Creating Accurate, Research-based Behavioral Representations for Leadership Simulations

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ABSTRACT

The Center for Army Leadership (CAL) created simulations for leaders to practice high priority skills. Six hours of simulations covered decision-making, negotiation, cross unit cooperation, and subordinate assessment and development. To ensure leader and actor behaviors were accurate and grounded in behavioral science, CAL integrated a number of practices into the simulation development process. First, a needs analysis drawing on annual survey data on Army leadership identified topics critical for performance. Next teams of applied psychologists interacting with technical engineers identified research-based theories and associated content to ensure accurate representation of leader behaviors. This was further reviewed by Army subject matter experts. Customized treatment documents where then developed which instantiated human input, throughput, and output behaviors. Often numeric values were assigned to human behaviors, goals, or attitudes (e.g. satisfaction, intended effect, etc) to set threshold criteria that would trigger realistic changes in work/environmental conditions and outcomes. First playable simulations were created to demonstrate an example leader action, other actors' responses, and subsequent leader action or work environment consequences. Behavioral science experts as well as Army SMEs reviewed the first playable to confirm a leader's actions were appropriate and triggered typical responses and outcomes. Once accurate leader behaviors were confirmed, the rest of the simulation's leader interactions were created along with associated work environment consequences. In beta tests Army leaders confirmed the authenticity of each simulation and rated its ability to generate learning. This paper identifies innovative and effective ways to develop simulations which seek to create and emulate leadership behavior, one of the most complex and vital elements of military operations.

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Introduction

The Center for Army Leadership (CAL) operates the Army's 360° assessment program[1]. In 2009 CAL developed a complementary program called the Virtual Improvement Center (VIC) to assemble learning materials for areas identified as developmental needs during 360° assessments. VIC was designed for interactive multi-media instruction, web-based simulations, and other learning resources that link to doctrinal leadership attributes and competencies (Headquarters, Department of the Army, 2012). The most challenging task of the VIC initiative was the creation of realistic, engaging simulations which accurately represented human-to-human behaviors. Simulations traditionally have been used so that humans could practice their control and interaction with weapon or platform systems (e.g. missile control, aircraft, tanks, ships, etc). While allowing for wide variability, human-to-equipment simulations are nevertheless bounded in design by the known embedded parameters of the equipment itself. With human-to-human simulation, however, the challenge of creating an accurate replication is multiplied by the variability of reactions and outcomes that any given human might exhibit in response to another human or to changes in the situation. The factors that guide or influence an individual's behavior (e.g. personality, previous experiences, physical and mental wellbeing, critical thinking, creative ability) are many. The complexity of these factors makes it difficult to predict how people will act or respond in any given situation.

The Center for Army Leadership method for developing accurate, research-based leadership simulations evolved over the three year project. In its fully evolved state, the method consisted of several iterative design steps. A brief summary of these follows with additional details together with examples from one of the simulations. It is also important to establish that leadership relies on skills that can be developed (Doh, 2003; Mumford, Marks, Connelly, Zacarro, & Reiter-Palmon, 2000; Riley, Hatfield, Paddock & Fallesen, 2013); leadership is not solely or principally a matter of personality or style.

The general topic or content domain of a simulation is derived from reliable sources that indicate there is a need for leaders to improve in a given skill. Another consideration is that leaders could benefit from practicing specific behaviors prior to implementing them in real life situations. Next applicable concepts, theories and research from the behavioral sciences were identified to guide the creation of simulation content. A visual framework was then constructed and described in a written simulation treatment document. The treatment document described the work or mission context and each of the major characters thought to be necessary to replicate a realistic leadership situation. Especially for a leadership simulation who the leader is and how and what actions they will be taking in the simulation were important to specify. Similarly the creation of other human characters and under what conditions and situations they will react and respond were important to identify. Outcomes and consequences also need to be identified and associated with each of the leader's options for how they can act or behave in the simulation. The steps previously described culminate with research psychologists, working with subject matter experts and information technology engineers to generate an accurate, sample depiction of the situation, leader actions, Non-Player Characters (NPC) reactions, and consequences.

[1] The multi-source assessment and feedback (MSAF) program is also available for use by all sister services.

Especially important to a leadership simulation is the accurate depiction of behavioral affect (e.g. anger, joy, excitement, energy, disappointment, happiness, level of motivation, etc.) along with appropriate concrete outcomes and consequences (e.g. loss of life, restored infrastructure, increased security, work agreements, task/mission accomplishment, etc.) that result from leadership behaviors. Design also must identify the targeted leadership behaviors to elicit or that are allowed. Critical to leaders actually learning from the simulation is attention to how simulation graphic, narrative and/or audio stimulus are employed to provide them with feedback. Inevitably all leadership simulations will have limitations in their ability to fully depict human behavior. Thus limitations must be identified and attention paid to how the simulation will address them. Once a framework and sample depictions are worked out and graphically depicted, the entire team reviews the simulation. The team confirms that it is realistic, engaging and consistent with the research for leadership and it has plausible consequences on other humans and task/mission outcomes. While the simulation will not have complete representations, limitations should not overly detract from realism and the opportunity to learn. Finally, the team confirms that appropriate feedback mechanisms are embedded to gain the leaders attention and prompt their learning in accordance with learning objectives.

For leadership simulations especially, initial conceptualization and depiction of the simulation ought to be guided by a common frame of reference for leadership itself. The US Army's definition of leadership *is* "… the process of influencing people by providing purpose, direction, and motivation to accomplish the mission and improve the organization (Headquarters, Department of the Army, 2012)." Leadership defined as an influencing process puts special demands and challenges on the accurate depiction of leadership. Each of the leader's interactions will need to model a combination of technical and tactical knowledge as well as interpersonal knowledge of the person or persons they are attempting to influence. Combinations of effective and ineffective communications skills and displays of appropriate affect, both verbally and non-verbally, all need to be accurately depicted within the simulation. The complex combinations of factors must work together to depict appropriate and inappropriate methods of leader influence and the associated consequences.

Beyond depicting leadership in alignment with the organization's definition of leadership, the simulation must also correctly model behaviors the organization has determined reflect effective leadership. The U.S. Army's leadership requirements model describes the attributes and competencies required for holistic, effective leadership. Owing to a rigorous validation study, the Army can legitimately claim its competency-based leadership behaviors are associated with effective leadership (Horey, Harvey, Curtin, Keller-Glaze & Morath, 2007). Thus a leadership simulation that focuses on the competency *gets results, develops others* or *influences beyond chain of command* must reflect the Army's behavioral descriptions of them. This ensures appropriate and effective behaviors are learned via the simulation. Similarly, the simulation must appropriately model all other Army leader attributes and competencies that might enter into the storyline to make for a realistic depiction of leadership.

To provide a specific example, The *Command Team* simulation will be used to describe the steps taken to create accurate, research-based behavioral representations of leadership. Effective leadership is critical in fostering cooperation and appropriate competition within a command team (De Cremer & van Knippenberg, 2002). Without it, command teams will not be able to achieve mission success. Conversely, rivalries can be especially dysfunctional under the high stakes and stress of deployed operations. The need for Army leader improvement in this competency came from several sources. In a Center for Army Leadership annual study of leadership quality, only two thirds of peers were rated as effective leaders (Riley, Conrad & Keller-Glaze, 2012). Additionally, de-conflicting roles is the lowest rated behavior of the *gets results* competency by superiors in 360° assessments (Foster & Freeman, 2013). A frustrated battalion commander reported that his company commanders compete to the point of degrading the battalion's ability to accomplish its mission. Given this identified need, CAL embarked on creating a simulation to reinforce and encourage cooperative teamwork. At the same time, care was taken to ensure appropriately competitive behaviors were not discouraged.

While there are various tactics that can be employed to encourage cooperative teamwork, they may be inappropriately applied when individual differences and situational factors are not taken into account. It is therefore necessary to thoroughly understand the science of leader tactics and how and when they contribute to the development of cooperation and appropriate competition within the command team. In so doing, the *Command Team* simulation focuses on three competencies from the Army leadership requirements model.

- Extends Influence Beyond the Chain of Command by fosters teamwork, cohesion, cooperation, and loyalty (esprit de corps)
- Leads by Example by seeking diverse ideas and points of view
- Creates a Positive Environment by negotiating, building consensus, and resolving conflict

In the section that follows, theoretical underpinnings of the *Command Team* simulation are identified. From these underpinnings general tactics for how leaders ought to act to obtain cooperation or compete appropriately are discovered. Positive outcomes are also identified so that they can be associated with the tactics in the simulation. Similarly, less than effective behaviors and their associated negative outcomes are also identified. It is this compilation of leadership behaviors, together with appropriate outcomes, that forms the foundation for accurate, research-based simulations.

Theoretical Underpinning: Transformational and transactional leadership

Transformational leadership tactics are those that appeal to values, emotions, or shared experiences. Roberts (1985) described transformational leadership as having "…hope, there is optimism, there is energy," and called it a type of leadership that facilitates "…a renewal of their commitment, and the restructuring of their systems for goal accomplishment" (p.1024). Transformational leadership theory predicts that a transformational leader will inspire others through articulating a vision for the group and encourage expression of ideas through active listening. Through these actions, leaders engender buy-in and individuals on the team will be eager to work toward collective goals. Individuals are intrinsically motivated to go beyond self-interest when a leader articulates the vision, discusses self-sacrifice, exemplifies personal courage, and rewards collaboration (House & Baetz, 1979; Deci & Ryan, 1985; Tyler, 1999; De Cremer & van Knippenberg, 2002). Platoon leaders demonstrating transformational leadership behaviors have been found to have more effective platoons (Bass & Avolio, 2000).

In contrast to transformational leadership, transactional leadership is based on a set exchange (Leithwood & Poplin, 1992). An individual leads by explaining what must be done and what reward or outcome will be forthcoming if objectives are met. A transactional relationship is a reciprocal one, where parties negotiate toward the best possible outcome with the resources at hand (Bass, 1985). Those who are motivated by a transactional leader are motivated by what will be gained, either personally or by the group, when tasks are completed and goals are achieved. Transactional leaders use rewards as a control mechanism, whereas transformational leaders use a system designed to increase commitment to the cause and intrinsic motivation (Goodwin, Wofford, & Whittington, 2001).

Though they pique different motivational interests, transformational leadership and transactional leadership are complementary, not polar opposites, and may be linked to the achievement of desired goals and objectives (Bass, 1985). Both transformational leadership and transactional leadership can be effective in establishing command team cooperation and healthy competition. Transformational leadership brings team members to a common understanding of mission goals and objectives and, therefore, a reason to be cooperative and work hard in appropriate competition with others. Transactional leadership grants rewards or specific outcomes when certain objectives are met, which motivates teammates to either work together to reach that objective or compete healthily to achieve on one's own.

Theoretical Underpinning: Organizational Citizenship Behavior (OCB)

Organ and his colleagues first coined Organizational Citizenship Behavior (OCB) to refer to individuals who go beyond their self-interest for the good of the organization (Organ, 1988). OCB is more widely conceived as a transformational class of behaviors, as it increases an individual's self-worth without that individual expecting a tangible gain (Podsakoff, MacKenzie, Paine & Bachrach, 2000). OCB is also a measure of organizational work outcomes, similar to productivity, satisfaction, and engagement (Podsakoff, Whiting, Podsakoff & Blume, 2009). Based on transformational and transactional leadership and OCB, there are several tactics that a leader can use to encourage cooperation among team members:

- Create a sense of belonging.
- Build relationships and alliances.
- Ensure procedural fairness.
- Use cooperation and competition in tandem.
- Set conditions for collaboration.
- Share recognition and reward for success.

Theoretical Underpinning: Cooperation and competition

Cooperation and competition are constructs with a long history of conceptualization, research and application. And level of analysis spans individuals to nation-states. Cooperation and conflict have two very different ways of structuring environments for productivity and effective, mission-driven work. Cooperation involves a group of individuals working together toward a common goal (Deutsch, 1962), while competition is defined as one person attempting to outperform another (Kelley & Thibaut, 1969). Some theorists have argued that cooperation better facilitates high performance (Aronson & Bridgeman, 1979; Deutsch & Krauss, 1962) and that competition can adversely affect groups by promoting negativity among team members (Deci & Ryan, 1985; Kohn, 1992). However, at times, depending on the situation and the dispositions of those involved, a healthy level of competition may be more effective for accomplishing the mission than encouraging cooperation. Healthy competition is friendly and generally involves competing against an objective standard. Competition is also appropriate to use occasionally, as it is realistic; many real world activities include elements of both cooperation and competition (Deutsch, 1962). Competition may be an effective motivator because it creates excitement and increases the desire to do well (Tauer & Harackiewicz, 2004). Because research findings advocate for both, it is critical to assess the situation and determine whether cooperation or competition is the most appropriate response.

When deciding whether to pursue cooperative or competitive tactics leaders ought to go through the following sequence of thought and behavioral steps.

- Accurately assess the dispositions of fellow command team members to cooperate or compete.
- Apply behavioral tactics to enhance the cooperation of fellow commanders.
- Demonstrate assertiveness and adaptability simultaneously – maintain a position and influence others to adopt the position until convinced by facts that other options are better.
- Be willing to change course of action when new and relevant information is provided.
- Distinguish between options to cooperate or not cooperate based (act independently) on requirements to accomplish own unit mission and higher unit commander's mission.

The previous review of the literature, focused on simulation topic theoretical underpinnings, resulted in defined tactics and steps leaders ought to model to create shared understanding and foster cooperation across any given team. The literature also identified moderating factors. To facilitate shared understanding within the simulation

development team itself, a visual model of how leader tactics and moderating factors (e.g. peer disposition) interact to result in effective command team and unit performance outcomes (see Figure 1).

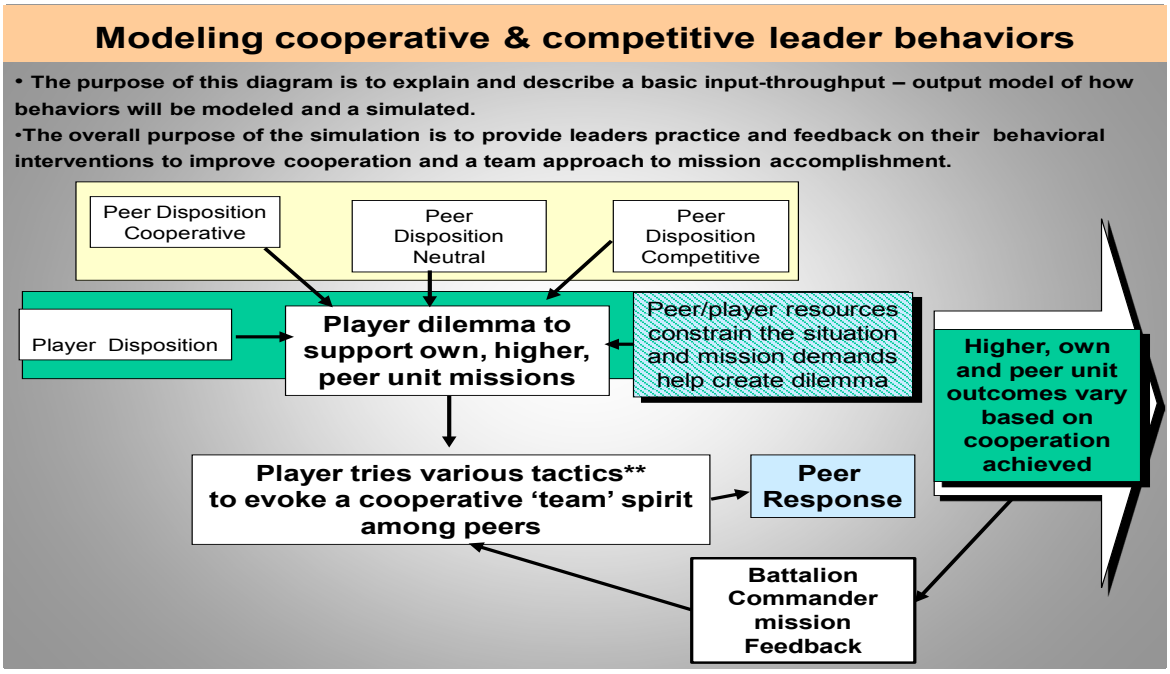

Figure 1: A conceptual model of cooperative & competitive leader behaviors

Scenario Development

Concurrent with a review of the literature, the simulation development team determined the general scenario, role and level of leadership to be depicted by the simulation. Battalion unit commanders had expressed frustration with non-cooperative behavior by company level commanders (e.g. they were not acting in ways that placed the higher battalion mission and its importance on par with their own company success). This contributed to a decision to create a battalion unit mission scenario with its company commanders possessing various dispositions to cooperate or compete to achieve mission success. Titled *Command Team,* the simulation was designed with two primary learning objectives: 1) Promote command team norms that are appropriately cooperative, and 2) understand how and when healthy competition can be used to achieve mission success. A brief synopsis of the simulation scenario follows.

The learner is placed into the role of CPT Anderson, a leader who was recently promoted to Company Commander (CO CDR) of Alpha Company. Alpha Company is part of Task Force Safe Haven, whose mission is to stabilize the Lansi region, a fictitious Sudan-type country, which is on the verge of becoming a failed state due to persistent rebel attacks combined with a major natural disaster. A crisis situation storyline is important to creating an engaging simulation with challenging scenarios that demand leader action. The *Command Team* simulation is designed to place the learner under competing demands, where the learner has to balance the demands of the company (CO) mission, battalion (BN) mission, and the various attitudes of the simulation player's fellow command team (CO CDR's) members. As in a realistic operation, the choice the player makes affects the missions of fellow CO CDRs.

Thus a player's decision may negatively or positively affect the peers attitudes and decisions. Because many of the missions requires gaining the cooperation of the other command team members, determining strategies that ultimately are satisfactory to the player, BN leadership, and fellow CO CDRs missions is important for success in the *Command Team* simulation.

The player's history with fellow CO CDRs is an important aspect of this simulation. In each scenario, the player must determine how to best gain the cooperation of his fellow CO CDR, or compete in a way which still leads to mission accomplishment. Whether the player is successful or unsuccessful in gaining cooperation has a carry-over effect to the next interaction with that peer. Players who damage their relationship with their fellow CO CDRs will have a more difficult time negotiating with them in the future, while improving the relationship sets the conditions for stronger future interactions. The simulation player interactions take place in a variety of realistic dilemmas relevant to providing relief, reconstruction support, and security of the Lansi region. The player is presented with different sets of tactics from which she or he selects to attempt to resolve the issue and/or dilemma at hand.

Simulation Mechanics Development

Development team psychologists' and Army subject matter experts write narrative descriptions of player and non-player character (NPC) interactions, appropriate options and their associated outcomes (grounded in the theoretical underpinnings and leader tactics). In order for the simulation to work as designed, development team technology engineers then devise underlying mechanics to be consistent with the theoretical underpinnings and the modeling of cooperative and/or appropriately competitive leader tactics. Figure 2 depicts part of the mechanics for the *Command Team* simulation.

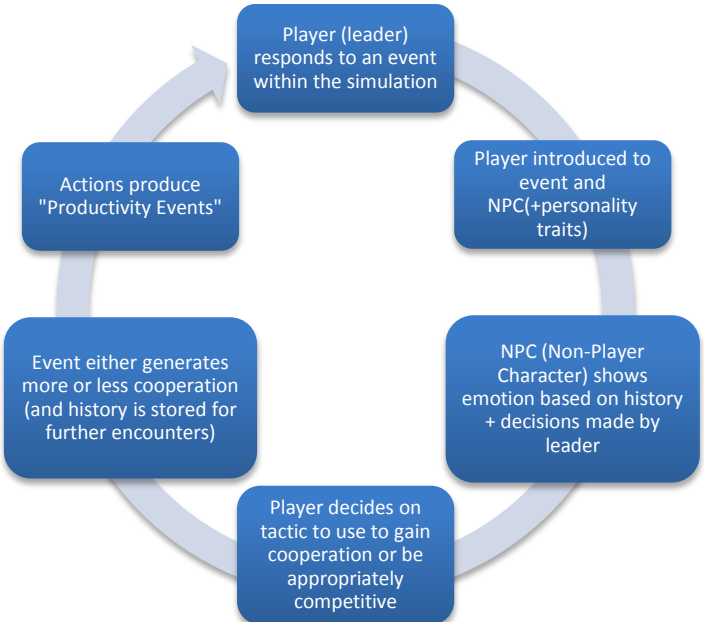

Figure 2: Simulation mechanics

To further populate simulation events, character descriptions, attitudes and conversation narratives are created. Characters are imbued with predispositions to cooperation or compete, facilitating player practice with a wide variety of cooperative to competitive situations (see Figure 3).

Complexity and Realism Enhancements

Like a true operational environment, the situation is constantly changing in the *Command Team* simulation. The player is introduced or comes into contact with multiple characters with different needs and dispositions. Players are given access to resources (e.g., engineering equipment, water filters, defense barriers, etc.), and must decide how to best use the resources in the context of the specific leader cooperation dilemma. At the end of each scenario and mission, the learner participates in an interim After Action Review (AAR) with their BN CDR, LTC Shannon. This enacts the earlier emphasized need for leadership simulations to provide feedback to the player on the consequences and outcomes of his or her actions within the simulation itself. LTC Shannon provides constructive feedback if the learner chooses an incorrect tactic, explaining why the tactic was wrong, and what the optimal strategy would have been. A correct tactic solicits praise from LTC Shannon. LTC Shannon exhibits appropriate *develops others* Army competency behavior in delivering feedback. Thus the simulation holistically models appropriate leader behavior across the Army's leader requirements model.

Name & Rank	Personality Characteristics that can be tied to getting past issues of cooperation	Position
CPT Bucknell	Formally a line CO CDR, he tends to over cooperate as he sees his mission is to support the line CO CDRs no matter what the cost. At times he will make promises to the line CO CDRs that are all but impossible for his HHC Soldiers to execute.	HHC Co.
CPT Anderson (Player)	As the newest CO CDR you want to cooperate with your peer CO CDRs. This will help you get to know them and become part of the team, while also helping you learn from them At the same time you want to establish your CO as a high performance team that the BN CDR can count on to accomplish the toughest missions.	A Co
CPT Mattingly	He tends to be more competitive than cooperative. He sees other CO CDRs as his competition and other companies as competition against which his company must always come out on top. He encourages this perception among his subordinates and they are proud of being part of B CO.	B Co.

Figure 3: Sample of character descriptions and associated dispositions

To create realism and enact the human dimension of leadership, dialog construction is a 'back and forth' interaction between the player and various non-player characters (NPC) he/she encounters. Players can also probe/inquire for more information from unit and non-unit (e.g. indigenous) NPC (see Figure 4).

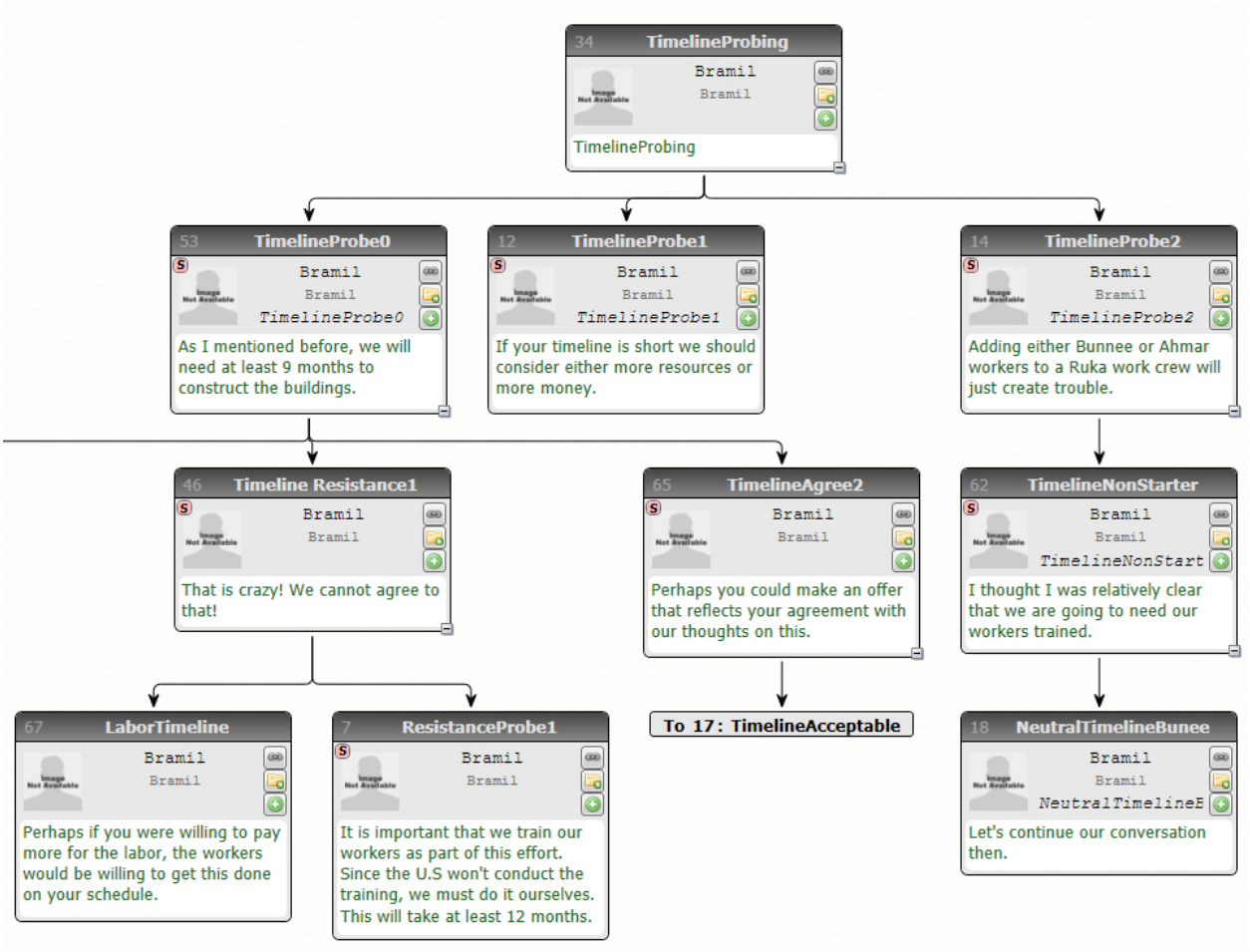

Figure 4: Sample dialogue tree

Conversations are designed to set up a situation whereby the player leader is presented with an opportunity to employ a number of different tactics. Each conversation includes information that provides clues and hints as to whether the player ought to seek cooperation (and which tactic to employ) or be appropriately competitive for a given scenario event. For example:

- **Previous 'story' and relationship to NPC**
  Each NPC possesses an opinion and perspective on you and who you are relative to cooperation and competition. Player is provided this information by way of NPC introductions.

- **NPC has dynamic history in the simulation**
  The NPC is or can be aware of the player's previous history of cooperation or competitiveness. When appropriate, s/he may take into consideration the player's previous actions in generating a conversation response.

- **NPC disposition**
  The NPC has his or her own disposition to cooperate or compete. To be successful the player must recall and recognize via dialogue the disposition of the NPC and decide upon the appropriate conversational response.

Simulation Testing

The simulation was beta tested with a small number of officers (n= 9) and feedback was obtained to improve the final version. Given high demands on Soldiers in a time of repeated deployments, Army test subjects were difficult to obtain. Test participants on average indicated increases from pre to post testing on knowledge gained and ability to apply what they learned, but the differences were not statistically significant with such a small sample. Positive participant feedback was received on the simulations ability to carry forward consequences from one event to another within the simulation. Participants also felt that the time invested in practicing with the simulation was worth it. In terms of value and learning, participants stated that the simulation prompted them to think more about the consequences of every decision and how cooperation with peer leader, while requiring some concessions, can be beneficial in the long run for them and their unit as well. Subsequent to revision following testing, the simulation was made available for download within the Army's Multi-Source Assessment and Feedback (MSAF) website. Additional reports of its effectiveness are expected in the future.

Conclusion and Future Research

The leadership simulations developed by the Center for Army Leadership are admittedly a first step toward achieving research-based, accurate representations of leadership simulations. In the course of developing the simulations a number of capability enhancements were identified that future research will explore. While some of these enhancements are attributable to resource constraints, they nevertheless represent challenges that need more attention. One needed capability enhancement is for simulations in which the player's decision options can be created rather than established *a priori* by the simulation itself. For example, all currently developed CAL simulations offer the player leader a predetermined set of options from which to choose. Second, simulations ought to allow the player to be represented with an avatar character that reflects his or her unique appearance, knowledge, experience, and personality. As presently configured, the player interjects their own style, experience, and personality into the simulation by way of the decisions they make. The player can choose from a limited number of Avatars to match basic demographics. Further expanding this simulation capability, however, complicates narrative dialog (e.g. salutations referring to gender must differ – sir, ma'am, etc). Third, allowing players to make decisions and take actions at their own timing, rather than at prescribed times within event scenarios, would further create simulation realism. So, too, the ability to revisit a previous decision or action, while partially modeled in another

simulation (Mission at Mubasi), needs further research and development to be correctly modeled. Last, there are advantages and disadvantages to creating simulations focused on a single competency skill set (e.g. cooperative – competitive tactics). The advantages are that they provide the player with a high level of practice and repetition with a specific skill set. The disadvantage is that the simulation does not holistically model the full range of responses a leader might take across any of the competencies identified in the Army's leadership requirements model. This can detract from simulation realism while also making the situation seem less complex and interconnected that it would be in real life. In summary, leadership is a complex phenomenon with accurate and realistic simulation a challenge. Continued development of more individualized and free play capabilities is a recommended direction for future research.

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