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GOAL ANALYSIS TRAINING:

CONTEXTUAL INFLUENCES ON LEADERSHIP PERFORMANCE

A THESIS APPROVED FOR THE

DEPARTMENT OF PSYCHOLOGY

BY THE COMMITTEE CONSISTING OF

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Abstract

Goal-setting theory is perhaps one of the most successful theories of motivation and performance that has been practically applied. However research has given little consideration to how individuals analyze goals that are set for them by someone else. In this study, 192 undergraduate participants took on the role of a principal during an educational leadership task. Participants were randomly assigned to conditions of training in goal analysis strategies, increased task complexity, and increased pressure. Findings indicate that training in goal analysis is beneficial when working through low complexity tasks – an effect that is accentuated under conditions of pressure. The implications of these findings as well as avenues for future research are discussed.

Keywords: leadership, goal analysis, task complexity, problem-solving

Goal Analysis Training: Contextual Influences on Leadership Performance

One of the main directors of human behavior is an individual's intended outcome, known more commonly as a goal (Ryan, 1970). These idealized future states set the stage in one's mind for what they wish to achieve. Goals allow for individuals to plan or forecast what actions must be taken in order to achieve their goal state which in turn leads to a tendency to pay more attention to activities that are goal-relevant than activities that are not (Rothkopf & Billington, 1979). The notion that an individual's goals purposefully regulate their actions, both consciously and subconsciously, is the entire basis of goal setting theory (Locke & Latham, 1984).

Goal-setting theory is perhaps one of the most successful psychological theories of motivation and performance that has been applied practically (Latham & Arshoff, 2015). It has been studied over a thousand times in at least eight countries, on over 88 different tasks, in both laboratory settings as well as the field, for time ranges from as little as one minute to as long as 25 years, and under conditions where goals were either self-set, set by means of participation, or assigned to individuals (Locke & Latham, 1990; Mitchell & Daniels, 2003). One of goal-setting theory's central tenets is that individuals use goals to guide their behavior. Accordingly, findings have indicated that the identification of key goals allows for individuals to better plan their behavior to be goal-focused, which in turn leads to increase performance (Thomas & McDaniel, 1990). Empirical findings have also indicated that individuals are likely to measure success relative to attainment of their goals (Kluger & DeNisi, 1996). These performance evaluations are often received from others but can also be a judgment one makes about their own goal completion. As such goal-setting theory is important for understanding both how individuals direct their behavior as well as how they assess their performance relative to actions taken and goals attained.

Although goal-setting theory can be applied broadly to all individuals, its findings may prove to be more salient under certain conditions, namely that of leadership. The setting of effective goals is likely to be critical for leader performance, especially for individuals exhibiting certain leadership styles (Mumford & van Doorn, 2001). It is also essential to remember that not all goals are of equal value – they can vary on a number of factors including difficulty, clarity, and time to completion. Goals that exhibit certain characteristics may similarly be more important for certain leadership styles over others. As an example, pragmatic leaders are more likely to be successful in influencing followers when clear goals are present (Podsakoff & Mackenzie, 1995). Because pragmatic leaders rely on a consensus regarding needs, they are less likely to be effective when conflict exists among group members about goals. They may also prove to be less effective under conditions of ambiguity where individuals cannot readily take actions that lead to goal attainment (House, 1971).

The scenario is often not as simple as a leader merely setting goals that are most likely to be effective for their situation, however. As Latham and Locke (1991) point out, it common for goals to be set not by the individual or group in an organization that is required to attain them but rather by a supervisor or manager. As such these individuals or groups that are required to achieve these goals have very little say in what goals are actually set. Furthermore, it is not a given that they will see these assigned goals as necessary or legitimate. Although assignment of these goals by an authority figure such as a supervisor or manager often implies that the goal is legitimate, individuals will not necessarily by committed to achieving these assigned goals (Latham & Locke, 1991).

In the case of only a single goal being set or assigned for an individual, it could easily be inferred that the individual will work towards this goal as it is their only option. In organizations

however, it is often the case that individuals, namely middle managers, will be assigned multiple goals to work towards at any given time. These individuals are likely to view these goals differently, seeing certain paths as more legitimate than others. Moreover the different characteristics of these goals are likely to be more appealing to certain individuals than others. For example, a given goal is more likely to be chosen if it is believed that it can actually be attained (Latham & Locke, 1991). As such one could expect that "dream" goals are less likely to be worked towards than more realistic goals. Alternatively, an individual may prioritize goals that can be maintained for an extended period of time after its initial attainment (Brodscholl, et al., 2007). Certain goal states might require a number of resources in upkeep in order to continuously gain their benefits which is a likely consideration for individuals such as leaders that need to forecast past the short-term. Furthermore, individuals may seek to minimize the amount of conflict between goals. In a situation where multiple goals need to be worked towards at the same time, goals that conflict with one another can undermine performance as an individuals is required, to seek attainment of one goal, to act in a way that is incompatible with one or more other goals (Locke et al., 1994). Because resources in an organization are necessarily limited, individuals need to carefully choose the goals that they deem to be the most likely to be successfully attained instead of goals that are either infeasible or unreasonably costly.

These points imply that, when presented with multiple goals that have been assigned to them, an individual needs to weigh the relative merits of each goal to effectively decide which goals are most worthy of pursuing. As such these individuals need to analyze certain aspects of each goal and compare them according to the costs and benefits of their attainment and maintenance if they wish to effectively manage these goals.

Goal Analysis

Up to this point, the literature has not studied goal analysis as a unique process distinct from goal-setting and goal choice. This has occurred despite the argument that it is a critical contribution for leader performance (Mumford et al., 2017). One of the few studies of goal analysis was completed by Strange and Mumford (2005). In this study, 212 undergraduates were asked to form a vision for a new experimental high school where they were to take on the leadership role of principal. These undergraduates were presented with either relatively good or poor examples of other educational interventions. They were then asked to analyze these cases with respect to goals, causes, both goals and causes, or neither goals nor causes. After this task participants formulated a plan for leading their experimental school as well as a speech communicating this plan to potential stakeholders, including students, parents, and teachers. Researchers found that the strongest plans and speeches were created after participants analyzed unsuccessful cases with respect to goals and successful cases with respect to causes. This study thus provides evidence that leaders, when engaging in problem-solving activities, must be able to analyze not only what causes lead to success on a task but what goals are unlikely to succeed as well.

As this is the only study to empirically measure the effects of goal analysis, it is important to keep in mind Strange and Mumford's (2005) findings. One such finding was that explicit searches for the key goals and causes operating in a given system prior to working towards a solution in that problem space resulted in greater task performance. As such goal analysis appears to be generally beneficial for individuals solving problems. Moreover, goal analysis was found to be most effective when examining weaknesses or failures. This implies that it may be easier or more effective to consider what goals should not be pursued rather than

weigh multiple worthy goals. Furthermore the abstraction of key goals or causes was found to be critical for reflection on past experience to benefit task performance. This finding suggests that individuals, when relying on their expertise or their prior knowledge to solve problems, must actively either analyze which causes or goals play central roles in finding a problem solution should they wish to be successful. Although these preliminary findings are good signs for the merits of goal analysis, there is little else in the literature so far to provide further supporting evidence.

Unlike goal analysis which to this point has been understudied, causal analysis has received more focus in the literature. Whereas goal analysis involves analyzing the potential merits of pursuing a certain goal, causal analysis is concerned with examining what actions or behaviors are likely to lead to success. Because these processes are similar to each other, the next steps for empirical research on goal analysis can be drawn from looking at the research on causal analysis.

Following directly from the findings of Strange and Mumford (2005), Marcy and Mumford (2007, 2010) researched how causal analysis could be trained. In these studies, experimenters developed a self-paced instructional program aimed at improving the causal analysis skill of individuals in leadership roles. This training program provided seven heuristic strategies for analyzing causes: 1) work with causes that can be manipulated, 2) work with causes that have a great influence on outcomes, 3) work with causes that influence multiple outcomes, 4) work with causes that can be controlled, 5) work with causes that have synergistic effects, 6) work with causes that work well together, and 7) work with causes whose effects are direct. Each of the two studies used a different experimental task but both tasks asked participants to take on the role of an organizational leader and both were evaluated on solution

quality, originality, and elegance. Results indicated that problems solutions were of higher quality, were more original, and were presented more elegantly when participants were exposed to the causal analysis training.

In much the same way that Marcy and Mumford (2007, 2010) found increased task performance after individuals were trained in strategies for analyzing causes, we argue that individuals can be trained in strategies for analyzing goals. Moreover we believe that individuals that have undergone this goal analysis training will show great problem-solving performance on a leadership task than individuals that have not received this training. Furthermore we expect that individuals that have completed this training will be able to manage goals more effectively with respect the to the goal analysis strategies presented. In accordance with these predictions, we present our first hypothesis.

> **Hypothesis 1**: Individuals that undergo training in goal analysis strategies will show greater task performance and better goal management on a subsequent leadership task than individuals that do not complete this training program.

Although we expect that individuals will perform better after receiving this training, it is possible that we will see a detrimental effect on these outcomes. Individuals that are low in ability may attempt to employ these strategies when they are not relevant. As such they could choose goals that are worse than those that they would have otherwise selected using only their intuitive judgment. In order to further explore the possible effects that this training may have, it is important to examine this process under various circumstances. As such, we consider other constraints in this study.

Performance Pressure

Organizational leaders are often under various pressures at any given point during their work. Some of the most salient examples of high-pressure situations are times of crisis. These crisis scenarios are defined as situations in which high priority goals are threatened. Furthermore, they occur suddenly with very little response time available (Jick & Murray, 1982). Under such circumstances, it can easily be seen that leaders will perform differently based on further characteristics of the situation as well as their own leadership style and skills. As an example, Hunt et al. (1999) found that crisis situations may actually be necessary for certain types of charismatic leadership to be established. As such, it is important to examine and understand how leaders perform under these conditions.

With respect to goal analysis, we expect that individuals will find some amount of difficulty when attempting to manage multiple goals under conditions of pressure. It is possible that in these situations individuals will lock onto and focus on a particular goal or set of goals at the expense of considering alternative goals. As such pressure may inhibit not only their performance on a leadership problem-solving task but their basic goal management as well. Accordingly we present our second hypothesis.

> **Hypothesis 2:** Participants performing under conditions of pressure will demonstrate lower levels of goal management and task performance than participants performing under unpressured conditions.

Task Complexity

Another possible moderator of the effects of goal analysis is the complexity of the task. Task complexity was conceptualized by Wood (1986) as consisting of three elements: information cues, required acts, and products. This framework was later simplified by Bonner

(1994) by terming each of these as task inputs, processes, and outputs, respectively. Mapping these onto a goal-setting framework, task inputs would entail the resources at hand when solving a problem, processes would be the actions and behaviors taken to turn inputs into outputs, and outputs would reflect the desired goal or end-state of the task. This is supported by Haerem and Rau's (2007) conceptualization of task complexity in which task inputs and outputs represent the surface structure of a task whereas the task processes are more indicative of a task's deep structure.

With regard to goal-setting theory, task complexity has already shown some empirical effects. When compared to tasks that have been rated as simpler, more complex tasks show weaker effect sizes for the relationship between goal-setting and task performance (Locke & Latham, 2002; Wood et al., 1987). In a similar vein, we theorize that higher levels of complexity will inhibit both task performance and goal management during the course of a problem-solving task in a leadership context. We construct our third hypothesis in accordance with these predictions.

> **Hypothesis 3:** Participants presented with a problem scenario of greater task complexity will manage their goals less effectively and perform worse overall than individuals presented with the same scenario with less complexity.

In addition to main effects of each of these manipulations on both goal management and task performance, we intend to investigate the interaction effects between each of the manipulations regarding these outcomes. Due to the lack of empirical evidence to support a compelling theoretical argument along these lines, however, we make no formal hypothesis along these lines and instead intend to investigate these potential effects during analysis of our data.

Method

Sample

The participants collected for this study consisted of 192 undergraduate students attending a large Southwestern university. The sample consisted of 58 males, 132 females, and 2 participants that did not wish to disclose their gender. The average age of the participants was 18.57, with a standard deviation of 1.28 years. Participants were recruited from undergraduate psychology courses that provided extra credit for participation in experimental studies. Those seeking to participate in these studies reviewed a departmental website where a brief one-paragraph description of each available study was provided. Interested undergraduates then selected the study, or studies, in which they wished to participate.

General Procedures

Participants were recruited to complete a study focused on leader problem-solving. The study's informed consent document noted that the study could take between one and three hours to complete. In the first part of the study, participants completed two timed individual difference covariate measures. In total, participants spent about half an hour going over the instructions and completing these measures. After these tasks, participants in the training conditions worked through a self-paced instructional program regarding goal analysis strategies. This program was comprised of seven modules and took on average between an hour and an hour and a half to complete. Once participants completed this training program, they moved on to the experimental task. Participants in the untrained conditions proceeded directly from the timed covariate measures to the experimental task.

The experimental task for this study involved a low-fidelity leadership simulation exercise in which participants were asked to take on the role of a principal for a new experimental high school. Participants first read through the material, then formulated a plan for how they would lead the school. After completing their plan, participants created a vision statement in the form of a speech conveying this plan to stakeholders of the school. Manipulations for task complexity and pressure were embedded in this experimental task. Following completion of this task, which typically took between half an hour and an hour to complete, participants completed a number of untimed individual difference covariate measures as the last part of the study.

Covariate Measures

Based on the findings of previous studies of leadership (Vincent et al., 2002; Zaccaro et al., 2015), the timed covariate measures that participants completed first were measures of divergent thinking and intelligence. The divergent thinking measure served to assess participants' ability to think creatively. The divergent thinking measure completed by the participants was Merrifield et al.'s (1962) Consequences measure. This measure asks participants to generate novel ideas reflecting the possible outcomes of unlikely events. One example prompt for this measure asks "What would be the results if people no longer needed or wanted sleep?" Participants were asked to generate as many consequences as possible for five of such prompts. For each prompt, participants were given a time limit of two minutes (for a total of ten minutes for the overall measure). When this measure is scored for fluency, defined operationally as the number of consequences generated, this measure yields internal consistency coefficients above .70. Evidence for the construct and predictive validity of this measure have been provided by Vincent et al. (2002).

As a measure of intelligence, participants were asked to complete the verbal reasoning measure drawn from the Employee Aptitude Survey (EAS). The EAS verbal reasoning measure presents six problem scenarios, with each scenario presenting four or five known facts about the problem. The 30 items of the EAS measure are conclusions that could be drawn from these facts, with 5 conclusions presented for each problem. Participants were asked to indicate whether each conclusion was true, false, or unknown given only the facts of the problem. This measure yields retest reliabilities over .80. Evidence supporting the validity of this measure had been provided by Ruch and Ruch (1980) as well as Grimsley et al. (1985).

The first untimed covariate measure, after a demographic information form, was a measure of global personality characteristics. Participants completed a 100-item inventory checklist developed by Goldberg (1992) to measure the Big Five personality characteristics of extraversion, agreeableness, neuroticism, openness, and conscientiousness. Each participant indicated on a nine-point Likert-type scale the extent to which each of the 100 items, an adjective such as bashful, kind, or prompt, describes their own personality. The resulting 20-item scales of each of these Big Five characteristics yield internal consistency reliabilities above .80. Goldberg (1992) as well as Gill and Hodgkinson (2007) have provided evidence for the predictive and construct reliability of these scales.

To measure expertise relevant to the experimental task, participants were then asked to complete a background data measure developed by Scott et al., (2005). This measure presented participants with a set of questions regarding their exposure to and interest in issues surrounding education. Example items include "How much time do you spend thinking about how to make schools better?" and "How likely is it that you will go into education as a career?" Participants responded on five-point Likert-type scales. These items yield an internal consistency coefficient

above .70. Scott et al. (2005) as well as Robledo et al. (2012) have provided evidence for the construct and predictive validities of this measure for expertise in education.

Because the leader problem solving task requires participants to think deeply, the next untimed covariate measure participants were asked to complete was Cacioppo et al.'s (1984) need for cognition measure. This measure includes 18 items rated on five-point Likert-type scales. Items measures a participant's engagement in intellectually challenging tasks. Example items include "I only think as hard as I have to" (reverse-coded) and "I prefer my life to be filled with puzzles that I must solve". The scale resulting from these items yields internal consistency coefficients above .80. Cacioppo and Petty (1982) and Watts et al. (2017) have provided evidence supporting the construct validity of this measure.

Because the nature of the training in combination with the experimental task required planning, participants next completed Marta et al.'s (2005) measure of planning skill. In this measure, participants are present with case abstracts that describe scenarios in which a business leader engages in planning. Participants are then presented with five questions regarding the scenario with eight to twelve potential response options. They are asked to select the two to four options that they prefer. Response options were structured so that they reflected key planning skills such as forecasting, identification of restrictions, and identification of key causes. When scored for overall planning skill, this measure yields split-half reliabilities above .80. Marta et al. (2005) have provided evidence supporting the predictive validity of this measure for planning performance.

The final untimed covariate measure participants completed was intended to control for leadership style. Drawn from Bedell-Avers et al. (2008), this measure assesses a participant's preference for charismatic, ideological, or pragmatic leadership style. Each item in this 12-item

measure presents three one-paragraph summaries of a speech given by a charismatic, ideological, or pragmatic leader. Participants indicated which of the three speeches belonged to a leader that they would characterize as most similar to themselves. This measure yields split-half reliabilities above .80. Bedell-Avers et al. (2008) have provided evidence in support of this measure's validity.

Goal Analysis Training

The first of the experimental manipulations, the training versus no training condition, occurred after participants completed the timed individual difference measures but before they began working on the experimental task. Half of the participants completed the training program while the other half did not. The participants that did not receive the training content went directly from the timed covariate measures to the experimental task. Development of the training program began with a review of the literature (Latham & Locke, 1991; Locke & Latham, 2002; Brodscholl et al., 2007; Kluger & DeNisi, 1996) and was additionally based on the development process completed by Marcy and Mumford (2007, 2010) for causal analysis training. These reviews were completed to identify the strategies that individuals are likely use when working with multiple goals in complex problem-solving situations. This led us to pinpoint seven different characteristics of goals that individuals should consider when undergoing goal analysis. These include goals that 1) are attainable, 2) have clear paths to attainment, 3) have specific endpoints, 4) are relatively low-cost to attain, 5) can be maintained for an extended period after attainment, 6) are required for completion of future goals, and 7) can be worked towards at the same time as other goals.

The training program developed for this study thus included seven individual training programs designed to instruct participants in applying each of these heuristics. These self-paced

modules were each five pages long and followed a single identical format. Participants were asked to initially read through an operational description of the heuristic that defined how the heuristic could be identified and how its application contributes to managing goals and solving problems. Participants were then presented with an example of a day-to-day application of each strategy.

After reading through this introductory material for each heuristic, participants worked through a series of multiple-choice questions related to three scenarios that were either structure or semi-structured in nature. Each of these scenarios was either day-to-day in nature or domain-general so that each participant could understand the problem content. After each of these scenarios, participants were provided with correct answers to each multiple choice question as well as explanations regarding the reasoning behind these answers. The final part of each of these heuristic programs involved a short, one-paragraph prompt setting up an unstructured problem scenario. Participants were asked to generate three to four goals that would benefit them in the scenario and select one to two of these goals that would be the best to pursue in the scenario, applying only the relevant heuristic for that program. These one-paragraph prompts were again drawn from globally applicable contexts to allow for each participant to understand the constraints of the problem. Completion of all seven of the goal analysis heuristic training programs took on average between an hour and an hour and a half.

Experimental Task

To assess the effects of the goal analysis training, participants were asked to complete a low-fidelity simulation exercise. This task required participants to take on the role of a principal of a new experimental high school and was drawn from Strange and Mumford's (2005) study of cause/goal analysis. This task was chosen as it presented participants with a number of goals, of

which they had to prioritize those they deemed most significant. Prior studies using this task have indicated that undergraduates have the expertise required to perform this task and that they generally find the task to be realistic and engaging, indicating that they are motivated to take the task seriously.

As the new principal for the experimental high school, participants were to take on the challenge of improving the academic success of the student body by crafting a new curriculum for the school. Participants were initially presented with a description of the high school. This material noted that the school had been established by the State Department of Education based on funds allocated as a national effort to establish experimental secondary schools in each state. The purpose of this effort was to establish new programs to contribute to improving the academic performance of the student body. School performance was to be assessed at the end of each academic year and compared to other high schools in the state as well as other experimental schools in different states. These performance evaluations were to be conducted using standardized tests administered in a pre-post format measuring general educational skills such as writing skills, reading comprehension, mathematical skills, and analytical skills. Additional tests were to examine student performance in specific content domains including the sciences, geography, social studies, and foreign languages. Participants were informed that schools that produced the greatest performance gains would receive additional funding in the following academic year and would be asked to circulate their curriculum through the other secondary schools in the state. It is noteworthy that the issues presented in this material were collected from a review of educational literature completed by Scott et al. (2005) aimed at identifying the key issues influencing school performance.

After reading through this introductory material, participants were provided with a more detailed description of the experimental school as well as the state educational system. Participants were informed that current issues facing the state's educational system had resulted in the state's schools being ranked 47th in the nation in terms of academic performance and ranked 49th nationally in terms of school funding. The school itself was described as having a projected enrollment of 400 students drawn from a variety of ethnic groups. Participants were told that their teaching method should include programs to help members of special populations such as gifted students and academically disabled students. Furthermore they were told that funding for the school would provide enough teachers to have a ratio of 20 students per instructor. These teachers were to also be paid above average salaries for their involvement in the school. As such, participants were told that they would be able to recruit higher-caliber instructors that would be motivated to make the school a success.

Participants were then asked, in two to three pages, to formulate a plan to "achieve academic excellence" in the new school, including elements such as teaching strategies, process improvement ideas, and special activities or programs. To assist with creation of this plan, participants were provided with a list of important issues such as socioeconomic status, graduation rate, and purposeful teaching. These issues additionally served as a number of goals that participants could choose to pursue at the expense of other goals, as the number of issues included in this section was too large to reasonably consider addressing each of them. After writing their plan, participants were then asked to create a two-to-three page speech aimed at communicating their plan to the students, parents, and teachers that would be stakeholders for the school.

Manipulations

The manipulations of pressure and task complexity were embedded in the experimental task. The pressure manipulation was created by imposing a time limit on certain participants as they created each of their plans and speeches. In the high pressure condition, participants were instructed of this time limit, which was set to be 30% below the mean time taken to formulate a plan or speech based on a pilot study of 8 undergraduates. In the low pressure condition, participants were free to complete their plans and speeches in as much time as they wished. This manipulation was based on the study conducted by Barrett et al. (2011) and has been shown to induce perceptions of pressure when completing the task.

The complexity manipulation was embedded in the information that participants were asked to consider and consisted of differing amounts of information and differing levels of disjointedness in such information. In the high complexity condition, participants were asked to consider 23 issues specifically from teachers as well as 7 issues specifically from parents whereas in the low complexity condition participants were simply asked to consider 28 issues without reference to source. Additionally, in the high complexity condition an additional paragraph was added to the description of the school's situation which noted that attention ought to be given to education programs for disabled and gifted students and that teacher turnover due to a lack of autonomy and developmental opportunities has resulted in dissatisfaction from both parents and teachers. This additional information was not presented to participants in the low complexity condition.

Dependent Variables

The first set of dependent variables were aimed at assessing the performance of participants in producing viable plans for their role as principal of the school. Based on the findings of Christiaans (2002) as well as Mumford et al. (2015), participants' plans were

appraised for quality, originality, and elegance. Following along the lines of similar studies (e.g. Dailey & Mumford, 2006; Scott et al., 2005; Vessey et al., 2011), quality was defined as a plan that was complete, coherent, and useful. Furthermore originality was defined as a plan that was unexpected and clever and elegance was defined as a plan that was refined where each part flowed well together. Participants' speeches were appraised with respect to perceived utility, defined as whether the content of the speech would lead to successful change in the institution without undue effort on the part of stakeholders (Strange & Mumford, 2005).

With respect to goal management, plans and speeches were rated with regard to three key characteristics to consider in goal analysis: goal attainability, goal maintainability, and goal synergy. Goal attainability was rated as the extent to which participants exhibited working towards goals that were easy to attain, quickly attainable, and of some real value. Goal maintainability was defined as the extent to which participants considered working towards goals that had few upkeep costs and that could be maintained for a long time after initial goal attainment. Finally goal synergy was rated as the extent to which participants considered goals that could be pursued at the same time as the other goals they selected.

All of these ratings were completed by three trained judges familiar with industrial and organizational psychology as well as the educational and leadership literature. They were asked to evaluate the plans and speeches prepared by participants on five-point rating scales. Judges first practiced applying these rating scales to a set of sample products. They subsequently met with the researchers to discuss their ratings relative to the operational definitions of each variable and to resolve discrepancies between raters. Following this training and the rating of variables throughout the course of the study, inter-rater reliability coefficients obtained for quality, originality, elegance, and perceived utility were .87, .82, .86, and .86, respectively. Inter-rater

reliability coefficients obtained for goal attainability, goal maintenance, and goal synergy were .83, .82, and .82, respectively.

Analyses

A series of analysis of covariance (ANCOVA) tests were used to examine the effects of each of the manipulations on the outcome variables. In each of these analyses, covariates were retained only if they were proved to be significant at the .05 level. Follow-up analyses for significant main and interaction effects were conducted in order to examine the direction of each effect.

Results

Table 1 presents the means, standard deviations, and correlations for each of the dependent variables as well as the various covariate measures. Of particular note here is that the goal management variables included in this study are correlated with only a few covariate measures. Goal attainability was correlated with only intelligence ($r = .15$, $p < .05$) and conscientiousness ($r = .20$, $p < .01$), goal synergy was correlated with only intelligence ($r = .18$, $p < .05$), planning ($r = .17$, $p < .05$), and openness ($r = .15$, $p < .05$), and goal maintenance was correlated with no covariate measures whatsoever. When summarizing the ANCOVA analyses in the following sections, it should be noted that no covariate measures were found to have significantly affected any of the dependent variables at the .05 level, and thus they were dropped from the ANCOVA analyses.

Turning to the effects of the manipulations on goal management variables, we turn first to goal attainability. Table 2 presents the results of the ANCOVA test looking at the main and interaction effects of training, pressure, and task complexity on goal attainability. A main effect

for pressure was marginally significant ($F(1,192) = 3.08$, $p < .10$) such that participants that were pressured ($M = 3.15$) worked towards goals that were rated as less attainable than those pursued by participants that were not pressured ($M = 3.28$). Furthermore, a significant two-way interaction was found between training and task complexity on goal attainability ($F(1,192) = 7.79$, $p < .01$). Follow-up analyses (see Table 3) indicated that, when the situation was less complex, participants that were trained worked towards goals that were rated as more attainable ($M = 3.35$) than those pursued by individuals that were not trained ($M = 3.19$). A significant three-way interaction between all of the manipulations on goal attainability was also found ($F(1,192) = 3.88$, $p = .05$). A follow-up analysis for this interaction (see Table 4) showed that the two-way interaction was enhanced under conditions of pressure – this is to say that under conditions of pressure, when the situation was relatively less complex, participants that underwent goal analysis training worked towards more attainable goals ($M = 3.27$) than participants that were not trained ($M = 2.96$).

ANCOVA analyses examining the main and interaction effects of the three manipulations on goal maintenance are presented in Table 5. A main effect for pressure was found ($F(1,192) = 6.37$, $p < .05$), indicating that participants that performed under conditions of pressure generally worked towards goals that were less maintainable ($M = 3.11$) than individuals that were not pressured during the experimental task ($M = 3.32$). Additionally, a main effect for task complexity on goal maintenance was found ($F(1,192) = 8.25$, $p < .01$). Examination of this effect showed that individuals working under conditions of higher complexity worked towards goals that could not be maintained as easily ($M = 3.10$) as those pursued by participants working under conditions of lower complexity ($M = 3.33$). A marginally significant interaction effect between training and task complexity on goal maintenance was also found ($F(1,192) = 3.45$, $p < .10$).

Follow-up analyses for this interaction effect (see Table 6) indicated that, when the situation was less complex, individuals that were trained in goal analysis strategies worked towards goals that were rated as easier to maintain (M = 3.43) than participants that did not complete the goal analysis training program (M = 3.24).

Table 7 presents the results of ANCOVA analyses regarding main effects between the three manipulations and goal synergy. A significant main effect for goal analysis training was found ($F(1,192) = 4.01$, $p < .05$), indicating interestingly that individuals that were trained worked towards goals that worked less well together (M = 3.11) than participants that did not complete the goal analysis training program (M = 3.28). An additional main effect of pressure was found ($F(1,192) = 16.55$, $p < .001$). Looking at these results indicates that participants that performed under conditions of pressure prioritized goals that worked less well together (M = 3.01) than individuals that were not pressured (M = 3.37). No significant interaction effects were found between the manipulations and goal synergy.

Turning towards variables measuring task performance, we first present results regarding plan quality. ANCOVA results are summarized in Table 8. A significant main effect of goal analysis training was found ($F(1,192) = 4.62$, $p < .05$), indicating that individuals that completed the training program generally produced plans rated as being of lower quality (M = 2.84) than participants that did not complete the training (M = 3.07). Furthermore a significant main effect of pressure on plan quality was found ($F(1,192) = 31.321$, $p < .001$). Analyses indicated that participants that created plans under conditions of pressure produced plans of lower quality (M = 2.66) than individuals that worked without pressure (M = 3.25). No significant interaction effects were found between the manipulations on plan quality.

With regard to plan originality, ANCOVA results (see Table 9) found a significant main effect for pressure ($F(1,192) = 16.91$, $p < .001$). Follow-up analyses indicated that participants that worked through the experimental task under conditions of pressure generated plans that were rates as being of lower originality ($M = 2.03$) than those created by participants working without pressure conditions ($M = 2.46$). No significant interaction effects were found between the manipulations on plan originality.

ANCOVA results for effects between the three manipulations and plan elegance are presented in Table 10. Once again, a significant main effect for pressure was found ($F(1,192) = 36.38$). Follow-up analyses indicated that individuals working under conditions of pressure produced plans rated as being less elegant ($M = 2.44$) than those participants that did not work under pressure ($M = 3.08$). No significant interaction effects between the manipulations and plan elegance were found.

Finally, ANCOVA results for main effects and interaction effects between the manipulations and perceived speech utility are shown in Table 11. A significant main effect of pressure was found ($F(1,192) = 21.124$, $p < .001$), indicating that participants that performed under conditions of pressured produced speeches that were perceived to be of lesser utility ($M = 2.75$) than those individuals that did not work under conditions of pressure ($M = 3.19$). No significant interaction effects were found between any of the three manipulations and speech perceived utility.

Discussion

Before examining the implications of this study's findings for both future research and practical applications, a number of limitations should be noted. The first limitation to note here is

that the experimental task included in this experiment was a low-fidelity simulation. The leader plans and speeches evaluated in this study were obtained from a sample of undergraduates. Accordingly, the question arises regarding whether our findings can be generalized to more experienced leaders that have domain-relevant expertise (Ericsson, 2009). Furthermore, participants in this experiment had neither the time nor the resources that an actual principal would be expected to have in a real-world equivalent of this study's experimental conditions. As such the pattern of findings found in this study, particularly those regarding training effects, would likely be different in more practical applications.

Moreover it should be recognized that this study used only a single experimental task looking at leadership, and thus only a single task domain, education, was examined. This should be taken into account when applying these findings to other domains with individuals of differing domain expertise. However it should be recognized that the domain was one that undergraduates had some familiarity with, as they had all attended secondary school. Prior studies by Barrett et al. (2011), Shipman et al. (2010), and Strange and Mumford (2005) have all provided evidence supporting the validity of this task when employing the use of undergraduate samples.

Another major limitation of this study involves the nature of the primary manipulation, the goal analysis training program. Due to the constraints inherent to an experimental environment, the training program was necessarily limited in scope. We estimate that, on average, participants took between an hour and an hour and a half to complete all seven heuristic modules included in the training program. This is far less time than what an organization could reasonably provide for relevant employees to complete such an exercise and as a result we expect that our findings are similarly limited in scope. Future studies should consider this issue

and investigate the possible effects that goal analysis training might have when administered in more depth and over a greater period of time. Longitudinal benefits of such a program should also be explored.

Finally, the primary findings in this study that suggest that the goal analysis training program had any positive effects were only seen on two of the goal management criteria. Patterns were found for the goal attainability and goal maintenance criteria but not for the goal synergy outcome. There are several possible explanations for these findings apart from an actual lack of effect. First, there may have been some error in the content of the synergy heuristic portion of the goal analysis training program. It is possible that participants were unable to fully apply the knowledge imparted in this section to relevant aspects of the experimental task. Alternatively, the nature of the experimental task itself may inherently pose challenges for application of the training content – in this case the training itself is working as intended but does not itself synergize with the experimental task. Despite this lack of findings, we would like to note that the two criteria that did show a pattern of effects, goal attainability and goal maintenance, are critical for any task regarding multiple potential goals. Consideration should always be given to which goals are realistic to achieve as well as the length of time that the given goal state can be maintained.

Our findings show some support for the merits of training in goal analysis strategies. Although the benefits do not at the moment seem to be global, it does appear that training in goal analysis strategies can help individuals to prioritize goals that are more readily attainable when dealing with problems of low complexity. Moreover training in goal analysis seems to help individuals in these situations to prioritize goals that can be maintained for an extended period of time after initial goal attainment. Both of these effects are accentuated when external situational

elements, such as deadlines, apply situational pressure during the process of completing a task at hand.

The negative main effects regarding goal analysis training seen for the goal synergy and plan quality criteria might seem alarming at first but are not as surprising when taking into account the fact that participants were relative novices in this study. Although the task at hand was chosen to be universally understood by the sample recruited for participation, it is likely that some greater amount of domain expertise would be beneficial for applying the concepts learned in the training to the simulated scenario. Moreover the task complexity manipulation in this experiment primarily affected the critical complexity of the deep structure of the task (Haerem & Rau, 2007). The added information regarding issues with teacher turnover and parental dissatisfaction fundamentally changes how participants should use task inputs to produce required outputs. Because novices tend to underperform relative to experts on tasks with this type of complexity (Haerem & Rau, 2007), we would therefore expect that these individuals are better able to use recently-trained knowledge, that has just been integrated into their weak conceptual framework, on tasks with lower complexity. It is likely that our findings will be different when this training is adjusted to be domain-relevant and is provided to intermediates or experts in the domain of interest.

Another particularly noteworthy finding from this study is that the phenomenon of goal management is largely independent. We found an unusually weak pattern of correlations between these goal management ratings and our extensive battery of control measures. Goal attainability was only related with measures of intelligence and conscientiousness, goal synergy was only related with measures of intelligence, openness, and planning ability, and our measure of goal maintenance was related with none of the covariate control measures in any significant

way. Future studies may wish to reexamine the relationship between goal management, these measures, and other potentially correlated measures.

Interestingly, although our goal management criterion measures were mostly correlated with our task performance criteria, training in goal analysis strategies did not seem to positively affect any of these measures of task performance. It is possible that this finding is due to the relatively limited expertise of the participants in our sample. Previous research has shown that the relationship between goals and performance is more evident in individuals that are high in ability relative to those that are low in ability (Battle, 1966). Although the sample recruited in this experiment was not low in cognitive ability, there may be a pattern present similar to that found by Battle (1966) such that the benefits of goal analysis training may be limited by a requisite level of expertise as a sort of boundary condition, rather than by intelligence. Alternatively, these patterns may be due in part to the nature of the experimental task at hand. Complex, challenging problems often involve a large number of emergent goals. This can make it difficult for goal analysis itself to influence problem solving performance, as the goals involved in the task are never completely clear. Despite this goal analysis is still expected to contribute to the effectiveness in which one manages their goals during the problem-solving process, regardless of resulting task performance.

Although this study provides preliminary evidence supporting the potential value of goal analysis training, there is still a breadth of work to be completed in this area. Future studies ought to examine the training content developed as a part of this effort and refine or adapt it to investigate its effects in other settings. As mentioned previously, the training program included in this study was necessarily limited in scope. The empirical effects of a more extensive training program have yet to be seen and ought to be examined. Future research should also consider

studying the effects of this training program, or a similar one, on a wider variety of tasks. The domain of focus in this study, education, may not provide the clearest path for applying goal analysis strategies. As such we encourage researchers to use this training program in conjunction with tasks drawn from multiple different domains. Future endeavors should also investigate other potential moderators that may influence the relationships seen for goal analysis training in this study, as well as examining the longitudinal effects of such training. It is entirely possible that, given time to integrate goal analysis heuristics into one's cognitive framework, goal management improves even further over time. If these heuristics do truly become integrated, potential longitudinal influences may even be able to mitigate the negative effects of situational pressure and task complexity.

Goal-setting theory should also take this opportunity to expand its scope into the goal analysis area. Thus far it appears that the closest construct that has been studied in goal-setting theory is that of goal choice, which has simply concluded that individuals are more likely to choose goals that can be attained or that they believe to be appropriate or desirable (Latham & Locke, 1991). As such, the literature has focused almost exclusively on goal attainability as the sole criteria for which individuals select goals – goal maintenance has received much less attention in the literature (Brodscholl et al., 2007), and goal synergy is rarely discussed. This study should hopefully provide an opportunity for goal-setting theory to shift its focus onto the aspects of goals that individuals must weigh relative to one another. Future research in goal-setting theory should examine under what conditions certain goal characteristics take precedence for goal management. Put briefly, the future research in goal-setting can greatly benefit from considering how individuals actively, consciously think through all of the aspects of a goal when selecting avenues of pursuit.

Training in goal analysis strategies has many potential benefits for organizational leaders. This study developed the first of such training programs and provided evidence supporting its merits for leaders solving problems of relatively low complexity. These effects are exacerbated under conditions of situational pressure, indicating that leaders are able to quickly rely on these heuristics as long as they operate in a context that the leader can understand. Although findings in the area of goal analysis are at this point still preliminary, the available evidence is promising for those wishing to research this phenomenon further.

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Table 1. Descriptive Statistics and Correlations

	M	*SD*	1	2	3	4	5	6	7	8	9	10
1. Quality	2.95	.78	1									
2. Originality	2.24	.74	.530**	1								
3. Elegance	2.75	.80	.775**	.412**	1							
4. Attainability	3.21	.54	.241**	-.105	.305**	1						
5. Maintenance	3.21	.59	.201**	-.146*	.237**	.622**	1					
6. Synergy	3.19	.64	.648**	.288**	.573**	.418**	.354**	1				
7. Perceived Utility	2.97	.69	.648**	.295**	.551**	.342**	.257**	.681**	1			
8. Fluency	5.8	1.62	.050	.010	-.027	.011	-.038	.000	.095	1		
9. EAS	25.56	5.66	.136	.003	.137	.153*	.099	.175*	.151*	.197**	1	
10. Age	18.57	1.28	.111	.013	.056	.093	.034	.301	.111	.009	.072	1
11. Gender	.69	.46	-.031	-.108	-.095	.088	.049	.029	.022	.013	.015	-.126
12. English 1st Lang.	.93	.25	-.141	-.163*	.002	.043	.133	-.018	-.111	.028	.031	-.285**
13. Educational Interest	2.50	.74	-.084	-.030	-.072	.034	-.036	-.062	.009	-.107	.028	-.001
14. Need for Cognition	3.22	.67	.096	.030	.129	.115	.060	.128	.056	.050	.148*	.061
15. Planning	6.10	2.57	.180*	.176*	.163*	.081	-.063	.173*	.137	-.044	.173*	-.020
16. Charismatic Ratio	.33	.12	-.015	-.004	.059	.022	.032	-.010	-.008	-.019	-.065	.124
17. Ideological Ratio	.33	.15	-.072	-.027	-.108	.052	-.007	-.027	.042	.051	-.059	.107
18. Pragmatic Ratio	.34	.16	.078	.027	.055	-.066	-.018	.033	-.033	-.032	.105	-.194**
19. Extraversion	116.70	20.31	-.120	-.079	-.128	-.014	-.023	-.007	-.134	.128	-.104	-.179*
20. Agreeableness	144.06	18.48	-.144*	-.173*	-.120	.038	.017	-.063	-.023	-.001	-.169*	-.167*
21. Conscientiousness	130.65	18.44	.011	-.097	.002	.197**	.090	.064	.101	.029	-.058	-.087
22. Emotional Stability	99.52	19.03	.083	.001	.104	.121	.072	.104	.074	-.028	.058	-.094
23. Openness	131.16	17.64	.037	-.065	.030	.097	.124	.154*	.088	.074	.058	.023

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

Table 1. *continued*

	11	12	13	14	15	16	17	18	19	20	21	22	23
11. Gender	1												
12. English 1st Lang.	.047	1											
13. Educational Interest	-.016	-.120	1										
14. Need for Cognition	-.273**	-.078	.199**	1									
15. Planning	-.153*	-.034	.117	.162*	1								
16. Charismatic Ratio	-.009	-.060	.115	.052	.032	1							
17. Ideological Ratio	-.014	-.126	-.081	.080	-.130	-.318**	1						
18. Pragmatic Ratio	.020	.163*	-.012	-.114	.097	-.471**	-.687**	1					
19. Extraversion	.125	.042	-.113	-.019	-.163*	.021	-.057	.037	1				
20. Agreeableness	.152*	.006	.027	-.038	-.049	-.101	.004	.074	.216**	1			
21. Conscientiousness	.045	.080	.108	.202**	.100	-.042	-.062	.090	.080	.451**	1		
22. Emotional Stability	-.061	.096	-.216**	.021	.117	-.052	-.072	.107	.226**	.121	.159*	1	
23. Openness	-.108	-.049	.242**	.355**	.064	-.048	.061	-.020	.159*	.271**	.361**	-.111	1

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

Table 2. ANCOVA Results for Attainability

Source	*SS*	*df*	*MS*	*F*	*p*	Partial η^2
Main Effects						
Training	.118	1	.118	.437	.509	.002
Timing	.829	1	.829	3.076	.081	.016
Complexity	.536	1	.536	1.990	.160	.011
Interactions						
Training * Timing	.447	1	.447	1.658	.199	.009
Training * Complexity	2.099	1	2.099	7.788	.006	.041
Timing * Complexity	.038	1	.038	.141	.708	.001
Training * Timing * Complexity	1.046	1	1.046	3.882	.050	.021

Table 3. Follow-Up Analysis for Significant Two-Way Interaction for Attainability

Training	Complexity	Mean Attainability	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
No training	Low	3.189	.074	3.043	3.336
	High	3.293	.075	3.145	3.441
Training	Low	3.349	.075	3.201	3.497
	High	3.034	.076	2.884	3.183

Table 4. Follow-Up Analysis for Significant Three-Way Interaction for Attainability

Training	Timing	Complexity	Mean Attainability	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
No training	Untimed	Low	3.391	0.108	3.178	3.605
		High	3.319	0.108	3.105	3.532
	Timed	Low	2.987	0.102	2.786	3.188
		High	3.267	0.104	3.062	3.472
Training	Untimed	Low	3.307	0.104	3.102	3.512
		High	3.111	0.106	2.902	3.320
	Timed	Low	3.391	0.108	3.178	3.605
		High	2.957	0.108	2.743	3.170

Table 5. ANCOVA Results for Maintenance

Source	*SS*	*df*	*MS*	*F*	*p*	Partial η^2
Main Effects						
Training	.049	1	.049	.154	.695	.001
Timing	2.031	1	2.031	6.369	.012	.033
Complexity	2.631	1	2.631	8.249	.005	.043
Interactions						
Training * Timing	.829	1	.829	2.600	.109	.014
Training * Complexity	1.101	1	1.101	3.451	.065	.018
Timing * Complexity	.309	1	.309	.968	.326	.005
Training * Timing * Complexity	.469	1	.469	1.471	.227	.008

Table 6. Follow-Up Analysis for Marginal Significant Two-Way Interaction for Maintenance

Training	Complexity	Mean Maintenance	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
No training	Low	3.242	.081	3.083	3.402
	High	3.159	.082	2.998	3.320
Training	Low	3.426	.082	3.265	3.587
	High	3.040	.082	2.877	3.202

Table 7. ANCOVA results for Synergy

Source	*SS*	*df*	*MS*	*F*	*p*	Partial η^2
Main Effects						
Training	1.499	1	1.499	4.012	.047	.021
Timing	6.184	1	6.184	16.552	.000	.083
Complexity	.189	1	.189	.506	.478	.003
Interactions						
Training * Timing	.860	1	.860	2.303	.131	.012
Training * Complexity	.212	1	.212	.567	.453	.003
Timing * Complexity	.212	1	.212	.567	.453	.003
Training * Timing * Complexity	.541	1	.541	1.448	.230	.008

Table 8. ANCOVA results for Plan Quality

Source	*SS*	*df*	*MS*	*F*	*p*	Partial η^2
Main Effects						
Training	2.430	1	2.430	4.621	.033	.024
Timing	16.469	1	16.469	31.321	.000	.145
Complexity	.033	1	.033	.062	.804	.000
Interactions						
Training * Timing	1.254	1	1.254	2.385	.124	.013
Training * Complexity	.004	1	.004	.008	.928	.000
Timing * Complexity	.055	1	.055	.105	.746	.001
Training * Timing * Complexity	.145	1	.145	.276	.600	.001

Table 9. ANCOVA results for Plan Originality

Source	*SS*	*df*	*MS*	*F*	*p*	Partial η^2
Main Effects						
Training	1.868	1	1.868	3.640	.058	.019
Timing	8.680	1	8.680	16.913	.000	.084
Complexity	.810	1	.810	1.578	.211	.009
Interactions						
Training * Timing	.282	1	.282	.549	.460	.003
Training * Complexity	.246	1	.246	.480	.489	.003
Timing * Complexity	.257	1	.257	.501	.480	.003
Training * Timing * Complexity	.497	1	.497	.968	.326	.005

Table 10. ANCOVA results for Plan Elegance

Source	*SS*	*df*	*MS*	*F*	*p*	Partial η^2
Main Effects						
Training	1.102	1	1.102	2.055	.153	.011
Timing	19.507	1	19.507	36.384	.000	.165
Complexity	.552	1	.552	1.029	.312	.006
Interactions						
Training * Timing	1.264	1	1.264	2.357	.126	.013
Training * Complexity	.085	1	.085	.159	.690	.001
Timing * Complexity	.212	1	.212	.395	.531	.002
Training * Timing * Complexity	.261	1	.261	.487	.486	.003

Table 11. ANCOVA results for Speech Perceived Utility

Source	*SS*	*df*	*MS*	*F*	*p*	Partial η^2
Main Effects						
Training	.373	1	.373	.846	.359	.005
Timing	9.306	1	9.306	21.124	.000	.103
Complexity	.404	1	.404	.916	.340	.005
Interactions						
Training * Timing	.035	1	.035	.080	.777	.000
Training * Complexity	.047	1	.047	.107	.744	.001
Timing * Complexity	.018	1	.018	.041	.840	.000
Training * Timing * Complexity	.101	1	.101	.229	.633	.001