and feedback.

Cabello, Luciano, Gomez, and Barnes-Holmes (2004) cautioned against obtaining post-study reports of verbal behaviour, as the post-study report may not correspond with the actual verbal statements that occurred during the study. Researchers in relational frame theory have suggested that “think aloud” or protocol analysis be adopted for the study of rule-generation or rule-following (Cabello et al., 2004; Cabello & O’Hora, 2002; Hayes, White, & Bissett, 1998). It may be beneficial to introduce protocol analysis to examine verbal behaviour throughout a task such as the one in the current research. The aim of protocol analysis (Ericsson & Simon, 1980) is to provide a moment-to-moment analysis of the relation between what an individual is saying and what they are doing, thus investigating the role of verbal behaviour on human performance (Cabello & O’Hora, 2002). Participants are instructed to think aloud during an experiment, and provided a number of controls are met to ensure correspondence between verbal statements and private verbal behaviour, it can be concluded that the overt verbal behaviour and the private verbal behaviour are functionally equivalent. The use of this procedure avoids issues raised when verbal reports following a task do not concur with actual behaviour during the task, such as the feedback-solicitation question in the current study.

Protocol analysis has been utilised to a limited extent within OBM (Alvero & Austin, 2006; Austin & Mawhinney, 1999). Alvero and Austin (2006) implemented protocol analysis and the “silent dog” method (Hayes, 1986), a modified version of protocol analysis that incorporates additional methodological measures (e.g., disrupting verbal behaviour to observe for a disruption in task performance), in order to investigate whether self-reports about safety measures were related to safety
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performance. Results of two studies demonstrated a functional relationship between safety-related verbalisations and increases in behaviour with participants who were required to carry out safety observations (Alvero & Austin, 2006). The implications of this study were that the results provided a first step in determining a behavioural function of conducting behavioural safety observations.

As noted earlier in the thesis, behavioural theory is limited in providing accounts of many complex work behaviours, and protocol analysis may assist in determining functional explanations. According to the O’Hora and Maglieri (2006) model, individuals issue self-statements about current progress and these statements participate in comparison relations with the goal level. Adoption of protocol analysis during a task such as the one in the current research provides an opportunity to examine verbal statements throughout the task. If participants are issuing statements such as “I have inputted 20 patients’ data”, this provides further support for an RFT explanation of the behavioural processes underlying goal setting, and protocol analysis will allow an examination of whether or not these verbal statements predict performance. Consequently, it is recommended that future studies might benefit from incorporating such a detailed, controlled analysis of ongoing verbal behaviour throughout a similar study.

In the current programme of research, a number of feedback variables were not examined, as immediate knowledge of score and time remaining were the focus of the thesis. Future research might benefit from an analysis of a broader range of feedback variables, particularly in an attempt to explain the processes underlying goal setting and feedback from an RFT perspective. Of these variables, an analysis of frequency and timing of feedback may add to accounts of feedback as it affects performance. In the current programme of research, participants received feedback at the end of each work condition, whether they were in the feedback group or in the no feedback group. Feedback provided at the end of each condition may have maintained or increased performance in the no feedback group to a greater extent than if no end-of-condition feedback had been presented.

Prior research has focused on an explanation of the effects of frequency of feedback in terms of topography and not underlying functions. For example, Chhokar and Wallin (1984) found that feedback delivered once a week did not result in more effective performance than feedback delivered once every two weeks, in a machine manufacturing and repair plant. Pampino, MacDonald, Mullin, and Wilder
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(2003) found that daily feedback enhanced the effectiveness of a goal setting intervention to a greater extent than weekly feedback. Kang, Oah, and Dickinson (2003) examined the effect of differing frequencies of feedback under hourly and incentive pay conditions. Participants who received feedback after every session performed significantly better than participants who received feedback after every fourth session. With the adoption of protocol analysis, an examination of the effects of feedback frequency and timing on verbal behaviour and performance will add to a functional explanation of the processes underlying feedback, particularly in terms of rule-generation and rule-following. In particular, protocol analysis may assist in determining whether individuals issue self-statements about current level of progress when feedback has been delivered (and may provide a measure of latency). Furthermore, through the use of protocol analysis we can determine whether or not these self-statements affect goal-directed behaviour.

9.6 Conclusions

The current programme of research aimed to contribute to goal setting literature in a number of ways. First, the thesis was informed by a novel comprehensive behavioural model of goal setting (O’Hora & Maglieri, 2006) and results of five experimental studies were explained in terms of this account. This model is grounded in behavioural theory, yet can provide a functional explanation for how goals establish reinforcing functions; an explanation that has been lacking in earlier behavioural accounts. Debates have raged amongst behaviour analysts about why behaviour analytic approaches are not accepted in mainstream industrial/organisational psychology, and how to assimilate behavioural theory into teaching and practice within more mainstream organisational psychology. Some behavioural researchers have suggested adopting theories and models from other disciplines, for example achievement theory and self-efficacy. However, an alternative is to broaden existing behavioural theory to account for complex human behaviour (Hayes, Bunting, Herbst, Bond, & Barnes-Holmes, 2006). A behavioural model of the underlying processes of goal setting and feedback based on RFT attempts to accomplish this.

Second, the thesis provided an examination of the effects of unattainable goals on behaviour. Results showed that high goals led to higher levels of behaviour and feedback significantly enhanced goal-directed performance, replicating past
research. Results demonstrated that the majority of participants persisted in the presence of an unattainable goal; however, individual-level analysis revealed varying performance patterns. Participants who exhibited low levels of baseline responding demonstrated decreased resistance to extinction (Study 4). Similarly, participants who were assigned an initial extremely unattainable goal demonstrated less resistance to extinction when compared to participants who were assigned an initial marginally unattainable goal. The thesis contributed to the dearth of literature examining both the effects of unattainable goals on performance and the effects of feedback on performance in the presence of an unattainable goal. Additionally, the research provided an investigation of the effect of goal level on feedback seeking. Within the feedback seeking literature, effort cost has received little attention, and the current results indicate a possible trade-off between the reinforcing function of feedback and the effort required to reach an unattainable goal (Study 3).

Finally, laboratory studies examining the effect of goal level on performance are typically short in length, and several researchers have suggested that lengthened sessions should be employed (Austin & Bobko, 1985; Fried & Slowik, 2004). The current research aimed to add to the empirical research examining the effects of unattainable goals on performance over a lengthened time period. As noted above, the implementation of stretch goals has resulted in inconsistent effects on behaviour (See et al., 2011; Ordonez et al., 2009), and the current programme of research aimed to add to the literature to account for these inconsistencies. The results provide partial support for O’Hora and Maglieri’s (2006) model, and further research is necessary in order to gain a concise picture of the variables that result in higher levels of performance in the presence of stretch goals, and those that result in a reduction in performance.


References


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Appendix A: Consent Form

Title of project: Dynamic analyses of goal-directed behaviour

Researcher: Triona Tammemagi

The current research study will investigate the effects of goal statements on performance over time. The study will measure your performance on a work task over time. It is not a measure of ability. If you are a first year or second year psychology student you can choose to partake in research to earn credits. Please note that you are not obligated to participate in any research. Any information gathered during the study will be kept confidential – your name will not be used throughout the study, and the consent form will be kept separate from any data. Please contact the primary researcher if you have any questions or concerns following the study.

Please initial box

1. I confirm that I have read the information sheet dated __________ for the above study and have had the opportunity to ask questions

2. I am satisfied that I understand the information provided and have had enough time to consider the information

3. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my rights being affected

4. I agree to take part in the above study

________________________
Age of participant

________________________  ______________ ________________ __
Name of participant  Date   Signature

________________________  ______________ ________________ __
Name of researcher  Date   Signature

1 for participant, 1 for researcher, 1 to be kept with research notes
Appendix B: Task Instructions

During this experiment you will be coding data for a medical company. You will examine the data provided for each patient and decide whether it is within range or out of range for each patient. To do this, you will first have to input the patient’s ID number (in the blue box to your left) in the PATIENT ID box in the centre of the screen. Next, check the patient’s gender, and his or her QT interval number and compare it to the relevant box in the centre of the screen (i.e. for female patients, check the FEMALE range, for males, the MALE range). If the patient’s QT interval is within the range for his or her gender, then click the dot next to ‘within range’. If not, click the dot next to ‘out of range’. When you are satisfied that you have made the right decision, click on SUBMIT to process this patient’s file. The experiment is divided into a number of sessions. Sometimes you will be working unsupervised. Other times, a virtual manager will ask you to complete a certain number of patients correctly. Well, that concludes the instructions for this experiment. The experimenter will deal with any further queries you have at this point. Remember to let the experimenter know if you need a break for any reason. In this first session there will be no virtual manager present. If you are ready to start the experiment, just click OK and then START NEXT SESSION. Best of luck!
**Appendix C: Phase Means, Maximum Score and Trend for Each Participant in the Feedback Group, Study 1**

**Table C1: Individual Means, Max Score, and Trend for Each Participant in the Feedback Group, when the High Goal was Presented First**

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<th>BL2</th>
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*Note:* Each row denotes a participant. A participant row gives mean, max and slope value for each condition, as well as the chosen goal condition in the choice section (LG is low goal and HG is high goal). For example, Participant 1 scored a mean of 15 in baseline, with a max score of 17, and demonstrated an increasing trend throughout baseline.
# Appendix C

## Table C2

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Note: Each row denotes a participant. A participant row gives mean, max and slope value for each condition, as well as the chosen goal condition in the choice section (LG is low goal and HG is high goal).
### Appendix D: Phase Means, Maximum Score and Trend for Each Participant in the No Feedback Group, Study 2

#### Table D1

*Individual Means, Max Score, and Trend for Each Participant in the No Feedback Group, when the High Goal was Presented First*

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*Note:* Each row denotes a participant. A participant row gives mean, max and slope value for each condition, as well as the chosen goal condition in the choice section (LG is low goal and HG is high goal).
### Table D2

*Individual Means, Max score, and Trend for Each Participant in No Feedback Group, when the Low Goal was Presented First*

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**Note:** Each row denotes a participant. A participant row gives mean, max and slope value for each condition, as well as the chosen goal condition in the choice section (LG is low goal and HG is high goal).
Appendix E: Post-Testing Questions (Study 4)

Participant Number: ______________

1. How many patients did your manager ask you to input?
2. Did you look at the countdown clock on the screen?
3. Did you look at the counter at the bottom of the screen?
4. Which do you think you looked at more?
5. Did you follow the goals given to you or did you set your own goals?
6. Did you read the instructions presented to you from each manager?
7. Did you reach the goal?
8. Did you feel that you could reach the goal?
9. Did you keep track of how many patients you had inputted? (no feedback sessions)
Appendix F: Post-Testing Questions (Study 5)

Participant Number: _____________

1. Did you read the instructions presented to you from each manager? Did you know that the goal changed per session?
2. How many patients did Bob ask you to input in each session?
3. Did you reach the goal?
4. Did you feel that you could reach the goal?
5. Did you look at the countdown clock on the screen?
6. Did you look at the score feedback on the screen?
7. What type of feedback did you pick the most?
8. Why did you choose that type of feedback?
9. Did you follow the goals given to you or did you set your own goals?
10. Did you refer to the yellow part at the top of the task screen to find out what your goal was?