

# 9. Control Theory

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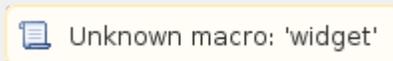
## Control Theory Overview

Unlike most other theories of personal motivation, Control Theory has the distinct characteristic of being derived from the study of mechanical processes. The modern Control Theory originated with [Norbet Wiener's](#) 1948 Cybernetics, but has been around dating back to Plato. Initially this theory was applied to physical systems; however, it can also be applied to human behavior. This theory connects multiple disciplines such as anthropology, biology, electrical engineering, mathematics, neurophysiology, and psychology. It is able to link these fields together by describing how separate systems are able to function as a whole. Control Theory breaks down each system into specific pieces and studies the relationships and connections between them. In order for the control theory to be applicable to humans, it is necessary to show that there are direct similarities between both the concepts associated with machines and the concepts which we can associate with humans (PSUWC, 2016).

While this overview offers a simplistic look at the genesis of Control Theory, the application of the theory is actually quite complex. Therefore, it is important to outline and review the components in detail in order to achieve a greater understanding; as well as to be able to apply the theory in useful and relevant ways.

### Video 9.1

The following video provides explanation to Control Theory (Marketingmansite, 2011)



(Marketing Man's YouTube Channel, 2013)

## History Of Control Theory

In the late 1950's and early 1960's problems were emerging in the field of engineering and economics that were not covered in any existing theories (Kalman, 2016). Eventually, these other theories were adjusted and the new idea of the Control Theory emerged. Control Theory has always existed from the use of water mills in Greece starting in the third century to the current use of windmills in California. Control Theory is not just used in engineering, it also relates to business by learning ways to streamline or optimize processes. While Control Theory is based in mathematics, it can be applied to organizations by using surveys or determining when performance-relevant information registers the sensor determining the control (Sanderlands, Glynn, Larson, 1991). When the information is processed and checked against what memory has stored, the decision receptors adjust the goal based on the information gathered. Evidence of Control Theory can be observed since life existed, but was more recently given a name and an equation to make determinations on behaviors in the environment.

# Assumptions of Control Theory

Control Theory makes 3 assumptions.

Assumption 1: Human beings are a system in and of themselves.

Assumption 2: Society is also a system.

Assumption 3: Systems are self-regulating

By assuming that human beings and society as a whole are systems, Control Theory allows you to break these systems down into their smaller components. The relationship between those components can be understood as individual pieces, but also in relation to one another and as an entire system. Assuming that systems are self-regulating means that people and the organizations that they belong to will behave in ways that aim to reestablish an equilibrium in the system when change occurs (PSUWC, 2016). People behave according to their basic needs, and when the needs of an employee align with organizational demands/standards, the desired behavior is achieved (Luria, 2008).

## Analyzing Control Theory: Comparisons and Core Components

Control Theory can be quite difficult to understand in a theoretical sense. Attempting to use it to analyze, or in applying it to real-world situations is equally complicated. The basic idea is that people seek feedback and then set goals based on that feedback. Control Theory does share some commonality with goal setting theory, but this commonality is a double-edged sword. It can help one to link easily understood concepts with the more complex aspects of Control Theory, but it can also cause confusion over the need or use for Control Theory in the first place. Also, the jargon found in Control Theory, that is largely absent in other similar theories, may serve as a source of confusion. To make matters worse, even though Control Theory seems similar to Goal- Setting Theory, many proponents of the latter, namely Locke, Latham, and Bandura, have expressed that Control Theory is far too mechanistic to be applied to humans (PSUWC, 2016).

When analyzing Control Theory, it is helpful to be mindful of the similarities, but one should also approach the linking of concepts, terms, or theory components with caution as they may cause more confusion than the benefit such comparisons create. Control Theory is a theory in and of itself, not simply Goal-Setting Theory 2.0.

### Key Terms and Concepts

- **Feedback Loop:** There are four basic elements of the feedback loop: *Sensors, Referent Standards, Comparators, and Effectors*. Borrowing from Locke (1991), an effective way to comprehend the feedback loop is to envision the elements as components of a thermostat that controls the temperature of a room. **(See figure 9.1 below)**
- **Sensor (Thermometer):** The sensor detects the current environment (e.g. a room's temperature). Sensors can include input from any of an individual's senses, such as hearing or sight, as well as cognitive inputs (mentally assessing an abstract principle such as a letter grade on an exam). The sensor puts the feedback loop into motion.
- **Referent Standard (Desired temperature set by thermostat):** The referent standard is a goal (desired temperature) or benchmark and it is this goal, which is compared to the Sensor (the current environment, in this case, room temperature) through the use of the comparator.
- **Comparator (Comparing mechanism):** The comparator is the mechanism that is used to compare the current environment (room temperature) based on Sensor input to the goal or Referent Standard (desired room temperature).
- **Effector (Furnace or air conditioner unit):** If the comparator detects a discrepancy between the current environment and the referent standard, the effector is invoked to reduce the discrepancy. For example, if the room temperature is too warm, the furnace may shut down and stop heating the air until the temperature falls. If the air is very far above the desired temperature, the air conditioner may be activated to reduce the temperature more quickly instead.
- **Retirement:** Retirement is the state of equilibrium achieved when one's efforts produce results that match up to their goals. In other words, when one's sensor detects a level of performance or condition that meets the referent standard during the comparator phase, no effector action is needed. The individual can simply maintain the extent, duration, condition or sequence of present action in order to maintain the desired level of performance. In circumstances where one's sensor never meets the referent standard, continuous effector action will be required and retirement cannot be achieved. One must either persist along this path with repeated attempts to alter their behavior to meet the goal or reform the goal itself to a more reasonable level so that retirement can be achieved.

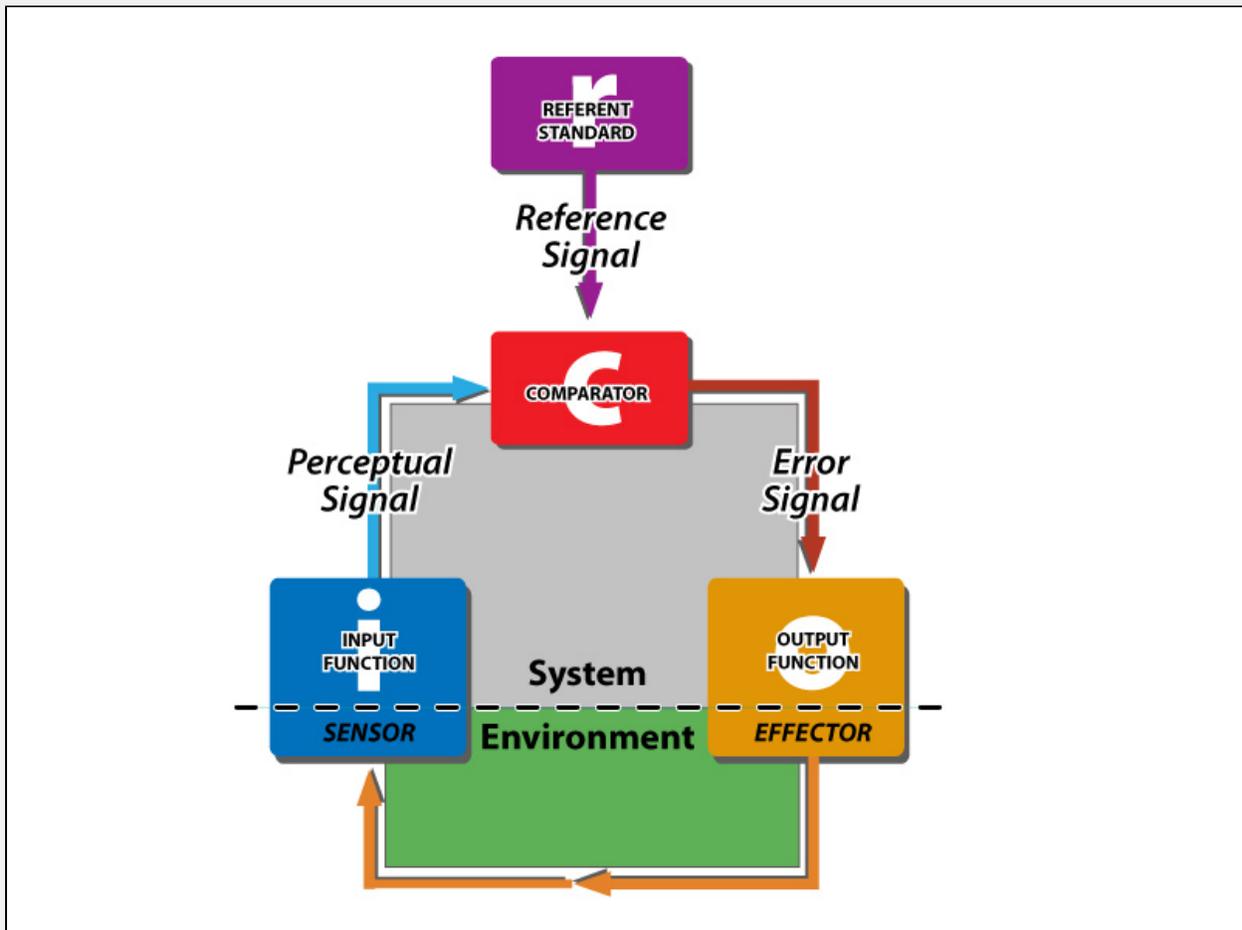
Another way to examine the components of the feedback loop might be to consider a laborer who works on a quota system of output. In this example the worker learns from his supervisor (input to sensor) that his quota is ten widgets per hour (referent standard). The worker evaluates his current output and finds that he has produced only five widgets (comparator). The worker will then make the adjustment to his work pace, and work faster or take fewer breaks to produce the additional widgets (effector) and achieve the goal of ten (retirement).

### Illustration A: The Feedback Loop



**Figure 9.1**

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Adapted from Klein, 1989

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- **Retirement (not pictures on the diagram):** Retirement is the state of equilibrium achieved when one's efforts produce results that match up to their goals. This is when the room has reached the desired temperature. In other words, when one's sensor detects a level of performance or condition that meets the referent standard during the comparator phase, no effector action is needed. The individual can simply maintain the extent, duration, condition or sequence of present action in order to maintain the desired level of performance. In circumstances where one's sensor never meets the referent standard, continuous effector action will be required and retirement cannot be achieved. One must either persist along this path with repeated attempts to alter their behavior to meet the goal or reform the goal itself to a more reasonable level so that retirement can be achieved.

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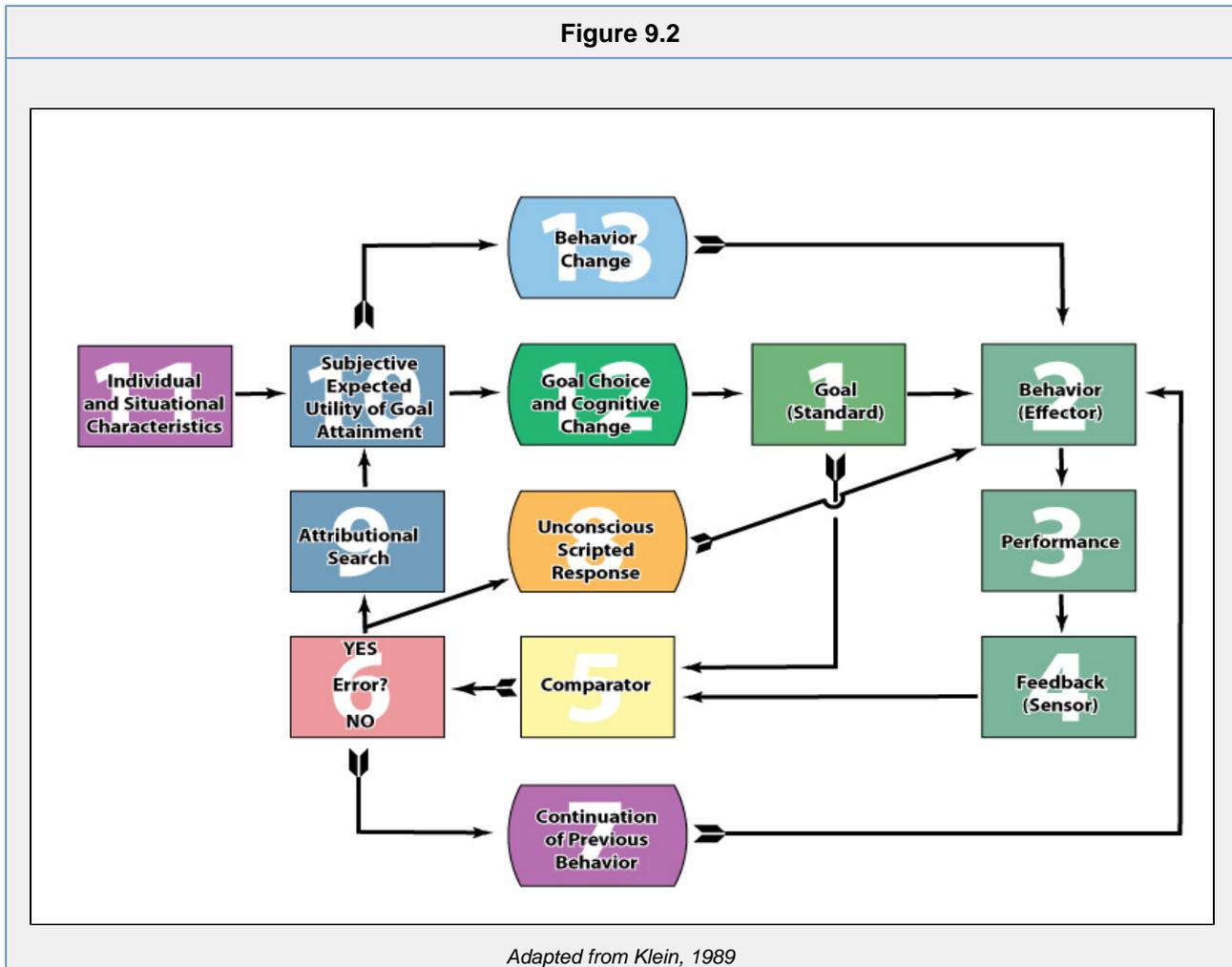
## Integrated Control Theory

Klein (1989) expanded Control Theory to better illustrate how it applies to human behavior and is known as Integrated Control Theory which, adds cognitive communication between the comparator and the effector. Further, it is communication between the comparator and effector, which show that in humans, the sensor, standards, or effector is not a set portion. Provided below is an overview of the components of the integrated Control Theory model. (See figure 9.2)

- **Goal (Referent standard):** Is the desired set point (standard) one would like to achieve.
- **Behavior (Effector):** This is the action taken to decrease the discrepancy between the information perceived and the goal.
- **Performance:** According to Klein (1989), performance is only partially determined by the behavior of the participant. It is further defined by goal difficulty and specificity (PSUWC, 2016).
- **Feedback (Sensor):** Ashford and Cummings (1983) explain that feedback is data obtained from the performance behavior and indicates if the goal was met. Feedback can be either positive or negative and is typically provided only upon task completion. Perception of feedback can be conscious or unconscious depending on the situation and the type of feedback.
- **Comparator:** This is consistent in both models. No matter where it originates, or how it is synthesized, when one receives feedback, one will proof it in contrast to the original goal. This is done by a psychological evolution exhibited in the comparator. This process can inform the individual, based on the information available, such as: if one is ahead of pace for the set goal, behind the pace for the set goal, or on pace for the set goal.
- **Error:** If the individual finds him/herself on pace (no error), the individual will likely continue the previous behavior. If an error is perceived, the individual will evolve their behavior to elicit a change in output, thereby correcting the perceived error. This response can occur unconsciously (Figure 9.2, component number 8).
- **Unconscious Scripted Response:** Klein (1989) suggests that scripts are helpful in attaining goals but that attention to the demands of goals can undermine performance. Scripts can comprise many complex tasks and may even include previously encountered problems. If presented with a new problem, there can be an interruption in the script. This may force an individual back into a conscious, planning state.
- **Attributional Search:** This is where individuals attribute their progress or lack of progress toward a goal (Klein,1989). If someone attributes success to experience, his or her outcome would increase. If an individual attributes their success to luck, the opposite would occur.
- **Subjective Expected Utility of Goal Attainment:** People are more likely to stay committed to a goal when their expectancy of attaining the goal, and value placed on the goal, are both high (Klein,1989).
- **Individual and Situational Characteristics:** Influencing the expected utility of goal attainment are individual and situational circumstances (Klein,1989). This is where factors such as one's experiences, needs or reward structure would influence the outcome.
- **Goal Choice and Cognitive Change:** Based on the likelihood individuals perceive of attaining their goals, they may make cognitive changes such as "changes in goal commitment, changes in the level of the goal, or changes in the goal itself" (Klein,1989). Generally, the individual will migrate in the direction of the greatest subjective expected utility. People enjoy successfully attaining and achieving their goals therefore they will make necessary changes to achieve that feeling of success.
- **Behavior Change:** Given all of the components above, individuals are able to change the intensity of their effort or the direction of their behavior. This can be considered the main goal of the entire Control Theory.

### Illustration B: Integrated Control Theory

Figure 9.2



Adapted from Klein, 1989

## GAP-ACT Model

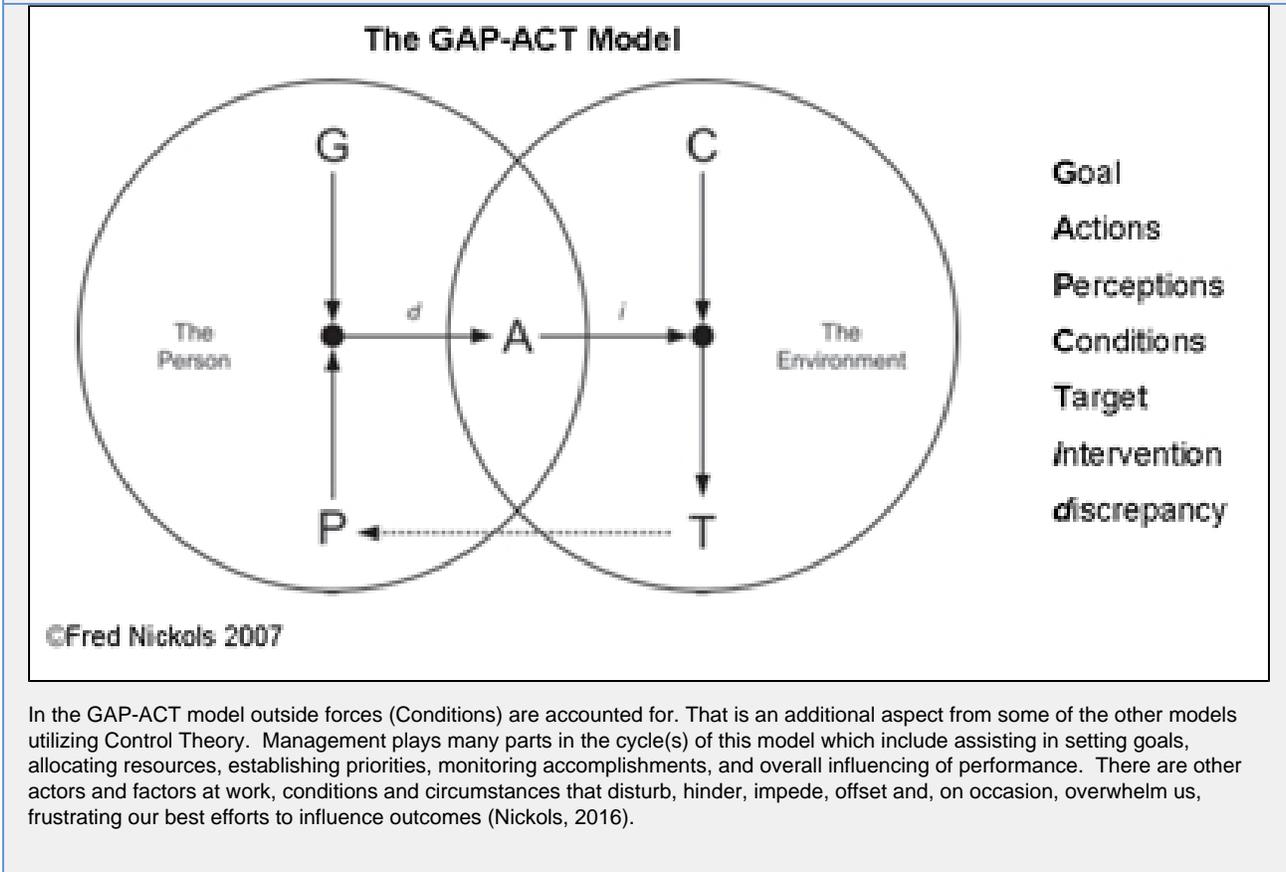
The GAP-ACT model is based on William T. Powers' Perceptual Control Theory (PCT), which is a closed loop view consistent with Basic Control Theory and Integrated Control Theory (Nickols, 2016). PCT states that an organism generates actions that impact the environment around them; in an attempt which creates or changes the experience in a way desired or attended by the organisms (Powers, 1998).

The key components of GAP-Act are:

- **Goal (G):** Desired outcome that is to be achieved.
- **Perception (P):** Perceived actual or current standards.
- **Discrepancy (d):** Any difference between the goal condition and perceived condition, which constitutes a gap.
- **Action (A):** Course taken to close the gap produced between goal condition and perceived condition.
- **Circumstances/Conditions (C):** Outside factors that disturb, hinder, impede, or offset our best efforts to influence the target. These outside factors may have a positive or negative influence on the outcome of the action taken towards a target (Nickols, 2016).
- **Target (T):** Target variable that is sought to be controlled.
- **Interventions (i):** Actual actions taken to affect the target in ways that reduce or eliminate the discrepancy between goal conditions and perceived conditions.
- **Feedback (f):** Perceptions of the target in which influences additional action to satisfy any remaining discrepancies (Nickols, 2016). Feedback is shown as a dotted line that may or may not contain the designator.

Illustration C: The GAP-ACT Model

Figure 9.3



## Strengths and Weaknesses of Control Theory

### Overview:

All human beings have six basic internal needs:

1. To survive
2. To have power
3. To belong and to be accepted by others
4. To have importance
5. To have freedom and independence
6. To have fun

### Strengths:

**Primary Strength:** The six needs apply to everyone and emphasize not how different, but rather how similar we are to one another (Glasser, 1998). Some needs are more profound than others and this makes Control Theory applicable to most people, even more so than that of the goal setting theory. All people have the will to survive and in today's society, especially in this country, we all have the basic need for freedom and independence.

**Secondary Strength:** Control theory assumes people look for feedback on their actions. If the feedback is positive then the goals will be positive and that can make for a simple and flourishing conclusion. This is a very practical theory to utilize in the workplace because of its relatively simple concept of how feedback influences employees' goals which may then lead to retirement of those goals.

### Weaknesses:

**Primary Weakness:** Like a two-edged sword, the fact that people look for feedback on their actions can also be a weakness. If the feedback is negative the individuals involved may become discouraged. This in turn would cause both motivation and productivity to decrease.

**Secondary Weaknesses:** Because Control Theory tries to break down individuals, but also groups of people, one of the major weaknesses of the Control Theory is that different cultures do not always embrace this theory. There is a concern in the workplace that people of different beliefs could rebel against this kind of diversity. In many parts of the world, it is common that people of different class, sex, and religion are segregated from each other. They do not believe that all human beings deserve the same treatment or respect. Some cultures are also authoritarian in nature and the idea of group meetings is a concept that they do not embrace (Carver and Scheier, 1981). Control theory grounds itself in mechanics and does not take into account that humans are not mechanical objects. Therefore, the theory meets considerable resistance among theorists who have examined it. Big names such as Locke and Bandura have spoken out against it and so it makes it that much more difficult for others to get past. More tests need to be done that relate to human motivation to get beyond the stigma to see if it really does or does not have relevance for Psychology (PSUWC, 2016). In organizational settings there has only been minimal research conducted. The Control Theory did not fare well when evaluating the feedback process from supervisors on their subordinates' behaviors (Carver and Scheier, 1981).

#### **Discussion:**

Control theory is similar to the goal setting theory, which is one of the most popular and utilized theories of motivation in the modern day workplace. Our goals and behaviors can be adjusted based on our experience and this in turn shapes our motivation. This can strengthen an individual's present skill level and can be very beneficial to the employee and employer (PSUWC, 2016).

The Control Theory offers a more diverse perspective on human behavior and motivation than most other constructs of motivation. However, the Control Theory does not ask why employees behave in a certain way. Rather, this theory looks to explain why most do not act in a certain way. In other words, why do most people act in a socially correct way for any given situation? The primary schema or driving force behind Control Theory is doing and thinking (Glasser, 1998). He explains that external events do not control individuals and states that, "nothing we do is caused by what happens outside of us. If we believe that what we do is caused by forces outside of us, we are acting like dead machines, not living people" (Glasser, 1998). One must take responsibility for one's actions.

## **Link Between Goals and Behaviors**

Goals and behaviors go hand in hand when considering the Control Theory. While the Control Theory incorporates self-established goals, the selection of the initial goals can be affected by four other sources. The sources can be direct influences from other people, past performance, higher objectives after achieving smaller goals, and social comparison (Campion & Lord, 1982). Note again the similarities between the Control Theory and goal setting theory. While on one hand the goal setting theory states that individuals will use set goals to motivate themselves in order to achieve such, the Control Theory has a cognitive element composed of goals, as well as an effective element that leads to a prescribed behavior aimed at reducing discrepancies that may hinder attainment of the goal (Klein, 1989). For example, an individual establishes a goal of getting to work ten minutes earlier every day; due to receiving an evaluation indicating a consistent morning tardiness problem. The individual may set a goal of arriving to work on time by leaving home earlier, which would alleviate possible discrepancies in achieving the goal. The individual might choose to set the alarm clock 10 minutes earlier, which is modifying early morning behaviors in order to reach the goal of getting to work early. When considering goals and behaviors linked by Control Theory, it is important to remember that the goal comes before the behavior. Most people would not change their behavior pattern and set the alarm clock ten minutes early for no particular reason.

Goals and behaviors do not only go hand in hand unless they are directly related since the theory states that "goal setting increases performance in a couple of ways" (Locke & Latham, 1985). A person's goal is the driving force of their behavior- particular goals direct attention towards the task at hand and then it mobilizes your efforts of achieving those goals as a direct consequence of your behavior. If a goal is set in order to increase wealth and/or happiness, you will immediately start to change your behavior to what may be necessary in order to allow you to achieve your goal.. Locke (1991) stated "according to goal setting theory and research, the more difficult and specific the goals, the more concentrated the effort in pursuing behavior to achieve them. Challenging goals channel behavior and the more specific the direction of this behavior the more motivation to attain the goals."

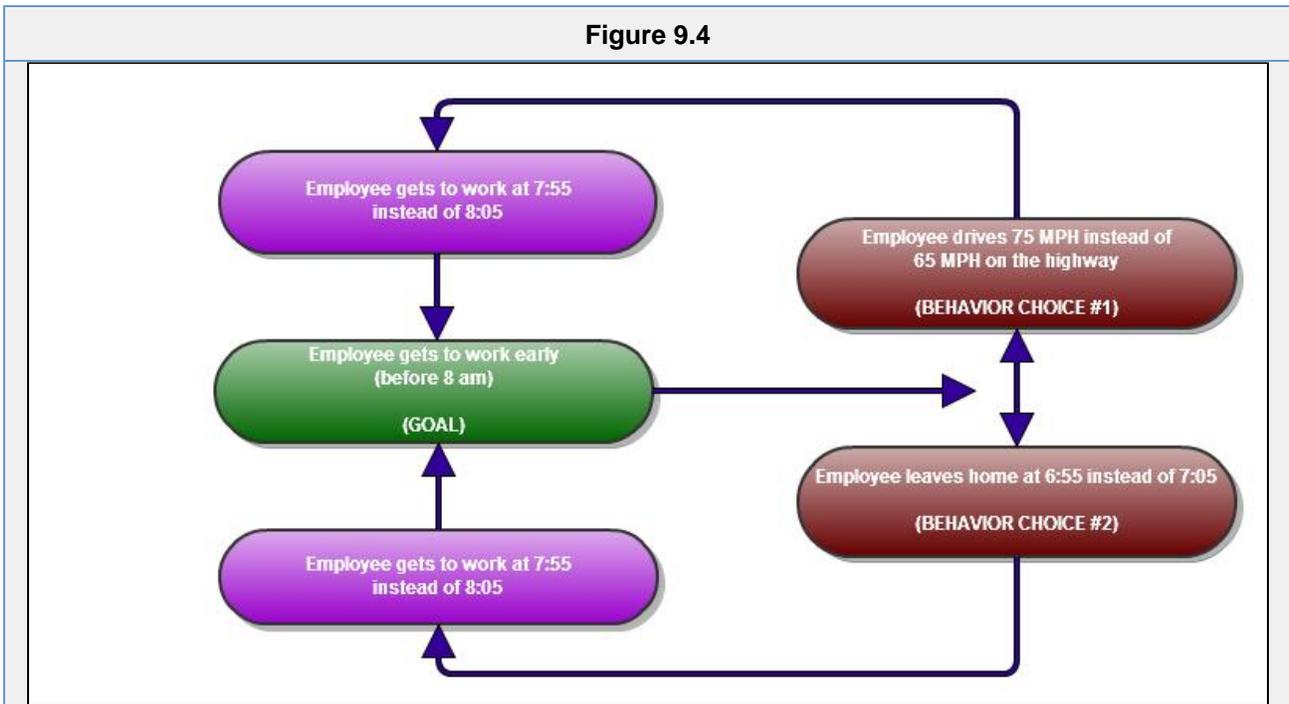
It is also important to note that the behavior in the given example is behavior that the individual chooses to control or regulate in order to reduce discrepancies in reaching the goal and it does not result from external influences (Klein, 1989). Consider the example of an individual setting the goal of getting to work ten minutes early.

In this example, the employee could reduce discrepancies in reaching the goal either by leaving 10 minutes earlier, or by driving at a faster rate. Both choices allow the employee to modify behavior, and it is the employee's choice as to which behavior is preferred to reach the goal of getting to work on time.

The employer chose to correct the tardiness problem with a controlling mechanism (poor evaluation) in hopes of reducing the employee's tardiness behavior. The employee saw enough value in reducing the tardiness to avoid possible punishment for being consistently late. The employee did not establish the goal of getting to work early and did not change his/her behavior to reduce the lateness discrepancy until the employer used a controlling mechanism such as a poor evaluation. The input from the employer caused the employee to select an initial goal- to be on time to work. The employee will probably continue getting to work early as long as the controlling mechanism continues to exist. If the company stopped evaluating the employee or if a new manager did not emphasize tardiness as a problem, then the employee may end the behavior of getting to work early because the goal no longer has a high level of importance once the control mechanism no longer exists. When feedback is missing, such as if the company stopped evaluating employee tardiness, then no error would be detected and no response aimed at reducing the discrepancy between current status and desired goal would occur (Campion & Lord, 1982).

#### **Illustration D: Link Between Goals and Behaviors**

Figure 9.4



## The Feedback Loop and Goal-Setting

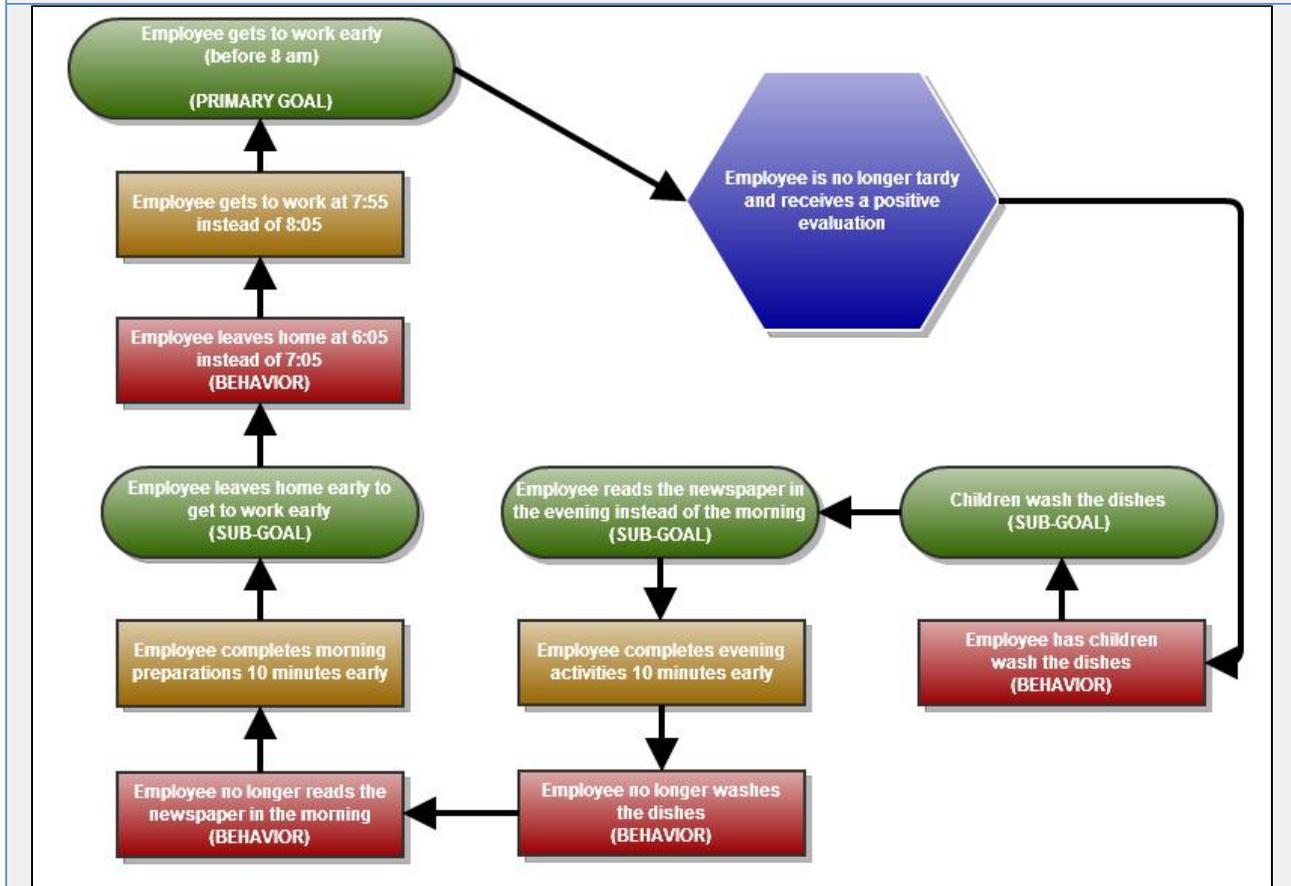
Rarely are individuals only working toward attaining a singular independent goal; life often requires the task of attaining multiple goals in the same time frame (Campion & Lord, 1982). Getting to work early may be the end goal for the employee, but it may require several sub-goals and other behavior modifications in hopes of successfully reducing the discrepancy of the control loop. Multiple control loops, with goals and behavior changes, take effect so the employee reaches the main goal of getting to work early. Utilizing both the Control Theory and goal-setting can assist individuals in reducing discrepancies and in meeting their goals.

### Something to think about

One's own goals ultimately have an effect on one's own behavior. However, it has also been brought forth that intentions are not necessarily translated into behaviors and that behaviors, reflecting the magnitude and direction of effort, are but partial determinants of performance. (Ajzen & Fishbein, 1997)

### Illustration E: The Feedback Loop and Goal-Setting

Figure 9.5



## Control Theory Research

Prior to Klein's work in the late 1980s of codifying the tenets of Control Theory as related to organizational motivation, research was conducted using many of the important concepts found in Control Theory. In 1977, Miriam Erez, at the University of Maryland, conducted a study hypothesizing that "feedback and goals would be interactively related to performance" and that said feedback would facilitate and enhance the individual goal setting and goal setting-performance relationship. In contrast to prior research findings, Erez focused her work on proving that knowledge of achievements and scores would be a necessary condition for goal setting and motivation. The study results were statistically significant in finding a correlation between the subjects provided feedback and their ability to set goals and perform better. In fact, the "results indicated that the variance in goal setting and performance were significantly higher" (Erez, 1977) in the group receiving their feedback scores versus the group that did not. Erez's research findings were an early pioneer for the basic elements of the development of Control Theory. Since Erez, there have been several research studies on the pros and cons of Control Theory, but few empirical studies to determine the true scientific value of the theory.

### Results of Control Theory and work environment perception, (Hollenbeck, 1989)

It was determined the relationship between both the perceptions of negative discrepancies and negative outcomes on both job satisfaction and organizational commitment, by theorizing that feedback was not a necessary component for motivation. The type of feedback and one's ability to meet the referent standard (goal) was crucial to his/her job satisfaction (retirement state) and one's ability to continue to be committed to their work.

- + Supports the theory that "work attitudes are a function of discrepancies between what one is perceiving and what one's standards are" (Hollenbeck, 1977). Workers with high focus on negative expectations or their belief that they failed to meet a goal did negatively affect their attitudes and level of motivations.
- The theory lacks a positive correlation "that perceived discrepancies would elicit stronger affective/behavioral reactions from high self-focused individuals" versus those that were less self-focused.

## Results of Control Theory in predicting behavior, (Sandelands, Glynn, Larson, 1991)

The results disputed the claim that control theory would predict the behavior of the worker's performance based upon having received feedback.

-  The findings concluded that no evidence existed on an "effect of goal specificity on supervisor feedback" (Sandelands et al., 1991).
-  The researchers believed their findings to be inconsistent with control theory in that supervisors provided inconsistent feedback based upon what the performance meant versus the role of the subordinate in the performance.
-  Despite findings in contrast with control theory, the authors conclude their paper with the idea that control theory should be preserved, as the findings of their research could have some inconsistencies in its ability to be generalized. Further, the authors recognized that the subjects could have taken their initial goals beyond the initial research, which may have supported why goal specificity was not found as related to feedback (Sandelands et al., 1991).

## Results of Control Theory within HR management (Snell, 1992)

Snell (1992) conducted a study connecting "behavior control to work flow integration", or control theory, to overall execution of human resource management control systems, particularly the input and output. Ouchi and Maguire determined that before an organization can have behavior control they must be aware of the cause-effect knowledge within human resource management control systems.

-  A Bureaucratic, strict organizational framework is to the point and effectively monitors the actions of subordinates
-  Too close of supervision from superiors can create rigidity and cost both money and time
-  Behavior control assumes superiors are aware of "cause-effect relations", or the steps subordinates take to reach the results they want to achieve
-  When there is a lack of this "cause-effect" knowledge superiors become unable to communicate what they need to subordinates in order to achieve goals
-  While it seems bureaucratic type controls are used less when organizations can afford greater technology, more research needs to be conducted on control theory within human resource management

## Results of multinational corporations using the control theory (Foss, 2006)

-  Its heuristic framework helped determine key variables when dealing with organizational knowledge. This was vital because some variables are more constraining than others.
-  Provides a more controlled style of the characteristics, nature, and general development of knowledge within multinational corporations.
-  The model provides clear insight into the interaction between knowledge stock and knowledge flow as a process for organizational control.

## Results of Using Control Theory When Managing Software Development Teams (Maruping, Venkatesh, and Agarwal, 2009)

-  By using control to monitor behaviors and outcomes, management can better regulate the efficiency and effectiveness of overall team performance.
-  Maruping, Venkatesh, & Agarwal (2009) via formal controls, "management can clearly layout expectations and then praise task completion in an organizational framework" (Kirsh, 1996).
-  Maruping, Venkatesh, & Agarwal (2009) via informal controls, social networks, or "teams" hold individuals accountable when it comes to team performance. This "peer pressure" forces others to self-regulate when meeting organizational goals (Jaworski, 1998).
-  Results of research found that for software teams, controls that focused on autonomy in development change would provide the most support in creating greater project quality.

## Results of Controlling for Quality: Climate, Leadership, and Behavior (Luria, 2008)

- + Hypothesis 1 specifies that employees will contravene quality procedures. On average, about one quarter of the observed employees behaved against company regulations, which differs significantly from 0. These results support the prediction of effort aversion and melioration bias.
- + Hypothesis 2 specifies that group quality climate level will negatively correlate with quality-damaging behaviors. Using linear regression, group quality climate negatively correlated with undesirable quality-related behaviors in the group. These correlations offer empirical validity to the concept of quality climate by predicting quality behaviors.
- + Hypothesis 3 specifies that leadership correlate negatively with eating on the job and other quality-damaging behaviors. The results supported the claim that transformation leadership is related to quality.

Finally, the idea that by being responsible for individual behavior and not being controlled by outside forces (or one's past) provides an environment for positive behavior change and movement toward not only acceptance, but also the embracing of diversity. Despite not having gained widespread acceptance as a predictive model for human action, Control Theory offers some benefits when applied to a workplace setting. The bottom line is that more studies need to be introduced that test this theory, which has already proven effective in the realms of engineering and physics, in the realm of human motivation. (Redmond, 2011)

## Applications in Organizational Settings

### Teacher Adoption of Technology: A Perceptual Control Theory Perspective

A study conducted by Zhao and Cziko tried to explain the use/lack of use of technology in the classroom as well as ways in which the incorporation of technology can be increased and accepted by the teachers based on the concept of the Control Theory- the PCT is the framework they used. Teachers in the classroom center this study on three conditions that affect and determine the use of technology, and these conditions are:

- The teacher must believe that technology can more effectively meet a higher -level goal than what has been used
- The teacher must believe that using technology will not cause disturbances to other higher-level goals that the he or she thinks are more important than the one being maintained.
- The teacher must believe that he or she has or will have sufficient ability and resources to use technology.

Some teachers feel the use of technology in the classroom is extremely beneficial; others see it as nonessential and don't improve nor make the learning process any easier. PCT maintains the assumptions that human beings will try to keep their perception and reference conditions in balance, so if a teacher sees technology as unimportant, then they won't use it or will fight against using it. The opposite is true for teachers who see technology in the classroom as beneficial. This study also expresses the importance of the interdependence of both the perception (input) and behavior (output), and that they both drive and affect one another. This means that both perceptions influence response and the different responses influence future perceptions. Therefore, the perception of technology needs to change for the teachers in order for their behaviors to change. Their goals in the educational atmosphere need to match up with the use of technology in order for the use to be increased, because based on the Control Theory, the decrease or elimination of a discrepancy between the goal and the standard is the main goal/motivation of the theory.

Findings and continued studies of this concept of technology in the classroom have a number of practical implications on a number of levels. This study and the use of the PCT focuses on the individual rather than group, the perceived rather than the objective, and the motivation rather than the skills. While control theory may focus on the more inhuman aspects of control, this tweaked theory adds the human and subjective side to it, which helps drastically improves its' possibilities for implementation.

### Application of Control Theory in the Workplace

Control theory has shown multiple applications in the workplace. To increase employee performance, managers need to ensure that employees have specific and challenging goals, which result in better performance than ambiguous goals (Campion & Lord, 1982). Ambiguous goals such as "do your best" or "try harder" provide no good comparative standard and direct feedback (Campion & Lord, 1982). Without a specific standard and clear feedback, an employee will not be able to recognize errors and then will not engage in behavior changes that improve performance.

Theoretical statements by Hanges and Lord (1987) and by Carver and Scheier (1981) suggest that supervision in the workplace can be analyzed as a control system made up of supervisors and subordinates. Management by Objectives (MBO) programs can also utilize Control Theory "to describe and organize the feedback loop between managers, their subordinates, and the tasks they are accomplishing as a team, as that team is a social network" (PSUWC, 2016). Control theory emphasizes that people continually seek feedback (PSUWC, 2016). Therefore you will see the Control Theory applied in areas of evaluation, weekly check-ins, and team meetings.

Workplace applications of Control Theory also arise when focusing on other control mechanisms that may factor into the "system" such as social control, social climate, and cultural changes. Control theory has also been used in human resource management where they use behavior control, output controls, and input controls to affect behavior and work performance.

According to Snell (1992), a major benefit with output control provides for lower level consideration, but it still affords encouragement and obligation, which enhance the employer. Further, it allows lower level employees the ability to change their behavior and engage in the occasion,

and bypass any hazards which can come up. Input controls are used to affect the quality of work through inputting information, such as training. Snell also believes that, an asset of input control is it aids the determinant of conduct issues. He advises to use caution when conducting manning and education sessions, as these can help stop anomalies that otherwise would be hopeless to fix at a later time.

Finally, the recent study by Agarwal, Maruping, and Venkatesh (2009) discussed in the previous section is a great example of Control Theory being applied to the workplace. They compared Control Theory and agile methodology when managing software development teams. The study indicated that first the project managers needed to take into consideration what was the context of the project. Secondly, base their level of control on the needs of the development team. It also mentioned that the steps needed to be taken by software development teams often require a sense of flexibility from all involved Agarwal, Maruping, and Venkatesh (2009). This being said, the study made note that project managers are encouraged to offer autonomy to the development teams so they can use their best judgment on appropriate methods for carrying out project. This is because software development team's main goal is outcomes and if these individuals have to be conscious of controlled steps and procedures set in place by management, they may lose sight of their overall objective. While more research will be beneficial, these conclusions could be extended to development teams in other industries.

### **An example of Control Theory in the Workplace**

A plumber might observe the speed with which water runs down a newly installed drain line (the sensor function), and mentally compare the observed flow to an internalized standard of how fast the water should drain (the comparator function). If there is a significant discrepancy between the two, i.e.; the water runs too slowly, the plumber must decide how to correct the problem (the decision function). For instance, he/she might decide to change the slope of the piping, or to add an air vent in order to facilitate the flow. The implementation of either option requires overt behavior (the effector function). Once complete, the speed of the drain is again observed, and if the discrepancy has been eliminated, no further action is needed. On the other hand, if the discrepancy is still there, further decisions and action will be required (Sandelands et al., 1991).

## Applications in Social Psychology

### Cultural (Societal) Differences

It is also worthy to note that despite the way differences in culture seem to affect the acceptance of control theory, research suggests that international organizations striving for improved organizational knowledge have encountered emotional, cultural, mental, and cognitive barriers. Scholars have turned to the control theory for ways of overcoming these barriers, within multinational corporations, in hopes of advancing organizational knowledge (Foss, 2006).

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