Simulating Combat to Explore Motivations Behind Why Military Members Make Costly Sacrifices

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***Abstract* – Why are soldiers, sailors, airmen, and marines willing to make costly sacrifices? Previous research suggests loyalty (e.g., duty) to teammates is important among other reasons. More recently, studies conducted overseas have identified sacred values (i.e., values held so deeply they are immune to material tradeoffs) and group identity fusion as primary factors. Importantly, however, these studies have been conducted using survey-based and other social science methods which assess attitudes and beliefs, but not behavior. For example, it is one thing for a respondent to *say* they would jump on a grenade to sacrifice for their group but another to *actually jump* on a grenade in real life. Thus, we have developed a simulation to help bridge the gap between what people say and do in life-or-death scenarios. This high-fidelity simulation was developed to provide a more immersive means of testing realistic, "shoot or no shoot" hostage scenarios. Using feedback from individuals with military experience, the scenarios were designed to elicit more real-life stress than attitude-based surveys. This paper describes the systems engineering process we used to design the simulation as well as the proof-of-concept study developed to explore reasons behind why people are willing to make costly sacrifices. Early pilot data have revealed that values and identities related to religion, risk to self, and the Air Force predicted engagement decisions of Air Force cadets, in a series of simulated hostage scenarios. Possibilities for future use of this simulation will also be discussed. For example, while this experimental setup lacks high stakes consequences, this simulation could be useful for selection and training in addition to a research tool for studying motivations in different simulated combat environments.**

Keywords—Decision Making, Systems Analysis, Modeling

I. Introduction

Both military doctrine and conventional wisdom suggest that states with better weapons, technology, training, and resources generally prevail over materially weaker adversaries [1]. Theories from a variety of academic disciplines, the focus of government leadership, budgets, and emphasis areas in defense research have followed this pattern of thinking. For example, in the United States alone, over 45 billion dollars is spent on developing material capabilities to maintain an advantage. People and nations have produced a wide range of technological solutions to this end.

Recent research has acknowledged the importance of material superiority, but found that human willingness to fight is a more important factor to determine outcomes in war [2, 3]. The disposition and motivation to fight and win even with the potential for costly sacrifices have led to some amazing feats. For example, during the Vietnam War, the Democratic Republic of Vietnam in North Vietnam demonstrated amazing resolve despite being bombed more than any other country in history. Their willingness to fight, despite a difference in power distribution, was underestimated by the United States and eventually led to the latter's withdrawal. The DRV did not reach a breaking point as expected. A recent RAND study suggests the human will to fight can impact the odds of victory from 10% to 1100%. Clearly, understanding human capital and motivations to fight in the face of extreme sacrifice is therefore an essential factor in military strategic planning efforts for future conflicts.

In order to understand the will to fight, studies have relied on common social science methods including surveys, ethnography, interviews, and case studies. Findings have uncovered why people fight including intercommunity dominance, emotional gratification, access to resources, honor, loyalty, religion, and the effects of rum [4, 5]. A number of theories have been posited to integrate findings and these have guided theory, policy, and practice. Yet, these methods are not without problems. Many reports analyze human resolve post hoc and fail to apply any empirical data to suggest factors that underlie human will and performance. Studies that do apply empirical methods suffer from challenges that face many social scientists. Self-report methods such as surveys and interviews suffer from significant method bias [6]. For example, it is one thing for a respondent to *say* they would jump on a grenade to sacrifice for their group but another to *actually jump* on a grenade in real life.

Atran and his colleagues have addressed this shortfall by using mixed methods to advance the devoted actor framework (DAF). This theory has identified the importance of sacred values and identity fusion as critical to understanding one's willingness to fight and make costly sacrifices [3, 7-8]. Sacred values are defined as being immune to material trade-off or social pressure to change. Group identity fusion is defined as a visceral, family-like bond that an individual or group experiences with another individual or group. Research on the link between identity fusion and sacred values in forming one's willingness to fight and make costly sacrifices has been performed on various fighting groups around the world including the Kurds, Chinese military, ISIS, and Moroccan revolutionaries [9, 10]. This research has shown that although few fighting forces have been effective after 30% loss, ISIS radicals, for example, maintained lethality after over 60% loss rates [11]. Despite the lower physical formidability of these forces, high perceptions of ingroup spiritual formidability prevailed as their primary motivation to continue to make costly sacrifices [12]. Instead of relying on standard Likert survey measures alone, DAF research has used dynamic survey measures, vignettes integrated within surveys, ethnographic, neuroscience, and other methods to understand the will to fight [9, 13].

We extend this research by developing a medium-fidelity simulation system to examine factors behind the will to fight. The Human Interface for Simulating Training Engagements with Actors in Costly Sacrifice Scenarios (HI-STEACSS) simulation prototype provides researchers and the defense community a way to behaviorally assess sacred values, identity fusion, and other demographic factors and how they contribute to decisions in combat scenarios. The performance measures in the simulation will supplement text-based surveys with behavioral data [14]. This paper outlines the system engineering process used in the design and development of the simulation, the proof of concept study involved in the system's implementation, and preliminary results from that study. The paper concludes with future research possibilities and the implications of this research.

II. System design and development

The design goal of the HI-STEACSS prototype was to provide a dynamic, easily adjustable, immersive, and low-cost game to collect data on why military members are willing to fight and make costly sacrifices. The following sections outline the design and development of the simulation.

A. Requirements Definition and Design Synthesis

After meeting with government and industry stakeholders and social science researchers, one of the early goals of this design effort was to make previous self-report willingness to fight survey data "come alive" in a simulated environment. Survey methods previously used in this research have been validated extensively across many cultures and militaries, and are continuing to develop with the integration of more diverse measures. DAF research in particular uses some measures that are more dynamic than standard text-based survey questions (Fig 1). In the same way that vignettes are used to decrease the ambiguity in survey questions and standardize the social stimulus across respondents to inform their decisions and judgments [15], the additional sensory components and cognitive engagement provided by simulated operational scenarios are a step towards more dynamic data gathering. The proven benefits of dynamic measures and the use of vignettes in survey items formed the foundation of early design goals for the HI-STEACSS simulation.

Fig. 1. *Example of a "dynamic measure" to assess identity fusion with family.*

Given the budget for this project was low (i.e., under $100) and the significant time constraints (one academic year cut short by COVID-19), the other requirements included (a) accessibility, (b) low cost, (c) ease of use and manipulation, (d) time demand for building, and (e) fidelity capabilities. Based on these evaluation criteria, we evaluated three different software options: Garry's Mod, Far Cry 5, and FlightGear (Table 1).

TABLE I. Comparison of Software Systems

Software	***Accessibility***	***Cost***	***Features***	***Ease***	***Fidelity***
Garry's Mod	Open source video game	free	high complexity	Can be buggy	Moderate graphics
Far Cry 5	COT video game	$60	Limitations on features	Intuitive	High def graphics
Flight Gear Simulator	Open source video game	free	Not very user friendly	Difficult to create new content	moderate graphics

We chose to use Far Cry 5 Software, which is a low cost Commercial, Off-the-Shelf (COTS) video game platform that was released in 2018. This software requires no external hardware, limiting the necessary controls to a computer keyboard and mouse, while affording the future option of adding other party extensions which will allow us to expand on the types of controls. It also includes a "level editor" that allows the creation of custom maps and "levels" with dynamic, easily manipulated features, which enabled the simulation's creation. Lastly, the software has very high-definition graphics with high fidelity features for a better sense of immersion.

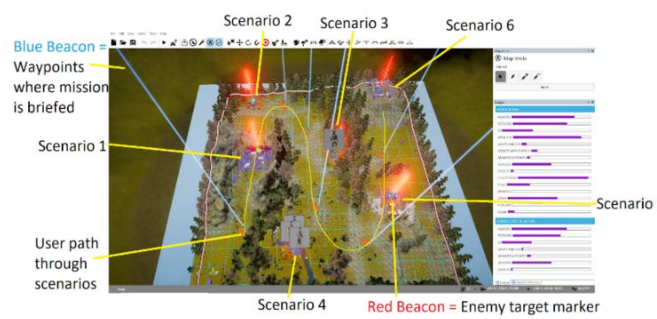

Fig. 2 *Overview of HI-STEACSS . The blue and red beacons represent the binary decision posed to the agent within each scenario: to engage the hostile target or to move onto the next scenario. This figure also displays the software's features and the designer's "budget" for those inputs (i.e. trees, AIs, textures, etc.)*

B. Features - Application Design and Prototyping

The development of the simulation leveraged features that already existed in the Far Cry game. Agents, weapons, adversaries, gaming physics, and terrain features embedded in the game allowed us to simply build new levels based on measures of interest. Most of the game is played in first person with some opportunities to take a god's-eye view of the environment.

Given one goal of our design was to make the survey come alive, we extracted vignettes from the survey to use as design specifications. Here is an example vignette:

*Imagine that a **USAF Airman** was captured by enemies of the United States. Recently, one of your Academy friends learned where this person is being kept hostage. If your friend knew that there was a high likelihood of being captured or killed in the rescue attempt, do you think your friend choose to volunteer for the mission?*

The vignettes were constructed in the environment with users involved. After a vignette was developed in Far Cry, we asked naïve cadets to play and elicited their feedback. The physical fidelity was constrained by cost and we were only able to use standard hardware such as a keyboard and mouse. However, the gaming scenarios were designed with high cognitive fidelity such that the sense of immersion was high.

The game presented binary decision dilemmas accompanied by scenario specific vignettes, with visual and auditory cues, in an open world environment where users are able to move autonomously in flight, while following the experimenter's instructions through the simulation. This made their role less passive and more action-oriented. For example, users can choose at what distance and at what time to engage or not engage the targets and when to position themselves to "fire" at the targets. Enemy targets were placed throughout each scenario, but only shot at the agent within a certain range (to increase the environmental realism and pressure to make a "shoot or no shoot" decision).

Not all features were embedded within the game. The concept of operations required most direct interactions with the game but the experimenter acted as a mission commander relaying important information over the shoulder. This information was scripted and, according to subject matter experts, not uncommon for some military operations (see Figure 3).

Fig. 3. *Experimenter providing guidance to visitor in a simulated hostage scenario.*

C. Scenario Development

Scenario development was the most important factor to our stakeholders (a variety of scientists, policy-makers, military decision makers, etc.). We developed a total of two maps with the first map providing participants an orientation to the environment, controls, and goals. The second map contained six hostage scenarios. These scenarios were seamlessly integrated into a sequence of operations (Figure 4). After each operation, we paused to measure confidence and motivations behind their actions.

Once the participant completed the training map and felt comfortable with the controls within the HI-STEACSS simulation, the experimenter loaded the operational map. To begin, the agent entered an aircraft idling in front of them. The agent then took flight and moved to the first waypoint where they received an intelligence brief about the hostage situation ahead. They were instructed to fly over the compound and fire upon it if the agent decided to engage. If they decided not to engage, they were told to shoot the visible cube beneath the blue beacon and proceed to the next waypoint, where they were briefed on the next scenario.

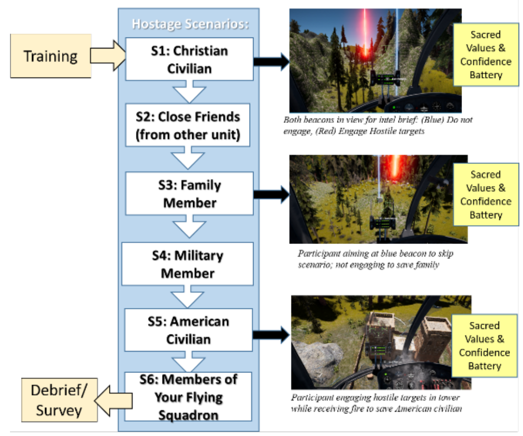

Fig. 4. *An overview hostage situation scenarios from first-person views*

D. Measures

Behavioral measures were passively recorded while participants played the game. In order to assess the willingness to fight with the potential for costly sacrifice, participants made an engage or do not engage decision. When the participants make the decision to engage they fire upon an enemy compound and risk their life and the hostage's life. After these scenarios, subjective data gathered via Likert scale ratings for confidence in their decision and variability in the extent to which different motivators (i.e. list of sacred values and list of identity groups) played a role in their decision.

To determine factors influencing these decisions, we asked participants to rate their confidence in their decision on 1-7 Likert item, sacred values that motivated their decision, and groups they may identify with. The values listed were: 1) Religious Group, 2) Family Well-Being, 3) American Democracy, 4) American Way of Life, 5) Duty to USAF, 6) Democracy for Others, and 7) Risk of Self. The identities listed were: 1) Family, 2) Squadron, 3) American, 4) Air Force, 5) U.S. Military, and 6) Religious Group. These motivators were identified in previous survey studies as the most common values and identities to which cadets felt tied or fused.

III. System Evaluation: Proof of Concept Study

A proof of concept study was conducted to evaluate the design of HI-STEACSS.

A. Participants

Disruptions to in-person data collection due to the spread of COVID-19 resulted in a smaller sample size for this study. Thirteen participants (seven females) volunteered for the proof of concept study and accomplished all six hostage scenarios.

B. Design

This study used a within-subjects design in which participants were guided through six hostage situations in the HI-STEACSS simulation, each of which was designed to elicit considerations of different values and identity groups, given a different type of hostage. The six scenarios involved hostages as follows in this order: 1) Christian Civilians, 2) Close Friends from a different unit, 3) Family member, 4) Military member, 5) American civilian, and 6) Members of your flying squadron. The participants were given information on the target compound's defenses and inhabitants (both friendly and non-friendly) for each hostage scenario. The hostage situation in each scenario and order of presentation remained constant for all participants.

C. Procedure

Following informed consent and a pre-brief, participants were guided through four training modules in which they were familiarized with how to use the simulation controls to fly, shoot, and move from each waypoint to the next in the simulation environment. Once they were comfortable with the controls, they began the "operational" scenarios in the HI-STEACSS simulation, making the decision to engage or not engage the hostile targets where the hostages were being held.

Before making the "engage or do not engage" decision in each scenario, the participants were given an intelligence brief from the experimenter. Each of the briefs included some level of ambiguity so as not to prompt the participants to automatically revert to utilitarian calculations in making their decision. After each brief was read and before the participant could make the choice to engage or move on to the next scenario, they were instructed to hover outside of the "operational zone" for 30 seconds (timed by the experimenter) to weigh their decision. The experimenter's guidance through the HI-STEACSS scenarios ensured the participants didn't rush to a decision and were therefore able to contemplate their ties to certain values, identities, and costly sacrifices, to inform the decision made (Figure 4).

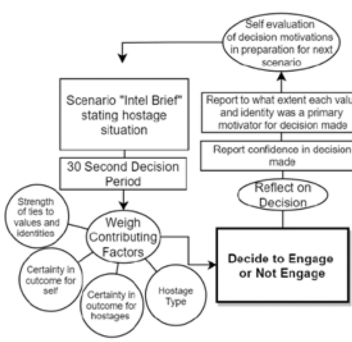

Fig. 5. *The decision making cycle involved in each scenario. The cycle starts with the "intel brief" provided by the experimenter.*

Following the completion of each of the six scenarios, the participant was given a post scenario questionnaire, which asked about the confidence in their decision (1- "not at all confident" to 7- "completely confident") and to what extent different values and identities motivated their decision (1- "not a factor" to 7-"primary factor"). Figure 5 provides an overview of the decision making cycle that participants engaged in throughout the study. Upon completion of the final questionnaire after the sixth scenario, participants were debriefed on the simulation study.

E. Results

Within each scenario, participants decided to engage in combat and risk loss of (virtual) life or withdraw from the combat situation and avoid (virtual) personal harm. Engagement rates were calculated for each participant across scenarios by summing all engagements and then dividing this value by the number of engagement scenarios (i.e., 6). Higher engagement rates on the 0-100 scale reflected an increased willingness to fight and make costly sacrifices. Lower engagement rates reflected lower willingness to fight and commit costly sacrifice. Cadets chose to withdraw more than engage (M = 43.5, SD = 5.4). Scenario six led to the highest number of engagements while the first scenario yielded the lowest number of engagements. Three of the participants withdrew and did not engage in any scenarios and one participant engaged in all six scenarios.

Engagement Confidence. Using Likert scale ratings (1- "not at all confident" to 7- "completely confident"), we recorded each participant's confidence in each decision within each scenario. A correlation analysis revealed that engagement rate was negatively associated with confidence, r = -.69, p < .01, as illustrated in Figure 6. In other words, participants that had a higher engagement rate, were overall less confident in their decisions. Confidence scores were generally high (M = 5.41, SD = 0.27).

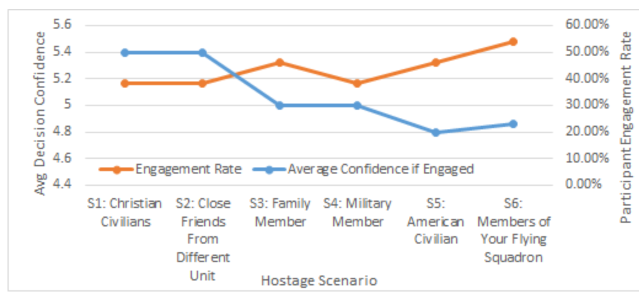

Fig. 6 *shows the negative correlation between engagement rate and confidence in decision to engage.*

Decision Motivation - Sacred Values. To assess the relationship between sacred values and engagement decisions, a binomial logistic regression was performed with each of the seven sacred values as predictors on the binary engagement decision (engage, withdraw) as the dependent variable. The model aggregated decisions for the thirteen participants across six scenarios for a dataset of 78 decisions. The model was significantly different from baseline, $\chi^2(7, n = 78) = 15.87, p = .026$. The model correctly classified 55.9% of those who engaged and 75% of those who withdrew for a combined classification rate of 66.7%. Within this model, religion and risk to self were significant predictors. The odds ratio for religion indicated that for each one-point increase on this seven-point scale, the odds that a participant engaged increased by 1.57. The odds ratio for risk to self indicated that for each one-point increase on this seven-point scale, the odds that a participant engaged increased by 1.68.

The lowest reported values averaged across all participants were religion and risk to self (M = 1.89 and M = 2.53, respectively). The highest reported values averaged across all participants were duty to USAF and family wellbeing (M = 4.73 and M = 4.47, respectively). Two participants reported a specific value (Religion for one participant and Family Wellbeing for the second participant) as their primary motivator (with a rating of 7) for every scenario, independent of their decision.

Decision Motivation - Group Identities. To assess the relationship between group identities and engagement decisions, a binomial logistic regression was performed with each of the six group identities as predictors and the binary engagement decision (engage, withdraw) as the dependent variable. The model aggregated decisions for the thirteen participants across six scenarios for a dataset of 78 decisions. The model was significantly different from baseline, $\chi^2(6, N = 78) = 22.26, p = .001$. The model correctly classified 64.7% of those who engaged and 75% of those who withdrew for a combined classification rate of 70.5%. Religious group, Air Force, and US military were significant predictors within the model. The odds ratio for religious group indicated that for each one-point increase on this seven-point scale, the odds that a participant engaged increased by 1.63. The odds ratio for Air Force indicated that for each one-point increase on this seven-point scale, the odds that a participant engaged increased by 3.08. The odds ratio for US military indicated that for each one-point increase on this seven-point scale, the odds that a participant withdrew increased by .33.

The lowest reported identity averaged across all participants was religious group (M = 1.89). The highest identities reported averaged across all participants were American and US military (M = 4.76 and M = 4.74, respectively). For the same participants with values of Religion and family wellbeing as primary factors in all their decisions, they reported their tie to religious group and family, respectively, as primary identities motivating their decisions. Furthermore, one participant reported their identity tie to US military as a primary motivator for every scenario, independent of decision.

IV. Discussion

This paper presented HI-STEACSS as a simulation-based system to assess human willingness to fight in a virtual combat environment. The system was developed using COTS gaming technology and adapted for research purposes using survey-based vignettes as a design guide. The entire design, development, and testing timeline was ten months and we achieved a working prototype using less than $60. Thus, we easily met our cost and schedule goals for this initial prototype.

Technical and performance goals were evaluated in a human-subjects study to assess behaviors within the context of virtual combat. Instead of simply taking a survey, participants were required to make "life-or-death" decisions in a gaming environment with another cadet in the room (i.e., the experimenter). Even though there were no real consequences or risks when engaging, it has been frequently demonstrated that people behave in virtual environments similar to how they behave in real-world environments [e.g., 16]. Social facilitation may have increased the sense of importance and pressure to perform well. Thus, in line with our goal, HI-STEACSS allowed participants to make decisions in a virtual combat environment that reflected their willingness to fight and make costly sacrifices. The scenarios allowed us to more deeply analyze the "why" behind these decisions by measuring how sacred values and identity fusion influenced their decisions and behaviors. The split of engage/withdraw decisions and lower confidence ratings for engaging in virtual combat suggests participants were not simply made on a rudimentary set of decision rules (i.e., always engage).

Indeed, despite the small sample size, we found cadets differed in their decisions to engage and risk their own (virtual) lives in combat. Religion and risk to self, along with identity fusion to a religious group and the Air Force, significantly predicted engagement. Religion was a predictor of engagements while the average rating of religion as a value was low. This seemed to indicate that, in this sample, even though the value of religion was not as important to the participant compared to the other values (i.e. the relative importance of religion was low), the smaller bit of variance that does exist within religion was diagnostic of predicting engagements. Why might a higher value of religion predict an increase in engagements? A speculation might be that those who are more religious have a higher sense of justice, a greater sense of responsibility, and a greater drive to do the right thing. This may have led to a bias to engage in highly ethical dilemmas such as the one presented in this experiment. Risk to self was likely confounded with degree of threat and hostile activity in the scenario. Thus, cadets likely engaged more than withdrew in riskier scenarios to protect themselves and a more automatic reaction to getting fired upon.

Fusion with the USAF led to increased likelihood of engaging. This finding aligns with previous research on American soldiers that has demonstrated connections to their team as an important motivator for fighting in battle. In contrast with this result, participants that identified more with the U.S. Military were more likely to withdraw. It is possible that individuals that relate more to the more abstract notion of the U.S. Military, and not the Air Force of which they are a member, are less willing to take risk by engaging the enemy. The US military might have more psychological distance than the USAF. Thus, it seems, the group that cadets identified with, is the one they are willing to take risks for because engagement of the enemy carries a certain risk. This dissociation of results points to the efficacy of our testbed: that it was successful in accurately simulating a sufficient degree of risk, that the participants responded to this risk in serious and plausible manner and that our measures were sensitive to parse out these differences.

We continue to analyze the data collected and plan for additional data collection to understand these preliminary results. Data gathered from simulations like the HI-STEACSS can inform military and political strategy by providing a more behaviorally-based understanding of the motivators of the US military, without relying solely on survey data. For example, results from simulations like HI-STEACSS have significant implications for wargaming given that the inclusion of human will to fight as a factor in war effort predictions has shown to have an impact on results of 10% or higher [2].

Simulations like the HI-STEACSS could also provide benefits as a cost effective and accessible means of helping military members contemplate (or reinforce) what sacred values they hold, what identity groups with which they feel most fused, and, considering these associations, how to respond. Prior self-reflection on what motivates one's decisions may lead to more confident and justified future decision making, even when presented with complex moral dilemmas. The results from this study and future studies in the HI-STEACSS can augment data provided in survey responses that enable this self-reflection and can help to develop individual military member's decision making processes. Simulations like this can also assist in assessments for job selection and other types of military training.

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B. Design Recommendations

It is important to note that HI-STEACSS is an early prototype designed on a very limited budget in a short amount of time. Thus, one of our primary goals of this first iteration and test was to inform the design of future iterations. The feedback we obtained from participants yielded the following items for further analysis and design considerations:

Decision time: Is 30 seconds too long for decision making in a combat environment? On one hand, previous research has shown spur of the moment, emotionally-driven decisions were common when going from paper to simulation [17]. However, in the same study, emotional decisions led to more utilitarian decisions verses deontological. Given that we gave cadets longer-than-normal decision times in battlefield situations, perhaps this allowed us to discover deontological reasons based on sacred values versus just simple gut reactions. Calibrating the decision time will be important in the next iteration or simply leaving it open and measuring reaction time.

Randomizing the order of scenarios: The higher engagement and confidence rates during the last scenario may be due in part to an order effect. Increased engagement rate could have correlated negatively with confidence because participants may have become more introspective as their reflection on motivations increased with every scenario presented. In future iterations, it could be beneficial to change the order of scenario presentation to prevent the possibility of an order effect.

Increase competition: One glaring limitation of our simulation system is the lack of real consequences. However, we observed participants taking it seriously and the data we collected resulted in a lot of variance. Still, the next design iteration should explore ways to measure game performance and spur competition to increase motivation.

Increase physical realism: Another way to increase realism is to use different visualizations and controls. The input functions were simple enough with a keyboard and mouse. However, an RPA stick and throttle along with visualizing through VR might enhance sense of immersion.

Future teams will continue to develop HI-STEACSS with these recommendations in mind. Other potential uses of this system include training, selection, and Modeling and Simulation.

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References

[1] Sullivan, P. (2012). *Who Wins?: Predicting Strategic Success and Failure in Armed Conflict*. Oxford University Press.

[2] Connable, B., McNerney, M. J., Marcellino, W., Frank, A., Hargrove, H., Posard, M. N., ... & Sladden, J. (2018). *Will to Fight: Analyzing, Modeling, and Simulating the Will to Fight of Military Units*. RAND Corp Santa Monica United States.

[3] Atran, S., Sheikh, H., & Gómez, Á. (2014). For cause and comrade: Devoted actors and willingness to fight. *Cliodynamics*, *5*(1).

[4] Gat, A. (2009). So why do people fight? Evolutionary theory and the causes of war. *European Journal of International Relations*, *15*(4), 571-599.

[5] Middlekauff, R. (2017). Why men fought in the American Revolution. In *Revolutions in the Western World 1775–1825* (pp. 3-16). Routledge.

[6] Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual review of psychology*, *63*, 539-569.

[7] Atran, S. (2016). The devoted actor: unconditional commitment and intractable conflict across cultures. *Current Anthropology*, *57*(S13), S192-S203.

[8] Atran, S., & Ginges, J. (2012). Religious and sacred imperatives in human conflict. *Science*, *336*(6083), 855-857.

[9] Pretus, C., Hamid, N., Sheikh, H., Gómez, Á., Ginges, J., Tobeña, A., ... & Atran, S. (2019). Ventromedial and dorsolateral prefrontal interactions underlie will to fight and die for a cause. *Social cognitive and affective neuroscience*, *14*(6), 569-577.

[10] Atran, S., & Axelrod, R. (2008). Reframing sacred values. *Negotiation Journal*, *24*(3), 221-246.

[11] Berman, E., Felter, J. H., & Shapiro, J. N. (2018). *Small wars, big data: the information revolution in modern conflict*. Princeton University Press.

[12] Gómez, Á., López-Rodríguez, L., Sheikh, H., Ginges, J., Wilson, L., Waziri, H., ... & Atran, S. (2017). The devoted actor's will to fight and the spiritual dimension of human conflict. *Nature Human Behaviour*, *1*(9), 673-679.

[13] Jiménez, J., Gómez, Á., Buhrmester, M. D., Vázquez, A., Whitehouse, H., & Swann, W. B. (2016). The Dynamic Identity Fusion Index: A New Continuous Measure of Identity Fusion for Web-Based Questionnaires. *Social Science Computer Review*, *34*(2), 215–228.

[14] Bennis, W. M., Medin, D. L., & Bartels, D. M. (2010). The costs and benefits of calculation and moral rules. *Perspectives on Psychological Science*, *5*(2), 187-202.

[15] Alexander, C. S., & Becker, H. J. (1978). The use of vignettes in survey research. *Public opinion quarterly*, *42*(1), 93-104.

[16] Rovira, A., Swapp, D., Spanlang, B., & Slater, M. (2009). The use of virtual reality in the study of people's responses to violent incidents. *Frontiers in behavioral neuroscience*, *3*, 59.

[17] Greene, J., & Haidt, J. (2002). How (and where) does moral judgment work?. *Trends in cognitive sciences*, *6*(12), 517-523.