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Correlation Between Headquarter Placement and Mirroring Collected Intel to Gain Knowledge on an Adversaries Headquarter Location Based on Gender: An ISR Assessment

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ABSTRACT

Background: Intelligence, Surveillance, and Reconnaissance (ISR) analysts are provided with a tremendous amount of information that needs to be accurately processed, exploited, and disseminated (PED) in order to provide our warfighters an advantage on the battlefield. Analysts can obtain valuable information about the enemy territory by using ISR, such as, imagery intelligence (IMINT), signals intelligence (SIGINT), and human intelligence (HUMINT). ISR analysts can have varying strategies when capturing intelligence. To address this problem, ISR subject matter experts (SMEs) developed Intrage: an ISR tabletop board game to gain skills relevant to ISR operations.
Methods: The goal of this study was to determine if a relationship exists with regards to mirroring headquarter placement and adversary headquarter placement collections based on gender. A sample of participants (N = 50) were selected from 25 military and 25 non-military participants completed the research study. The sample consisted of 11 female and 39 male participants. The participants were provided with the study objectives and were instructed to place their headquarters within a single quadrant in the northern region (i.e., Region A, B, or C) of the map. Additionally, participants were able to collect four times in the southern region of the map (i.e., Region E, F, and G) in an attempt to identify the adversary headquarters.
Results: An analysis of variance (ANOVA) was performed and displayed a statistically significant difference with respect to mirroring headquarter placement and adversary headquarter placement collections based on gender ($p = 0.04$). Two of the eleven female participants (18%) conducted collections on the adversary in a mirroring manner with respect to identifying headquarter placement. Whereas, twenty-one of thirty-nine male participants (54%) conducted collections on the adversary in a mirroring manner with respect to identify headquarter placement.
Conclusion: The findings of this research effort provided underlying evidence that individuals headquarter placement often mirrors the adversary headquarter placement regarding gender. Additionally, more male participants mirrored headquarter placement than female participants. However, further investigation should be conducted with a greater sample size.

Keywords: Intelligence, Surveillance, and Reconnaissance (ISR), Processed, exploited, and disseminated (PED), Imagery intelligence (IMINT), Signals intelligence (SIGINT), Human intelligence (HUMINT), Intrage

INTRODUCTION

Intelligence, Surveillance, and Reconnaissance (ISR) analysts are provided with a tremendous amount of information that needs to be accurately processed, exploited, and disseminated (PED) in order to provide our warfighters an advantage on the battlefield (Nelson et al., 2023; Nelson et al., 2023). Analysts can obtain valuable information about the enemy territory by using ISR, such as imagery intelligence (IMINT), signals intelligence (SIGINT), and human intelligence (HUMINT) (Boury-Brisset et al., 2016). ISR analysts can have varying strategies when capturing intelligence and often gain experience and expertise on the job rather than learning the necessary skills in a training environment.

To address this area of interest, ISR subject matter experts (SMEs) developed Intrage. Intrage is an ISR tabletop board game to provide training to Air Force intelligence personnel to gain skills relevant to ISR operations (see Figure 1). By investigating different aspects of gameplay, we can better understand the complex decision-making process that warfighters face day-to-day and enhance future training and technology development. For an example, a previous study on Intrage investigated whether military experience influenced headquarter placement. Evidence was found that individuals with military experience centralized their headquarter location compared to individuals with no military experience (Nelson et al., 2025). With this knowledge, we can modify and improve training to include a less predictable outcome. In addition to this found significance, demographic characteristics such as gender is a variable that could further this discovery and increase its impact. Therefore, the purpose of this study was to determine if individuals mirrored headquarter placement with the adversary headquarter placement with respect to gender.

Figure 1: Geographical representation for intrage.

METHODS AND MATERIALS

Study Participants

Before collecting data, the study was approved by the U.S. Air Force Research Laboratory (AFRL) Institutional Review Board (IRB). The goal of this research effort was to determine if a relationship exists with regards to mirroring headquarter placement and adversary headquarter placement collections based on gender. Participants were recruited via email from Wright-Patterson Air Force Base (WPAFB) and completed the task online through Qualtrics – a survey platform. A sample of participants (N = 50) were selected from 25 military participants and 25 non-military participants completed the research study. The sample consisted of 11 female and 39 male participants.

Procedures

All participants were provided with an overview with the study objectives and were instructed to place their headquarters within a single quadrant in the norther region (i.e., Region A, B, or C) of the map (see Figure 2). Additionally, participants were able to collect four times in the southern region of the map (i.e., Region E, F, and G) in an attempt to identify the adversary headquarters. The four collects contained a honeycomb pattern (see Figure 3).

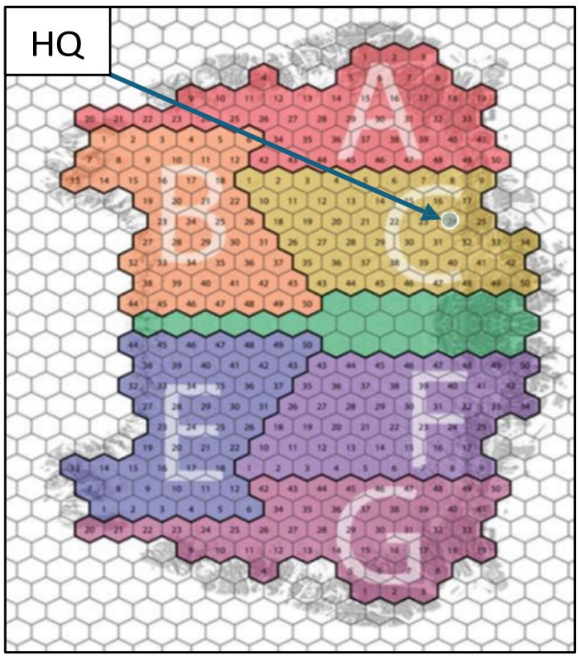

Figure 2: Headquarter placement in the northern region.

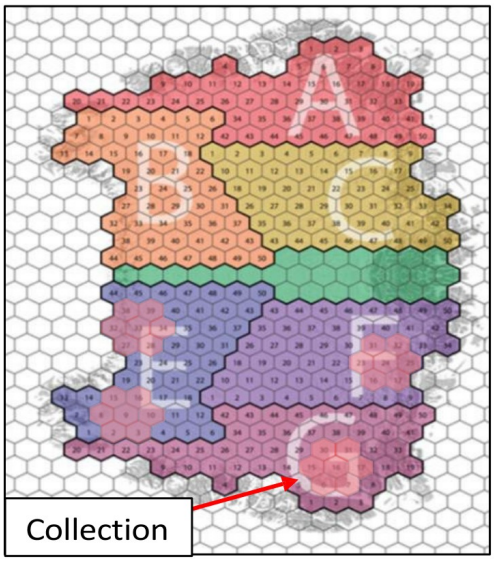

Figure 3: Adversary headquarter intel collections in the southern region.

Data Analysis

Data statistical analysis was conducted in Rstudio using functions from various packages (R version 4.1.2). R is an open-source programming language with downloadable packages from the Comprehensive R Archive Network (CRAN) repository. An analysis of variance (ANOVA) was conducted to determine if there was a statistical difference between mirroring headquarters placement and adversary headquarter placement based on gender.

Results

The analysis of variance (ANOVA) displayed a statistically significant difference was detected with respect to mirroring headquarter placement and adversary headquarter placement collections based on gender ($p = 0.04$) (see Table 1). Two of the eleven female participants (18%) conducted collections on the adversary in a mirroring manner with respect to identifying headquarter placement. Whereas, twenty-one of the thirty-nine male participants (54%) conducted collections on the adversary in a mirroring manner with respect to identifying headquarter placement (see Figure 4).

Table 1: Analysis of variance (ANOVA) comparing demographic characteristics and mirroring headquarter placement and adversary headquarter location based on gender.

	Source	df	SS	MS	F	p
Gender	Between-Conditions	1	1.09	1.09	4.54	0.04
	Within-Conditions	48	11.33	0.24		
	Total	49	12.42			

Statistical Significance at alpha level of 0.05

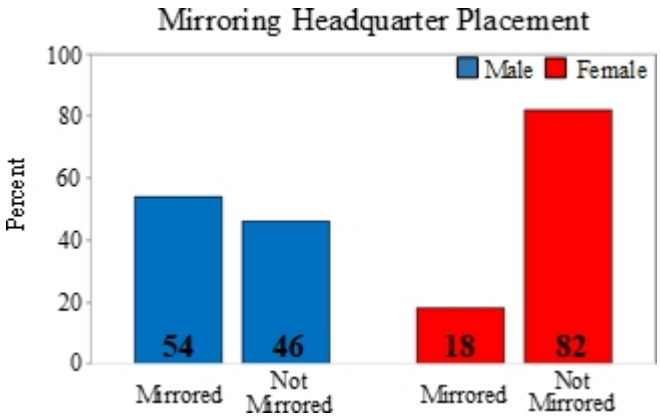

Figure 4: Geographical representation depicting headquarter placement and mirroring collected intel to gain insight on the adversaries headquarter location based on gender.

CONCLUSION

The findings of this research effort has provided underlying evidence that individuals headquarter placement often mirrors the adversary headquarter placement regarding gender. Additionally, more male participants mirrored headquarter placement than female participants. However, this should be investigated further with a greater sample size. As research continues, various findings will assist in the ongoing development and maturity of Intrage. In addition, future research should evaluate whether personality differences influence headquarter placement to mirror headquarter placement.

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