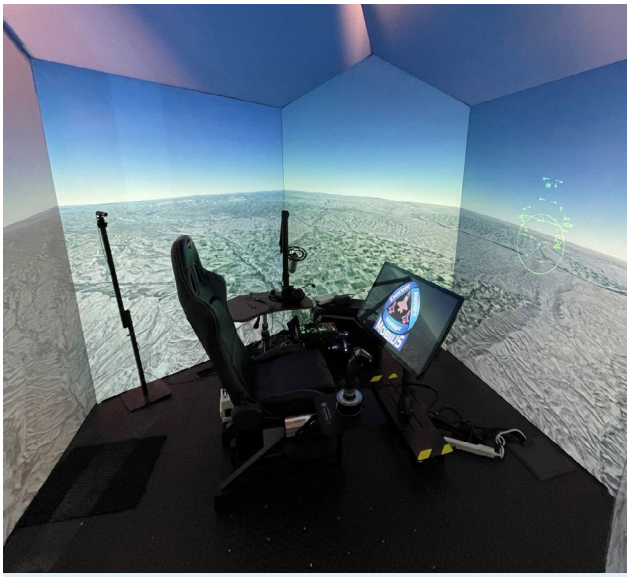
AFRL
FIGHT'S ON!
THE AIR FORCE RESEARCH LABORATORY
ISSUE 76
SPRING 2025



(Left) Collaborative combat aircraft concept artwork

(Right) RHW's Immersive Collaborative Environment (ICEbox)

Evaluating Pilots' Autonomous Collaborative Platform Command Decisions

Uncrewed fighter aircraft are poised to revolutionize air combat, becoming essential for achieving air dominance in future conflicts. A key question remains: how will these autonomous platforms seamlessly integrate with human pilots in the heat of battle? The Air Force's Human Effectiveness Directorate is tackling this challenge head-on, with research focused on understanding how pilots manage multiple uncrewed fighters from the cockpit and, crucially, how this impacts their decision-making. Specifically, researchers are investigating the critical moments when pilots command their Autonomous Collaborative Platforms (ACPs) to neutralize enemy defenses.

A recent experiment immersed pilots in a realistic virtual environment, ICEbox, where they oversaw four ACPs during a Suppression of Enemy Air Defenses (SEAD) mission. The core question: How do different ACP loadout configurations (e.g., varying amounts of ammunition, fuel, and missiles) affect a pilot's choice when selecting an ACP to eliminate a surface-to-air missile (SAM) site? The pilots' primary objective was to destroy three enemy ground vehicles with cannon fire before egressing from inbound enemy aircraft, navigating the threat of SAM sites along the way. Participants had to strategically choose and dispatch the optimal ACP to silence each SAM site using a touchscreen interface.

Each pilot completed two 45-minute missions, one starting with identical ACPs that diverged as the mission progressed, and the other with four uniquely configured ACPs from the outset. This design allowed researchers to compare the impact of ACP uniformity versus diversity on pilot performance. Throughout the experiment, comprehensive data was collected, including pilot-ACP interaction logs, simulation data, and electroencephalogram (EEG) readings. Post-mission questionnaires further assessed decision-making strategies, cognitive workload, and individual differences.

The results of this experiment promise to deliver critical insights into effective supervisory control of ACPs from the cockpit. This research will illuminate the impact of different operational concepts – specifically, how ACP similarity influences decision-making effectiveness. Ultimately, this groundbreaking work will pave the way for optimizing pilot-ACP interactions, ensuring mission success in the increasingly complex battlespace of the future. ☆

Dr. Christopher Myers, Sr. Cognitive Scientist, 711 HPW/RHWE

Graphic (left) U.S. Air Force artwork courtesy of General Atomics Aeronautical Systems, Inc. and Anduril Industries and photo (right) by Dr. Christopher Myers.

INSIDE THIS ISSUE

Modeling & Simulation Integration Lab Demonstration

Photos by Mr. Will Graver (BAE Systems, Inc)

The Modeling and Simulation Integration Lab (MSIL) is an initiative emerging from collaboration between the Air Force Research Laboratory (AFRL) and the Chief Modeling and Simulation Office (CMSO), with support from the Air Force's Life Cycle Management Center (AFLCMC). The focus is on creating a human-in-the-loop environment for technology experimentation, maturation, and transition that helps the Department of the Air Force (DAF) speed the delivery of new capabilities to the force with an operationally relevant research infrastructure connected to the broader operational training and test infrastructure (OTTI) for the DAF.

As a research environment, MSIL provides an opportunity for first contact between new technologies/capabilities and operators in operationally relevant environments and scenarios to close S&T gaps and de-risk new technologies. Experiments exploring mission impacts, concepts of operations (CONOPS), and tactics, techniques, and procedures (TTPs) can be conducted in a high-fidelity simulation environment with human operators in the loop as technology emerges and matures. At the same time, MSIL provides a unique venue for research and development related to human-machine integration and teaming. With the rapid evolution and proliferation of artificial intelligence and autonomy, there is a pressing need to understand how such technologies interface with human cognitive performance and how they change the nature of military operations. Virtual simulation is a critical tool in this process, and the MSIL is designed to enable exploration of these concepts in realistic scenarios.

On 27 February, the MSIL team provided a demonstration of its initial operational capability (IOC) to the DAF's M&S Council's General Officer Steering Group (GOSG). This demonstration emphasized integration of autonomous aircraft capabilities from the Defense Advanced Research Projects Administration (DARPA) and autonomous aircraft control concepts developed within AFRL. There were more than 40 attendees, including more than a dozen general officers (GOs) and GO-equivalent civilians. This included the Assistant Deputy Chief of Staff, Strategy, Integration and Requirements for Headquarters Air Force (HAF/A5) as well as the HAF's Director of Test and Evaluation (HAF/TE). The meeting was hosted by the DAF's Chief Modeling and Simulation Officer (CMSO) and the AFRL Commander. The demonstration gave attendees a glimpse of capabilities as well as the speed with which technology integration and experimentation can be accomplished through the MSIL. This includes an ability to move research from CUI to highly classified environments in a single facility, utilizing common architecture and infrastructure to increase scale, fidelity, and operational relevance more efficiently. ☆

Dr. Glenn Gunzelmann, Modeling and Simulation Lead, Warfighter Interactions and Readiness Division, 711 HPW/RHW

RHW
PUBLISHED CONTENT
AUGUST 2024 - APRIL 2025

Journal publications, conference proceedings, and paper presentation information can now be found online at the link below.

https://afresearchlab.com/rhwpubs

Graphic by 711 HPW/RHW

Contagion: How Narratives Spread in the Information Environment

During times of great change or uncertainty, people seek reliable information from trusted sources. These sources can range from a familiar national news anchor and the local newspaper to more informal networks via social media. As "social animals," we have the core social desires (Fiske, 2003) to not only understand and categorize the world around us but to belong and remain integrated with our meaningful identity groups ("I am an American", "I am a university professor", "I am a member of this church/temple/place of worship"). Consequently, as people navigate through the bombardment of news headlines and viral multimedia, their assessment of information is not only influenced by perceived accuracy or truthfulness but also by the narratives and "master narrative" endorsed by their social group that contribute to group identities.

The epidemiological model of narrative spread applies principles from disease transmission to understand how narratives, which includes stories, ideas, and themes, propagate through social networks. Researchers compare narratives to viruses, examining how certain people may become "infected" through exposure with messaging campaigns and how this may then spread across populations or regions of interest.

Key components of this model include:

- **Susceptibility (S)**: Individuals who are exposed to a narrative but have not yet adopted it.
- **Infection (I)**: Those who actively engage with and spread the narrative.
- **Recovery (R)**: People who disengage from the narrative or reject it.
- **Skepticism (Z)**: Some models introduce a skeptical category, representing individuals resistant to persuasion.

Studies use models like SIR (Susceptible-Infected-Recovered) and SEIZ (Susceptible-Exposed-Infected-Skeptical) to measure how narratives gain traction, evolve, and eventually fade over time. Researchers analyze social media platforms to track competing narratives, identifying which ones spread rapidly and which face resistance. This approach provides valuable insights for policymakers, media analysts, and researchers to understand how narratives influence public opinion, political discourse, and societal behaviors.

Our project examined the epidemiological narrative spread during a period of social change. Specifically, a disinformation campaign emerged online during the 2024 presidential election in Taiwan claiming that the election process was rigged, thus votes would not be counted fairly. However, very quickly, a grassroots movement rose up to debunk these claims and reassure voters that the democratic process was safe in Taiwan. Using the SEIZ model with Tik Tok social media data, our analysis found that the debunking campaign spread faster through the Taiwanese community than the disinformation campaign. One of the unique aspects of the debunking campaign was the "whole of society" approach that citizens took (Thompson, 2024), in which each person recognizes their own agency to combat disinformation and provide support within their social groups.

Our research team will be repeating this analysis with new datasets, such as examining how narratives spread during events like economic upheaval or attacks on a country's national identity. While the epidemiological model of narrative spread is just one approach to study narrative spread, it can be a very valuable addition to add to our analytic arsenal for understanding Information Warfare and the effects of cognitive attacks. ☆

Dr. Christine Vitiello, Research Psychologist, 711 HPW/RHWEM

CITATIONS

Fiske, S. T., Spencer, S. J., Fein, S., Zanna, M. P., & Olson, J. (2003, January). Five core social motives, plus or minus five. In *Motivated Social Perception: The Ontario Symposium, Volume 9* (p. 12). Psychology Press.

Thompson, D. (2024, Dec 6). *Whole-of-society resilience: a new deterrence concept in Taipei*. Brookings. https://www.brookings.edu/articles/whole-of-society-resilience-a-new-deterrence-concept-in-taipei/

RHW RECOGNITIONS

1st QUARTER AWARDS (2025)

RH
- Field Grade Officer: **Maj Jade Driggs**

RHW
- Civilian Category II: **Jenna Cotter**
- Civilian Category III: **Steve Plassman**
- Company Grade Officer: **Lt. Alexandra Weisenburger**
- Non-Commissioned Officer: **SSgt Aaron Elmore**

SPECIAL RECOGNITION

- DoD Research Audiologist of the Year for 2024: **Maj Taylor Paige**
- Brig Gen Wilma Vaught Visionary Leadership Award: **Dr. Cassandra Clouse**
- Lance P. Sijan USAF Leadership Award: **MSgt Matthew Boland**
- 4th Qtr CGO 711HPW Win (2024): **Capt Jacob Weiland**
- Deployment: **Maj Matt Fagan**

SERVICE AWARDS

- 10 Years: **Dr. Eric Thompson**, **Jennifer Winner**
- 20 Years: **Dr. Brian Simpson**
- 40 Years: **Frederick M. Meyer**

Hails

2Lt Timothy Davis
2Lt Joshua Edmonds
Mr. Dakota "Cody" Evans
2Lt Jonathan LeGault
Capt Matthew Rainwater
MSgt Jacob Scott
Capt Jessica Shevling

Farewells

Lt Col Jeremy "DJ" Baker
Jack Brown
SSgt Aaron Elmore
Bassel Elnamara
Lt Col Chris "Doc" Holliday
Capt John Hrabovsky
1Lt Andrew Ka
Dr. John Kegley
Capt Marco Pirozzoli
Francine Schaffner
Captain Chris Sears
Tim Sears
Dr. Kellie Turner
Dr. Mike Vidulich
Dave Williamson

JANUARY - APRIL 2025

ANNUAL AWARDS (2024)

711/HPW
- Company Grade Officer: **Capt Patrick LaFlam-McFall**
- Daniel Repperger Mentor of the Year: **Ms. Emily Conway**
- Field Grade Officer: **Maj Taylor Paige**
- IMA Field Grade Officer: **Maj Geoffrey Dobson**
- Scientific/Technical Management: **Ted Harmer**
- Technology Transition Direct to the Warfighter: **Legion Team**

  Patrick Ederer, Steve Plassman, Capt Kate Clements, Greg Rupert, Sam Johnston, Dr. Justin Nelson, Dr. Huaning Cheng, Erika Bucio, Jenna Cotter, Lt Turner Nims, Lt Jacob Dutt, Capt Marco Pirozzoli
- Technology Transition to System Program Office: **Warfighter Integration Team**

  Jessica Bartik, Dr. Sarah Bibyk, Danielle Brown, Guy French, Hilary Gallagher, Michael Lambert, Dr. Hunter Oldham, Allen Rowe, Dr. Eric Thompson
- Mission Support Team: **Human Learning & Cognition CTC Program Management Team**

  Jacquelyn Waggamon, Kirsten Rice, Kayelin Tiggs, Maj Shinae Wagner, Capt Denita Guthrey, Capt Venessannah Deppermann, Lt Anastasia Stuart, Dr. Nina Pryor, Ariel Molnar, Capt Christopher Sears, Capt Jacob Weiland, Capt Jaren Boykin, Lt Alexandra Weisenburger, Lt Tevin Miller

RH
- Administrative Excellence: **Pat Henline**
- James W. Brinkley Award: **Dr. Christine Vitiello**

RHW
- Civilian Category II: **James Howard**
- Civilian Category III: **Alan Wall**
- Collaboration Award: **Dr. Kent Etherton & Ms. Katelyn Kay**
- Commander's Cup Junior: **Sam Johnston**
- Commander's Cup Senior: **Dr. Paul Havig**
- Harry G. Armstrong (ind.): **Patrick Ederer**
- International Award (ind.): **Dr. Tiffany Myers**
- Jack Blackhurst Innovation Award (ind.): **Stephen McGee**
- Mission Support: **Lauren Morse**
- Non-Commissioned Officer of the Year: **TSgt Joel Dumont**
- Supervisory Level I: **Sabrina Ocampo**
- Thomas S. Wells Award: **Tim Anderson**
- Commander's Cup (Team): **Training Tech Group Leadership Team**

  Dr. Megan Morris | Dr. Jayde King | Jennifer Winner
- International Team Award: **MOBIUS**

  Kristen Barrera, Guy French, Brandon Nolan, Maj Jade Driggs, Adam Forster, Brent Miller, Ryan Carpenter
- Scientific/Tech. Achievement Team Award: **HLT HAYSTACK**

  Dr. Timothy Anderson, Emily Conway, Dr. Grant Erdmann, Dr. Jeremy Gwinnup, Eric Hansen, David Hoeferlin, Lauren Morse, Brian Ore

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Since 2001, Fight's ON! continues to serve as the Division publication for our partners and features innovative science and technology that is accelerating and revolutionizing readiness.

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www.afresearchlab.com/FightsOn

Fight's ON! Point-of-Contact
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Cleared / Case # AFRL-2025-3489

711 HPW/RHW Core Research Areas:
- Digital Models of Cognition
- Distributed Teaming & Communication
- Human-Machine Interactions
- Learning & Operational Training