

PSYC 4803-B (CRN: 94295) Special Topics

Topic: Structured Analytic Techniques (SATs) and Cognitive Modeling

Dr. Rick Thomas

School of Psychology, Georgia Institute of Technology

Fall 2026

Course Information

Meeting Time: Monday & Wednesday, 9:30–10:45 AM

Location: J.S. Coon 148

Course Description

This seminar focuses on how people think, make decisions, and sometimes make mistakes—especially in high-stakes, uncertain environments like intelligence analysis. You will learn structured analytic techniques (SATs) that help reduce bias and improve the quality of your reasoning, along with cognitive models that explain how judgment and decision-making actually work. The course is highly applied. Through case studies, hands-on exercises, and group discussions, you will practice using these tools to analyze complex problems, evaluate evidence, and make defensible decisions. By the end of the seminar, you will be able to apply structured methods to real-world challenges in intelligence analysis, risk assessment, and resource allocation.

Learning Objectives

- Explain cognitive mechanisms underlying judgment
- Diagnose cognitive biases
- Apply structured analytic techniques
- Conduct hypothesis-driven analyses
- Evaluate uncertainty and evidence
- Understand how some SATs have been integrated with cognitive models

Required Texts

- Heuer, R. J., Jr. (1999). *Psychology of Intelligence Analysis*.
- Heuer, R. J., Jr., & Pherson, R. H. (2015). *Structured Analytic Techniques for Intelligence Analysis* (3rd ed.).
- Pherson, R. H., & Beebe, S. M. (2nd ed.). *Cases in Intelligence Analysis: Structured Analytic Techniques in Action*.

Weekly Schedule

Week	Dates	Topic	SAT	Assignments
1	Aug 19–21	Intro	Ch1	

2	Aug 24–28	Cognition	Ch2	
3	Aug 31–Sep 4	Biases	Ch2	Bias Memo
4	Sep 7–11	Structuring	Ch3	
5	Sep 14–18	Organization	Ch5	
6	Sep 21–25	Exploration	Ch6	ACH Proposal
7	Sep 28–Oct 2	Hypothesis Gen	Ch7	ACH Draft
8	Oct 5–9	ACH	Ch7	ACH Final
9	Oct 12–16	Diagnostic	Ch7	
10	Oct 19–23	Reframing	Ch8	
11	Oct 26–30	Debate	Ch8	
12	Nov 2–6	Foresight	Ch9	
13	Nov 9–13	Indicators	Ch9	Scenario
14	Nov 16–20	Decision	Ch10	
15	Nov 30–Dec 2	Integration	Review	Final

Schedule of Detailed Readings

Week	SAT	Heuer	Cases	Articles
1	Ch1	Intro		“The Role of Intelligence at a Transformational Moment” as delivered CIA Director William Burns Georgia Tech, 14 April 2022, https://www.youtube.com/watch?v=yVWzer7TTP0 Remarks as delivered, https://www.cia.gov/static/Director-Burns-Speech-and-QA-Georgia-Tech.pdf
2	Ch2	1–3		Marrin, S. (2018).
3	Ch2	9–12		Folker, R. D., Jr. (2000).
4	Ch3	7		Larrick, R. P. (2004).
5	Ch5	4	3	Milkman, K. L., Chugh, D., & Bazerman, M. H. (2009).
6	Ch6	6	1,9	Thomas et al. (2014); Illingworth et al. (2023); Dhami et al. (2019)
7	Ch7	5	5,7	Valtorta et al. (2005);
8	Ch7	8	8	Wheaton & Chido (2006)
9	Ch7	10–11	4,10	Mandel, D. R., & Barnes, A. (2018)
10	Ch8	6	6,11	Tetlock et al. (2014); Mellers et al. (2015)
11	Ch8		12,14	Prelec (2004) ; Prelec et al. (2017); Ferreira et al. (2023)
12	Ch9	12	15,16	Degaut, M. (2016)
13	Ch9		12,14	
14	Ch10	14	17	
15	Review	Review		

Selected Readings

William J. Burns (2022, April 14). *The role of intelligence at a transformational moment* (Remarks at Georgia Institute of Technology). Central Intelligence Agency.

[Video recording](#)

[Transcript \(PDF\)](#)

Marrin, S. (2018). Evaluating intelligence analysis: Structured analytic techniques and their alternatives. *Intelligence and National Security*, 33(3), 343–359.

Folker, R. D., Jr. (2000). Intelligence analysis in theater joint intelligence centers: An experiment in applying structured methods. *Joint Military Intelligence College*.

Larrick, R. P. (2004). Debiasing. In D. J. Koehler & N. Harvey (Eds.), *Blackwell handbook of judgment and decision making* (pp. 316–337). Blackwell.

Milkman, K. L., Chugh, D., & Bazerman, M. H. (2009). How can decision making be improved? *Perspectives on Psychological Science*, 4(4), 379–383.

Thomas, R., Dougherty, M. R., & Buttaccio, D. R. (2014). Memory constraints on hypothesis generation and decision making. *Current Directions in Psychological Science*, 23(4), 264–270.

Illingworth, D. A., Lawrence, A., Dougherty, M. R., & Thomas, R. P. (2023, July). Using Perspective Taking and Information Paucity to Explore Alternative Realities. In *International Conference on Human-Computer Interaction* (pp. 17–31). Cham: Springer Nature Switzerland.

Dhami, M. K., Belton, I. K., & Mandel, D. R. (2019). The “analysis of competing hypotheses” in intelligence analysis: A critique. *Intelligence and National Security*, 34(4), 457–472.

Valtorta, M., Kim, Y., & Vomlel, J. (2005). Soft evidential update for probabilistic multiagent systems. *International Journal of Approximate Reasoning*, 39(2–3), 195–220.

Wheaton, K., & Chido, D. (2006). Structured analysis of competing hypotheses. *Mercyhurst College Institute for Intelligence Studies*.

Mandel, D. R., & Barnes, A. (2018). Accuracy of intelligence forecasts from the intelligence community. *Proceedings of the National Academy of Sciences*, 115(40), 10057–10062.

Tetlock, P. E., Mellers, B. A., Rohrbaugh, N., & Chen, E. (2014). Forecasting tournaments: Tools for increasing transparency and improving the quality of debate. *Current Directions in Psychological Science*, 23(4), 290–295.

Mellers, B., Stone, E., Atanasov, P., Rohrbaugh, N., Metz, S. E., Ungar, L., ... Tetlock, P. E. (2015). The psychology of intelligence analysis: Drivers of prediction accuracy in world politics. *Journal of Experimental Psychology: Applied*, 21(1), 1–14.

Ferreiro, O., Barbería, I., & Gómez, J. (2023). Improving probabilistic reasoning and forecasting accuracy: A review. *Judgment and Decision Making*, 18(2), e13.

Degaut, M. (2016). Intelligence analysis in the 21st century: The need for a paradigm shift. *Intelligence and National Security*, 31(5), 623–639.

Drazen Prelec (2004). A Bayesian truth serum for subjective data. *Science*, 306(5695), 462–466.

Prelec, D., Seung, H. S., & McCoy, J. (2017). A solution to the single-question crowd wisdom problem. *Nature*, 541(7638), 532–535.

Participation Expectations

A: Insightful, prepared, advanced discussion

B: Solid, consistent participation

C: Limited engagement

Final grades will be assigned based on the percentage of total points earned in the course and will follow the standard grading scale shown below. The instructor reserves the right to adjust grade boundaries slightly based on overall class performance, but any such adjustments will only benefit students.

Grade	Percentage
A	93–100%
A–	90–92%
B+	87–89%
B	83–86%
B–	80–82%
C+	77–79%
C	73–76%
C–	70–72%
D	60–69%
F	Below 60%

POLICY ON THE USE OF GENERATIVE AI FOR CLASS WORK

In this class, we treat AI-based assistance, such as ChatGPT and Copilot, the same way we treat collaboration with other people: for both individual and team-based assignments, you are welcome to talk about your ideas and work with other people, both inside and outside the class, and with AI-based assistants.

However, all work you submit must be your own. You should never include in your assignment anything that was not written directly by you without proper citation (including quotation marks and in-line citation for direct

quotes). Including anything you did not write in your assignment without proper citation will be treated as an academic misconduct case. If you are unsure where the line is between collaborating with AI and copying AI, we recommend

the following heuristics:

- Heuristic 1: Never hit “Copy” within your conversation with an AI assistant. You can copy your own work into your own conversation but do not copy anything from the conversation back into your assignment. Instead, use your interaction with the AI assistant as a learning experience, then let your assignment reflect your improved understanding.
- Heuristic 2: Do not have your assignment and the AI agent open simultaneously. Like the above, use your conversation with the AI as a learning experience, then close the interaction down, open your assignment, and let your assignment reflect your revised knowledge. This heuristic includes avoiding using AI directly integrated into your composition environment. Just as you should not let a classmate write content or code directly into your submission, you should also avoid using tools that directly add content to your submission. Deviating from these heuristics does not automatically qualify as academic misconduct; however, following these heuristics essentially guarantees your collaboration will not cross the line into misconduct.

Detailed Assignment Descriptions

Depending on course enrollment, some assignments may be modified to small-group projects rather than individual work. These adjustments are intended to facilitate collaboration and ensure a high-quality learning experience.

1. Weekly Analytic Memos (25%)

Purpose

The weekly analytic memos are designed to build fluency in applying structured analytic techniques (SATs) while explicitly linking those techniques to underlying cognitive processes. These assignments emphasize *practice over polish* and are intended to develop disciplined analytic habits.

Task

Each week, students will submit a **1–2 page memo** applying one or more SATs introduced that week to a specified or self-selected problem (e.g., intelligence, policy, security, diagnosis, or forecasting).

Required Components

Each memo should include:

1. **Problem Framing**
 - Clearly define the analytic question or decision problem
 - Specify scope, constraints, and relevant uncertainties
2. **Technique Application**
 - Apply the focal SAT correctly and transparently
 - Show intermediate reasoning steps (not just conclusions)
3. **Cognitive Analysis**
 - Identify relevant cognitive biases or limitations (e.g., confirmation bias, availability, coherence effects)
 - Explain how the selected SAT mitigates or fails to mitigate these issues
4. **Reflection**
 - Evaluate the usefulness of the technique
 - Discuss what the technique reveals that unaided reasoning might miss

Evaluation Criteria

- Conceptual accuracy
 - Proper application of technique
 - Integration of cognitive theory
 - Clarity and structure
-

2. Bias Mapping Memo (Week 3)

Purpose

This assignment establishes the core logic of the course:
cognitive limitations → **structured techniques as interventions**

Task

Students will analyze a **real-world analytic failure** (e.g., intelligence failure, policy misjudgment, investigative error) and diagnose the role of cognition.

Required Components

1. **Case Description**
 - Brief overview of the failure
 - Key decisions or judgments involved
2. **Bias Identification**
 - Identify **at least three cognitive biases or limitations**
 - Ground explanations in Heuer
3. **Mechanism Analysis**
 - Explain *how* each bias affected:
 - information search
 - evidence evaluation
 - hypothesis generation
4. **SAT Mapping**
 - Map each bias to one or more SATs
 - Justify why the technique would mitigate the bias
5. **Critical Reflection**
 - Are SATs sufficient?
 - What limitations remain?

Goal

Students should demonstrate that SATs are not arbitrary tools—they are **designed responses to predictable cognitive failures**.

3. Analysis of Competing Hypotheses (ACH) Project (20%)

Purpose

This is the **core analytic methods assignment**. It develops disciplined hypothesis evaluation and introduces formal structure into diagnostic reasoning.

Stage 1: Proposal (Week 6)

Students must:

- Define a **clear analytic question**
- Propose **3–5 competing hypotheses**
- Justify why ACH is appropriate for the problem
- Identify preliminary sources of evidence

Focus: problem formulation and hypothesis quality

Stage 2: Draft (Week 7)

Students must:

- Refine hypotheses to ensure:
 - mutual exclusivity (as much as possible)
 - conceptual clarity
- Identify and organize relevant evidence
- Construct a **preliminary ACH matrix**

Focus: structure and completeness

Stage 3: Final Submission (Week 8)

Students must:

1. **Present Hypotheses**
 - Clearly defined and non-redundant
 2. **ACH Matrix**
 - Evidence × Hypothesis table
 - Explicit consistency judgments
 3. **Diagnostic Evaluation**
 - Identify most diagnostic evidence
 - Highlight disconfirming evidence
 4. **Conclusion**
 - Identify the most supported hypothesis
 - Justify decision
 5. **Uncertainty Analysis**
 - Missing evidence
 - sensitivity to assumptions
 - residual ambiguity
 6. **Cognitive Reflection**
 - How does ACH mitigate bias?
 - Where might bias still persist?
 - Other Limitations
-

Evaluation Criteria

- Hypothesis quality
 - Evidence selection and use
 - Correct application of ACH logic
 - Depth of uncertainty analysis
 - Integration of cognitive concepts
-

4. Scenario Forecast Project (15%)

Purpose

This assignment focuses on **uncertainty, foresight, and dynamic environments**, where prediction is inherently probabilistic and model-based.

Task

Students will conduct a structured foresight analysis using SAT techniques such as:

- key drivers analysis
 - key uncertainties
 - scenario generation
 - indicators development
 - forecasting methods including the Bayesian Truth Serum
-

Required Components

1. **Problem Definition**
 - Define system/domain (e.g., geopolitical, technological, economic)
2. **Key Drivers**
 - Identify major causal forces shaping outcomes
3. **Key Uncertainties**
 - Identify high-impact, uncertain variables
4. **Scenario Construction**
 - Develop **3–4 plausible future scenarios**
 - Each scenario must be:
 - internally coherent
 - meaningfully distinct
5. **Indicators**
 - Define observable signals that would:
 - support each scenario
 - allow early detection
6. **Implications**
 - What does each scenario imply for:
 - decision-makers
 - analysts
7. **Reflection**
 - Limits of foresight

- Role of cognitive bias in forecasting
-

Evaluation Criteria

- Quality of drivers and uncertainties
 - Scenario coherence and distinctiveness
 - Indicator usefulness
 - Integration and clarity
-

5. Final Project: Integrated Structured Analysis (25%)

Purpose

This is the **capstone assignment**, integrating:

- SATs
 - cognitive theory
 - real-world analytic reasoning
-

Task

Students will conduct a **comprehensive structured analysis** of a complex problem under uncertainty.

Required Components

1. **Problem Formulation**
 - Clear, well-defined analytic question
 - Explanation of stakes and uncertainty
2. **Technique Selection**
 - Apply **multiple SATs** (e.g., ACH + scenarios + assumptions check)
 - Justify why each technique is appropriate
3. **Analysis**
 - Execute techniques rigorously
 - Show reasoning transparently
4. **Cognitive Integration**
 - Identify:
 - likely biases
 - cognitive constraints
 - Explain how SATs mitigate (or fail to mitigate) them
5. **Uncertainty Evaluation**
 - Missing information
 - sensitivity to assumptions
 - competing interpretations
6. **Conclusions and Recommendations**
 - Clear analytic judgment
 - Actionable insights or implications

STUDENT RESOURCES



Emergency Phone Numbers | State & National Resources

If You Are in Crisis:

If this is a life-threatening emergency, please call **911** or, if on-campus, call the Georgia Tech Campus Police at **404-894- 2500**.

Students experiencing a crisis that requires immediate attention may speak with the Counselor On-Call at any time, 24 hours a day, 7 days a week. Between 8 am and 5 pm Monday-Friday, students should call the Center for Assessment, Referral and Education (CARE) at **404-894-3498** and identify that they are in crisis.

After hours, please call **404-894-3498** and select option 1 to speak to the after-hours counselor. You may also call the Georgia Tech Police at **404-894-2500**.

The following list includes various services offered by Georgia Tech for the benefit of all students. For a more comprehensive list of health and well-being resources, events, and information, visit the [GT Well-Being Connect page \(Links to an external site.\)](#) or [Health and Well-Being at GT \(Links to an external site.\)](#)

Georgia Tech Police Department Website:

<http://www.police.gatech.edu> (Links to an external site.)

Phone: 404-894-2500 (emergency and non-emergency)

Look here for:

- Centralized point of contact available 24/7 that can connect you to any requested mental health resources
- All officers are trained in Crisis Intervention Team, Mental Health First Aid, and QPR to assist in mental health crises
- GTPD offers Good Samaritan and 9/11 Amnesty: if a student needs help and either of you are intoxicated or under the influence of any drug, call GTPD, and neither of you will be in legal trouble for being in that condition.

Center for Assessment, Referral, and Education (CARE)

Website: <https://care.gatech.edu> (Links to an external site.)

Phone: 404-894-3498

Look here for:

- Single point of entry for mental health services at Georgia Tech, no appointment necessary
- After a primary assessment at CARE, students can then be referred to other mental health resources and services on or off campus, including the Counseling Center and Stamps Psychiatry.

Counseling Center

Website: <http://counseling.gatech.edu> (Links to an external site.)

Phone: 404-894-2575

Look here for:

- Students may be recommended to the Counseling Center after an initial consultation at CARE
- Services are confidential and free of charge to currently enrolled students
- Website includes a wide variety of self-help resources, found [here](#) (Links to an external site.)

Stamps Health Services

Website: <https://health.gatech.edu> (Links to an external site.)

Phone: 404-894-1420

Look here for:

- Primary care
- Pharmacy
- Women's health
- Psychiatry
- Immunization, allergy, health promotion, and nutrition services for students
- Open 8 am-5 pm Monday through Wednesday and Friday, and 9 am-5 pm on Thursdays
- A list of after hours resources is available [here](#) (Links to an external site.).

LGBTQIA Resource Center Website: <http://lgbtqia.gatech.edu> (Links to an external site.)

Phone: 404-385-2679

Look here for:

- LGBTQIA+ support, resources, workshops, training, and discussions

- Virtual office hours offered Monday through Thursday, as well as a number of virtual community events and workshops, found [here \(Links to an external site.\)](#)
- Extensive list of resources and information available [here \(Links to an external site.\)](#)

VOICE

Website: <https://healthinitiatives.gatech.edu/well-being/voice> (Links to an external site.)

Phone:

- 404-385-4464 or 404-385-4451 (8 am-5 pm, Monday through Friday)
- GTPD: 404-894-2500 ask for the VOICE Advocate on call (after hours)

Look here for:

- Confidential support for victim-survivors of sexual violence, including sexual assault, sexual harassment, intimate partner violence, and stalking
- Education on healthy relationships and preventing sexual violence
- Students seeking support or further information can call either of the above numbers during regular business hours to speak to a VOICE Advocate, or call the Georgia Tech Police at 404-894-2500 after hours and ask for the VOICE Advocate on-call.