Intellection: A Game for Intelligence Collection Planning and Group Decision-Making Optimization

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ABSTRACT

We have developed a collaborative team board game, Intellection, which provides group decision-making and path planning instruction in a more engaging manner than traditional lecture-based methods. This game furthermore has been effectively leveraged as a research tool to understand the cognitive processes that underlie path planning and adaptive sequential decisions. Our applied motivation derives from intelligence gathering operations that require signals, images, full motion video, and ground radar information to be gleaned from particular areas of interest using a variety of platforms and sensors. Individuals who manage these collection operations must plan initial collection paths, and must further adapt those paths based on emerging requirements, additional opportunities to collect important information, and disasters that could compromise data collection. However, there are typically more targets of interest than there are resources to collect them, demanding individuals to assess the tradeoffs of taking a particular course of action over another. Furthermore, different individuals on a team may be responsible for different types of collection, all of which must be cross-coordinated. Teaching this skillset can be difficult, particularly when team members are geographically separated, and team communication is limited and distributed. Intellection provides an engaging tool for developing these critical skills for in-person teams. For distributed teams, we are developing a software version to provide a common visual interface for these teams to work on these skills. We present the initial research, development, refinement, and deployment of Intellection, as well as the results of our initial pilot work tested on multiple groups of novice and expert collections analysts. The framework developed for the Intellection game can be further customized to collect information on individual and group cognition within a variety of Department of Defense pertinent problems spaces. It also serves effectively as a research tool for optimizing operations and group decision-making processes.

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INTRODUCTION

Air Force collection management is the multifaceted system of gathering requirements, scheduling, planning, and assessing intelligence, surveillance, and reconnaissance (ISR) operations. Planning collection strategies against an ever-changing flight schedule for several aircraft with multiple ISR collection capabilities is a cumbersome and complex process. The necessary skills to perform such tasks are acquired in practice through on-demand venues and word of mouth. It is imperative to expound upon complex concepts in a short and concise manner. *Intellection* provides a method to increase proficiency of the skill sets required to perform collection planning, so that analysts can better adaptively react under time pressure during real operations. With three variants of the game, rule sets are changed to increase the difficulty and address needs for all skill levels of individual players and teams.

Team Decision-Making and Planning

Due to the complexity and scale of tasking, the majority of military operations are dependent on effective, highly communicative teams, rather than a single effective individual (Goodwin, Blacksmith, & Coats, 2018). Studying team decision-making in a naturalistic setting is difficult and complicated, leading many military researchers to rely on computational modeling and simulations to measure team performance without direct observations. This has led to the development of measures of team situation awareness (Gorman, Cooke, & Winner, 2006), and measures of interactive team cognition based on team communications (Cooke, Gorman, Myers, & Duran, 2013). When measuring real-world operations, previous military research has demonstrated the value of unobtrusive measures, such as scraping existing data from chat, email, face-to-face interactions, and wearable sensors. This data can then be aggregated and leveraged to model team decision-making (Orvis, Brown, McCormick, & DeCostanza, 2016).

Similar to previously utilized non-obtrusive measures, the board game of Intellection affords surreptitious data collection, as players must plot out their intended routes, keep track of changes to their plans, and tabulate their point totals on individual player sheets. These sheets are then collected as data and checked over to determine how mathematically optimal the initial routes were, the success rate of collection, overall point accumulation, potential for foregone points in the case of emerging requirements, and coordination between teammates. However, from the perspective of participants, they are merely playing an engaging game.

Using Board Games and Software for Skills Development

Recently, due to improving technological capabilities and ubiquity of software, there has been interest in utilizing games to convey necessary skills in professional working environments. Although a precise definition for what constitutes a game is somewhat contested, (Hays, 2005) defines a game as, "an artificially constructed, competitive activity with a specific goal, a set of rules and constraints that is located in a specific context." Physical board games, tactical games, and software can all be leveraged to help individuals or groups learn and hone critical skills within a wide array of fields. Utilizing or creating a game is often more cost-effective and customizable than other methods for educating professionals (Wilson, et al., 2009). In medical education, teaching complex skills including the latest surgical techniques and use of advanced equipment is often more effectively trained via software and simulations compared to more traditional learning methods (Lane, Slavin, & Zin, 2001). Importantly, by learning through a more interactive medium, learners are more motivated and actively engaged with the material, promoting faster skill development and longer-term retention (Smith, 2010).

Games have been effectively utilized specifically by the military as a means of developing necessary skill sets, developing mathematical models, analyzing tactics, and communication during debriefs (Smith, 2010). Both board games and software afford the opportunity to collect substantial quantities of data. When developed for military purposes, games are often more mathematically oriented, have a more complicated rule set, and may have calculable optimal solutions, compared to commercial board games that focus on fun and simplicity. This is done so that military games can be leveraged as a learning opportunity and can be used to measure pre- vs. post-training aptitude for essential skills. Games with this set of goals are often termed “serious games”, to distinguish them from more frivolous, entertainment-oriented games (Djaouti, Alvarez, Jessel, & Rampnoux, 2011; Michael & Chen, 2005).

In order to effectively develop a game that can convey essential skills, it is important to understand which attributes of gaming relate to various learning outcomes. Wilson and colleagues (2009) examined the effect of various game attributes on cognitive outcomes, skill-based outcomes, and affective outcomes. The found that compared to other learning methods, games conveyed greater declarative or factual knowledge (cognitive outcomes), particularly if those games involved active participation, dynamic interaction, goal-direction, competition, and novelty. Conflict, or the presentation of solvable problems during the game, particularly when difficulty was progressively increased, served as the strongest impetus for positive cognitive outcomes. For skill-based outcomes Wilson and colleagues (2009) found that as simulation fidelity increased, so too did psychomotor skill learning, but this eventually was asymptotic at a particular level of proficiency. Interestingly, increasing the fantasy dimension of the game, such as teaching flight controls in a space combat scenario, improved automaticity of skill learning. As with developing positive cognitive outcomes, interaction and engagement were also found to be necessary for effective skill development. Finally, Wilson et al. (2009) examined the affective outcome dimension. They determined that challenge, realism, exploration, and control were the most motivating factors of games. Once individuals develop sufficient expertise with a game, it can begin to lose its challenge and thereby reduce the curiosity of the player.

INTELLECTION: A GAME TO STUDY MILITARY PLANNING AND TEAM DECISION-MAKING

The game, Intellection, was inspired by feedback from the intelligence community on the need to quickly impart planning skills for Intelligence, Surveillance and Reconnaissance (ISR) operations during initial qualification training of Air Force intelligence personnel. Moreover, multiple versions were required to graduate skillsets from basic principles to more complex problems that emulate real-world complexity. It concurrently functions as an excellent research tool for gathering information on team decision-making, individual planning, and adaptive decision-making. A primary benefit of this board game structure is that it can be adjusted to the unique skill development needs of a particular unit. In our initial pilot studies on ISR expert and novice teams, we were able to selectively adapt the game rules to optimally measure the skill developments of interest for each respective group.

Game Design and Mechanics

Intellection is played on a large game board with 7 sectors, labeled A through G, that each has 50 hexagonal movement spaces (see Figure 1). Hexagonal spaces were selected to increase the degrees of freedom for movement for the assets and to prevent conflicts in space. Players must ingress on to the board at the start of the game from one of the bordering hexagons and must egress once they have expended their movement spaces by maneuvering to within 4 spaces of the border. Spaces are color-coded based on the type of intelligence that needs to be collected on that spot: orange for signals, yellow for full-motion video, blue for still images, and gray for ground detection. A coding sheet provides reference for how many points each space is worth (ranging from 20-100 in increments of 20).

All versions of Intellection involve a set of intelligence collection assets that are controlled by between 5-8 players: 4 Reapers, 1 JSTARS, 1 U2, 1 Rivet Joint, and 1 Global Hawk (see top panel of Figure 2 for the types of intelligence that can be collected by each asset). There is an additional role that can be played by another player, the role of the Senior Intelligence Duty Officer (SIDO), whose goal it is to redirect assets from their planned route to capture emerging requirements that appear as play unfolds. In the basic version of the game, each of the flying assets can collect one primary type of data along a pre-planned route and a set of secondary collection capabilities can be used for capturing emerging requirements. They also each have a different number of spaces they can move before running out of fuel, as well as different radii of probabilistic collection capability (bottom panel of Figure 2). Each asset also is assigned an altitude level, such that two assets of the same altitude cannot occupy the same space at the same time, as this would cause the two to collide and crash. The winning condition of the game is for each flying asset is to collect data from all spaces whose point value is 60 or greater and for the SIDO/the team as a whole to collect at minimum 15 emerging requirements. These needs are somewhat in conflict, requiring balance between team members so that all the collective goals can be achieved to win. However, in addition, teams are scored and ranked on a leaderboard and can compare their score with previous teams, incentivizing collection of all potential initial and emerging requirements.

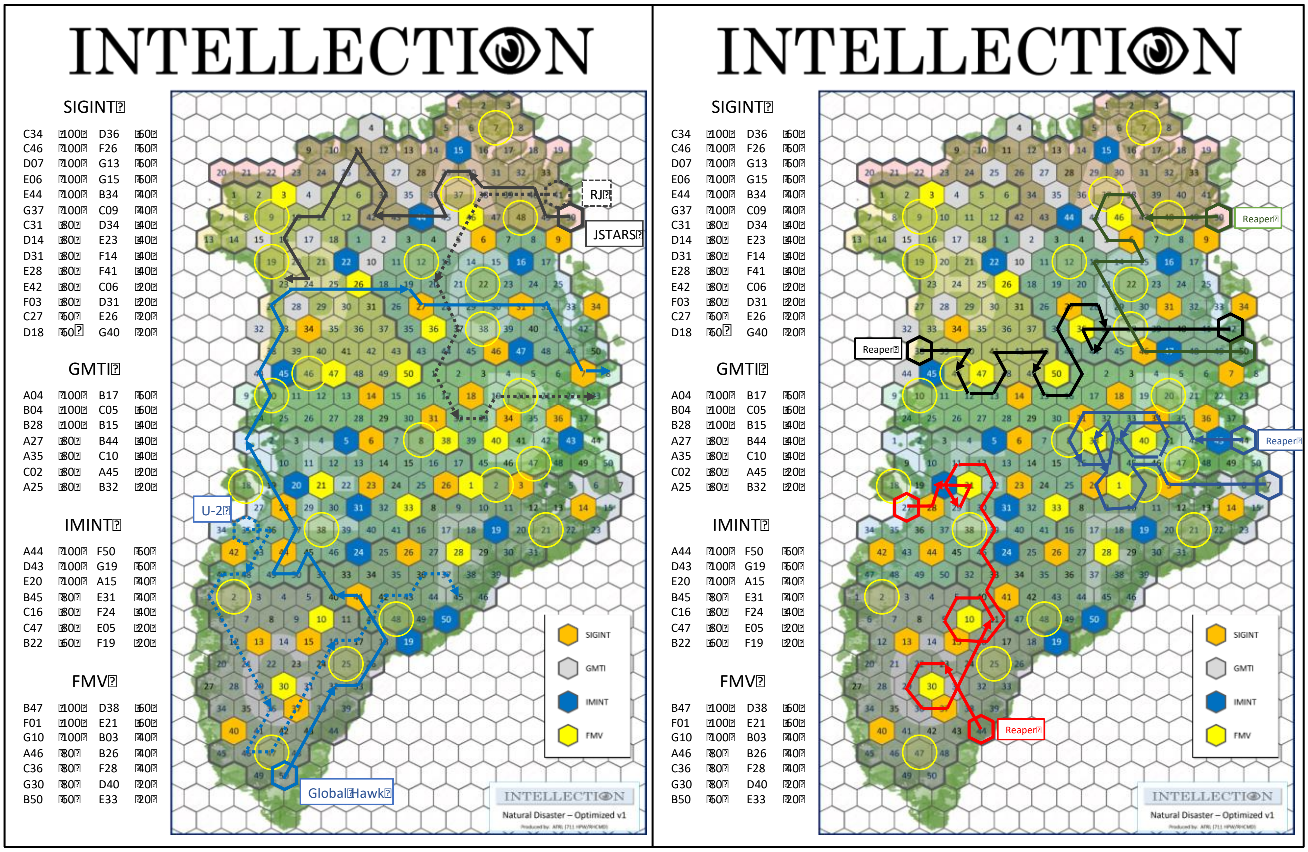

Figure 1: Individual game sheet for Intellection with ideal paths for each of the 8 assets (JSTARS, Rivet Joint, U2, Global Hawk, and 4 Reapers). Yellow circles indicate locations of emerging requirements and are only known to the SIDO. All other requirements and respective point values are provided to each player from the outset of the planning phase.

At the start of the game, players are given 10 minutes to plan their collection route. They are permitted to discuss and coordinate with each other during this time, but it is not mandatory. The left panel of Figure 1 shows the optimal route for the U2, Rivet Joint, JSTARS, and Global Hawk, and the right panel shows the optimal path for each of the four Reapers. During the movement phase, each asset takes turns moving to a position and attempting to collect on one or more available spaces. To collect, they roll a 10-sided die and must achieve a probability equal or less than the probability to collect based on the asset's collection probability radius (Figure 2). If they are successful, they can check off collecting the points, and if not, they must continue along their preplanned route and may be able to attempt again, depending on proximity. After each round of air asset movement, the SIDO may assign one or more assets to leave their pre-planned route to collect emerging requirements, which are only known to the SIDO. These emerging requirements typically require collection from multiple sources. During this phase, players can negotiate with the SIDO if they will encounter the desired emerging requirements along their planned route; however, the SIDO has final dictation as to where the asset must go. The SIDO earns bonus points if they are able to collect all needed INTs simultaneously, known as layering, compared to if they are able to capture the emerging requirements by passing multiple assets sequentially.

Version Differences

There are three versions of the game: Basic, Intermediate and Advanced. The basic version involves simplified sensor footprints (bottom left panel Figure 2) and limitations on collection asset capabilities as to not overwhelm the players. The intermediate version introduces terrain and weather to provide more considerations for both planning and dynamic re-tasking. The advanced version is designed to task the most skilled players by integrating realistic sensor footprints (bottom right panel Figure 2) and removing the limitations on the collection assets. This increases the demands on players to coordinate overlapping priorities and collection capabilities.

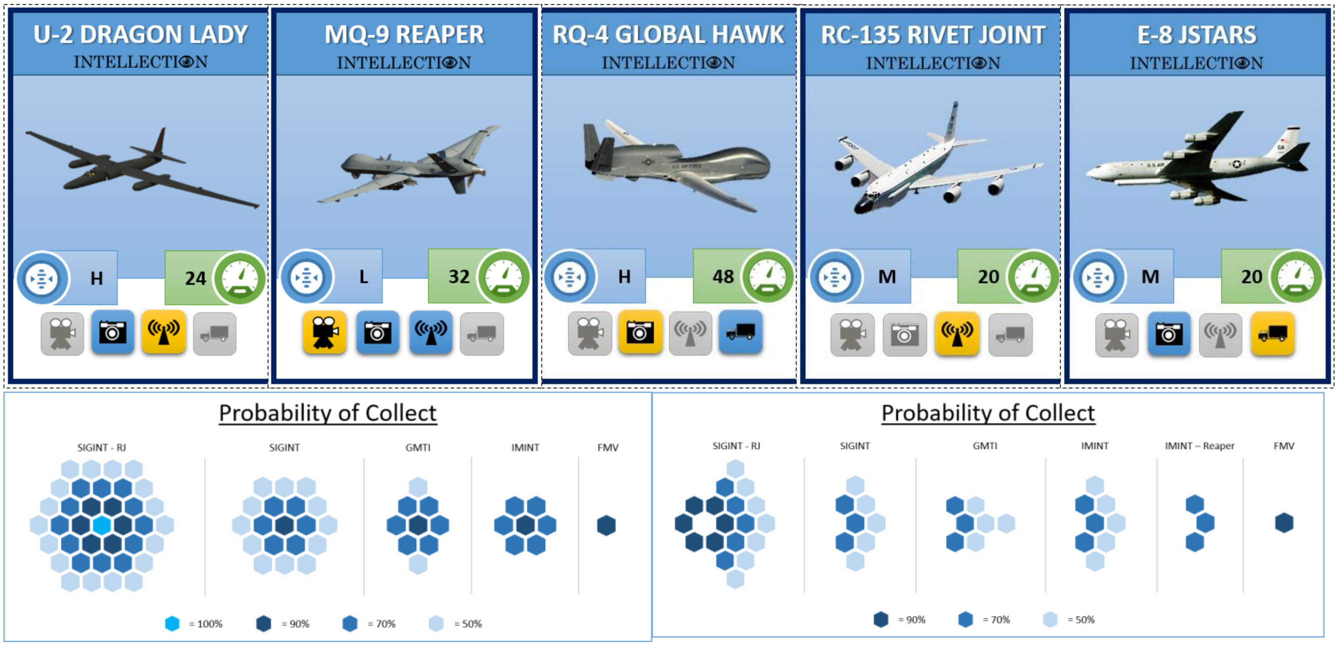

Figure 2: The five asset types that are allocated in Intellection. Yellow indicates the asset's primary collection method and blue indicates what the asset can collect when there are emerging requirements. The probabilities of collection radii on the left are for the basic version of the game, whereas the directional radii on the right are for the more advanced versions of the game.

RESULTS: ASSESSMENT OF DIFFERENT VERSIONS OF INTELLECTION

Intellection was tested and the rules were refined based on feedback from a variety of expert and novice piloting samples. The final debriefing from an ISRLO class of expert intelligence analyst shaped the current set of rules for the ISRLO version of Intellection. After refining the rules based on their feedback and adding a SIDO role, we collected data on a group of experts at a RED FLAG exercise, as well as a team of novices.

Pilot Test of the Game Using Expert Intelligence Analysts

The first data collection with a team of experts was conducted in an ISRLO class, using a preliminary iteration of the game that did not include a SIDO role, but instead revealed emerging requirements based on landing on spaces determined dice rolls at the start of the game. Students in the ISRLO training class all have prior experience with ISR collection and the course serves as an instructional course in becoming collections managers.

Eight students in the class served as a team for the collaborative version of Intellection with a 10-turn limit for all assets. Their goal was to collect as many intelligence requirements as possible. Most requirements were available at the start and appeared on the individual score sheets, while emerging requirements instead required coordination between the other members of the team of whether to deviate from the initially planned paths. For this version of the game, there were also triggered "disaster" events that could interfere with the team's progress by moving assets out of a particular zone, disabling an asset temporarily, or reducing sensor capacities for a certain number of turns. There were 4 disasters and 4 emerging requirements placed on the board and triggered by an asset passing within 1 space of the disaster or requirement. Each asset had additional movement compared to the current version of Intellection, allowing each asset to cover a larger breadth of the board. Reapers also didn't need to circumnavigate their targets and instead had a 90% probability of successful collection if they landed directly on the space. Observation of the team dynamics during planning revealed that the 4 Reaper operators were highly coordinated, and the other 4 asset operators made plans independently. However, there was little cross-communication within the full team, functionally splitting into two sub-teams.

Overall, the team was able to collect an average of 85.29% of all potential targets on the board, totaling 4220 points, as well as two of the emerging requirements, for an additional 400 points. The proportion of points was equally distributed between all the requirement types, accounting for double the signal requirements due to having two assets responsible for them, and the smallest proportion from bonus collection (See left panel of Figure 3).

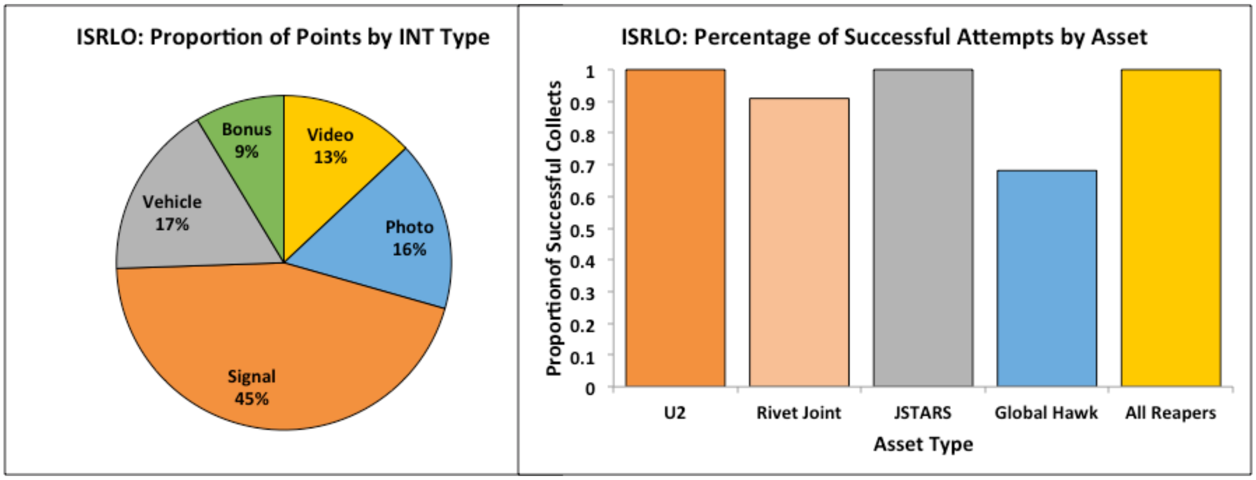

Figure 3: Results from pilot run with expert participants (ISRLO). Points were collected in relatively equal proportion, other than signals accounting for a larger proportion due to a higher base rate and two pursuing assets. Each asset collected a relatively high percentage of their requirements, other than the Global Hawk. Emerging requirements (Bonus) accounted for the smallest proportion of point accumulation.

Collection performance varied as a function of geographic region, however, indicating that in certain regions substantially fewer requirements were obtained. All requirements in Area E (100%) and nearly all requirements in Area A (91.66%) were collected, but only 62.5% were collected in Area C. However, the planned flight paths did allow for somewhat adequate planning in this area, and the lack of collection was mostly due to failed dice rolls. Compared to other regions of planning though, there were fewer contingency plans accounted for in this area, meaning there were initial fly-by plans, but little room to make a second pass upon initial collection failure.

We also examined the optimality of collects by the type of asset used to determine if certain assets were lacking in collection of initial requirements. By analyzing the planned paths of each asset, we found marked differences in contingency planning. One example of conservative planning was with the U2 asset, which failed to collect on F15 three times due to unfavorable dice rolls, before collecting successfully on the fourth roll. The planned path attempted to cross by most collection opportunity multiple times at a more difficult distance (in the 50% - 70% radius). Overall, this allowed the U2 to collect all attempted assets throughout the game. The Rivet Joint pursued a similar strategy, allowing it to collect most of its available requirements by making multiple attempts on the same turn (M = 90.91%). Conversely, the Global Hawk did not follow this strategy, instead pursuing single opportunities to collect in the 70% - 90% radius, which led to a higher failure rate and a lower aggregate success rate (M = 68.18%). See right panel of Figure 3 for performance by asset.

It was found during the ISRLO pilot data collection that the Reaper operators were able to collect their requirements relatively quickly, and by Round 7 had little to do other than pursue emerging requirements, decreasing overall engagement for four of the players. This insight demonstrated a greater need for emerging requirements that would increase engagement for skill development, as being adaptable to changing requirements is critical in real-world operations. Additionally, the team overall could have better planned the distribution of collection work by increasing coordination in the planning phase. There were also fewer ground radar requirements, causing the JSTARS to cover a broad distance while making few collections. Additionally, the rules did not force team members to make strong trade-off decisions when planning for and pursuing requirements, making it difficult to determine risk preferences of group members. Based on the feedback of this group, Intellection's rules were updated to the current two versions, to better meet the needs of specific DoD customers and increase overall interactivity in the planning and play phases.

Testing Expert Intelligence Analysts

The first data collection involving expert intelligence analysts was conducted with a team of 8 during a RED FLAG exercise. This version used for this group was the advanced version, which has an aimed sensor footprint (See bottom right of Figure 2) and allows assets to use both their respective primary and secondary sensors for initial (non-emerging requirements) collection. This version of the game also made use of a SIDO role, which prioritized emerging requirements. Similar to the ISRLO sample, the four Reapers coordinated by each patrolling in a different section of the map. The Reapers were also highly available for capturing emerging requirements and accumulated additional points by pursuing them. However, compared to the ISRLO sample, the experts in the RED FLAG exercise controlling the U2, Rivet Joint, JSTARS, and Global Hawk also chose to pursue emerging requirements, foregoing many of the potential points that could be earned by following an optimal initial path. Figure 4 illustrates how each of the assets accumulated their overall points throughout the course of the game.

When looking at the overall number of points by INT-type, there is a marked difference in the response proportions for this expert sample compared to the ISRLO pilot sample. For the ISRLO group, emerging requirements points only accounted for 9% of the total team points, whereas they accounted for 45% of the RED FLAG team's total points. This indicates the added value of the SIDO role and better reflects real-world conditions, where adaptations to paths must more often be made on the fly. Accounting for removal of the bonus points from emerging requirements, the proportion of other INTs collected is similar to the pilot sample. This yielded higher points scored overall compared to the ISRLO group.

When examining the assets individually, the Global Hawk asset did not pursue their primary imaging requirements, and other assets instead collected those requirements, mainly the JSTARS and the Reapers. Instead, the Global Hawk focused on collecting emerging requirements, contrary to the ISRLO sample that mainly used Reapers to capture emerging requirements. The U2 and Rivet Joint both allocated roughly equal proportion of effort to collecting their primary (signal) requirement and emerging requirements. The JSTARS spent the most effort pursuing their primary requirements, but also collected photo imagery and assisted with emerging requirements.

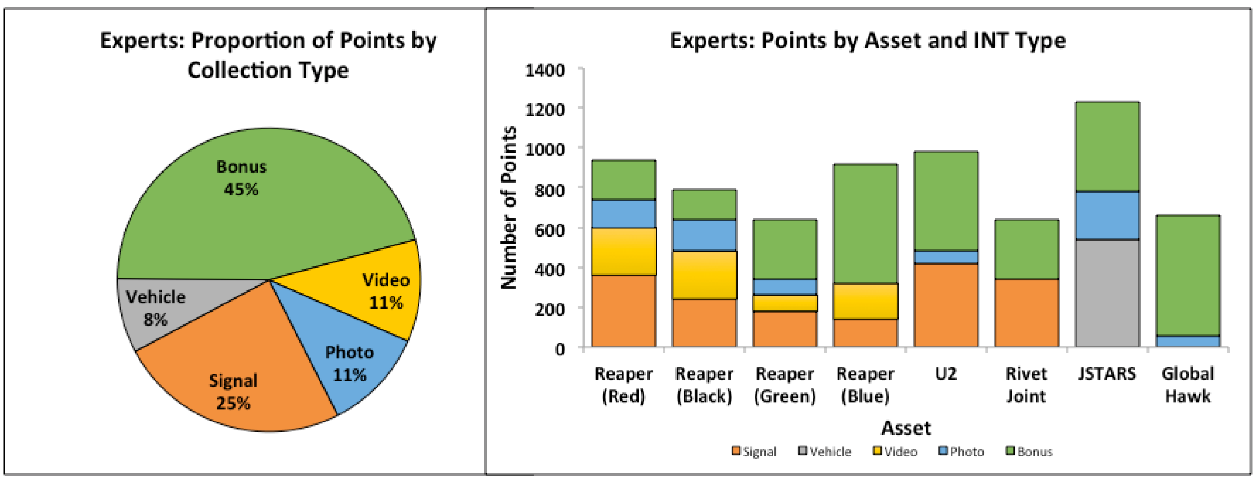

Figure 4: Results from the expert sample indicating how points were accumulated for each asset. All assets spent a far greater effort to pursue emerging requirements in addition to their initial requirements, compared to the ISRLO expert sample.

Testing a Team of Novices

For the second group, data was collected using the cooperative collections management version of the game from a team of 9 players with broad ISR knowledge, but with no relevant collections management expertise. The version used by the novices had the basic level radius (bottom left panel of Figure 2). For this sample, we were most interested in the planning phase of operations, rather than overall score, as final score is somewhat impacted by random chance. We were interested in determining if we could use Intellection as a means to understand how individuals make planning decisions and risk trade-offs and how this impacts group preferences and coordination, particularly between the 8 asset roles and the SIDO. Additionally, this allows us to determine if even subject-matter novices can learn and utilize necessary skills to determine the mathematically optimal path for their given asset and to coordinate effectively during the planning phase as a team.

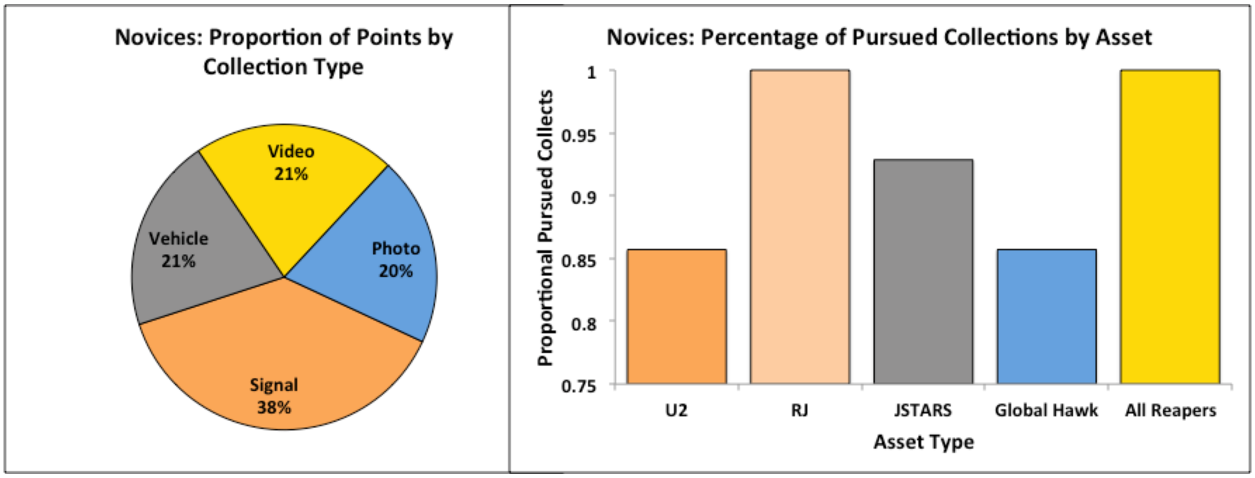

Figure 5: Based on the planning phase, proportionally, the Signal collection was relatively low. This indicates that although the two assets coordinated, the U2 chose not to pursue a considerable number of requirements. The right graph indicates that the Global Hawk also seemed to pursue a proportionally low number of requirements, compared to the Reapers and the Rivet Joint.

The planning phase was of primary interest to examine both to determine how the team coordinated strategy and to determine individual risk preferences. The two Signal-prime assets (U2 and Rivet Joint) coordinated during the planning phase to collect as many requirements between the two of them as possible, rather than competing for resources. However, both also chose to eschew potential requirements if they were of a lower priority. Maximally, all assets other than the Reapers could pursue a maximum of 14 targets. The U2 nearly perfectly followed the optimal path until it entered Sector F, at which point it chose to pursue the Signal collections in that region, rather than proceeding to sector B. Likewise, the Rivet Joint chose not to pursue half the opportunities in Sector C despite its large radius of collection and capacity to do so. Although Figure 5 illustrates that the Rivet Joint planned to pursue the maximum value of 14 requirements, it should be noted that this was not considering the optimal strategy between the Rivet Joint and the U2. Instead, 3 of the assets pursued by the Rivet Joint could have been obtained by the U2, allowing the Rivet Joint to collect the requirements in the northern part of Sector C. Between the two Signal-prime assets, this pattern of results demonstrates a more conservative strategy. Rather than risking greater opportunities to accumulate points, both players chose to stick to collecting priorities valued at 60 points or greater (as is required to win the game) and chose not to pursue additional points, to the detriment of the U2.

The Global Hawk also planned a path close to optimal, but chose not to pursue an opportunity to collect in Sector A and Sector F. However, both were under 60 points and not mandatory collects, again indicating a more risk-averse attitude toward requirement collection, which yielded a more certain but less mathematically optimal path. The JSTARS operator marked the point values of each opportunity prior to drawing a path, prioritizing the highest value collection opportunities at the risk of foregoing additional points. The four Reaper operators were successfully able to allocate collection requirements during the planning phase, dividing the territory by the proximity of collection opportunities. The yellow, blue and green Reapers each collected 3 of the 14 potential collects for 240, 160, and 240 points, respectively. The red Reaper collected the largest number of opportunities (5) for a total of 240 points. Reapers that were responsible for fewer standard collections were more available to be re-allocated by the SIDO. Overall, the team planned extremely well, even with the accounted for risk aversion. The planned route of the group (not including emerging requirements) had an expected value of 4100 points out of a maximum 4400 points.

It is important to understand the risk orientation of players during the game, especially since the SIDO and collection platform operators have different goals. The SIDO seeks to gain as many points as possible, incentivizing close to mathematically optimal behavior, whereas the platform operators are only seeking the most valuable collects, allowing slack space in case they are unable to collect as they initially pass the opportunity. If there is a conflict of risk aversion between the SIDO role and the asset roles, then there may be more difficulty negotiating tradeoffs and achieving team objectives.

SUMMARY AND NEXT STEPS

Intellection has demonstrated strong promise to be an excellent research and education tool for imparting necessary teaming and collections management planning skills and measuring team efficacy. The current and planned multiple versions and adaptable rules allow this to be a flexible research tool to test analyst planning and cross-communication under a variety of conditions. This also serves as an opportunity to evaluate individual and group risk propensity and how each analyst weighs various factors that are critical to path planning. In addition to flexibility in research applications, Intellection has been successfully utilized in environments such as ISRLO courses and RED FLAG as a part of operations that facilitates debriefing and modification. The results of these studies and ongoing development of the game provide a template for the broader I/ITSEC audience for creating engaging collaborative or competitive serious games for individual and team skills development. Feedback from experts and planned debriefs add to the research and educational value of these tools.

Within the game of Intellection, the SIDO role is relatively newer game role. This role not only increases realism to a collections management unit, but also affords the opportunity to further study the planning and ongoing interactions between the flying asset players and an authoritative supervisory player. We can also study how player risk aversion influences these player dynamics. Based on the mission objectives and incentives, the SIDO is typically more risk seeking than the asset players and prefers to pursue high-risk/high-reward emerging opportunities over pre-planned goals. This also adds an element of conflicting sub-goals within a team, requiring a degree of conflict resolution and alignment of low-level individual team-member sub-goals to serve higher mission-level goals. Finally, this adds a hierarchical element, requiring negotiation between low-authority, high-expertise individuals with high-authority supervisory roles. Players can play both roles and better understand the values and challenges of each role. This increases communication throughout gameplay and affords ample opportunities for instructors or proctors to debrief players on how to resolve these conflicting goals diplomatically and effectively for mission success.

For the board game version of the task, we have customized the level of difficulty by adding realistic elements to gameplay, including: 3-dimensional terrain features, weather patterns, and realistic sensor footprints. Additionally, we have developed a "versus" version of the game, named "Intrage," that allows 2 teams to play against one another with up to 4 players on each team. Each team designs an air defense system to defend their main headquarters while conducting ISR operations against their opponent to determine the safest route to strike their headquarters. The first to successfully strike their opponent wins. This expansion is particularly critical for skill development, as prior studies of serious games have demonstrated that a competitive aspect to games increases participant engagement and skill retention. Simultaneously, like Intellection, it affords opportunities to study within-team communication and planning, priority tradeoffs, and risk averseness.

One of the top priorities in the development of Intellection is to implement a software version of the game. This will allow for enhanced customizability for making various versions tailored to customer needs and specific circumstances. This includes weather, enemy weaponry, unexpected events that can impact asset efficacy, restrictions on airspace, among other individualized customizations to gameplay that players must incorporate into their mental models of the tradeoff space. Software can further afford opportunities for research, as this will allow for the collection of the time course of events in addition to mathematical optimization. Software also affords an opportunity to research the efficacy of teams of collections managers who must make plans with distributed teams. Previous research has established that team communication and coordination can be hampered by distance (Cramton, 2001; Gajendran & Joshi, 2012) but that this can be mitigated through shared visualizations and tools (Balakrishan, Fussell, & Kiesler, 2008). Using the shared visual of a virtual board game, Intellection may be leveraged to plan and adapt collections paths, even when members cannot coordinate in the same room. Software will allow us to further test the impact of time pressure on individual and team decision-making. In the real world, taking too much time can have negative consequences, so development of rapid skill deployment is essential. Finally, software will allow us to implement gradually increasing difficulty, which has been found in previous studies (Wilson, 2009) to improve overall task performance and increase engagement when using serious games as research and teaching tools. The software version of the game can be played multiple times by the same individuals as a team or with novel individuals, allowing for repeated practice and debriefing cycles under scalable difficulty and complexity. Instructors who wish to incorporate the software version of Intellection for skills development will also be provided with immediate performance feedback and access to communication logs, which can be directly referenced during the debriefing process.

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