Clouded Judgments









An educational game to explore meteorological uncertainty

1. **Aim**

Clouded Judgments is a game designed to engage players in the complexities of meteorological forecasting and alert systems. It offers a simplified simulation of operational uncertainty in weather alerts, inspired by the

Ligurian weather alert framework (ARPAL), and encourages players to balance accurate predictions with the social and economic implications of over- or under-warning the population.



2. Cumulative Expected Info: Expected cumulative number of fully correct forecasts over time across different initial RT levels. Guides the pacing of information growth as players approach the event, balancing difficulty.

2. Why a game?

- Forecasting is rarely black and white and neither is learning.
- Clouded Judgments helps players:
- Develop critical thinking and risk awareness;
- Gain a hands-on understanding of weather alerts and the role of uncertainty;

• Experience the **tension between caution** and cost in decision-making

It's tailored for schools, outreach, and anyone curious about how meteorology meets public policy.



3. Forecast Trajectories (500 simulations): Forecasts spread symmetrically around the true event. Higher RT values lead to faster convergence, less noise, and clearer signals showing the impact of better instruments.

3. Probabilistic core

Key Mechanism

Each of the 5 measurements compares a dice roll (3d6) to a growing threshold: **Threshold** = Reliability Tokens (RT) + Measurement Number (TRT)

Outcome based on roll difference:

Difference (Roll - Threshold)	Outcome
≤ O	All info accurate
+1 to +3	1 random error (1err)
+4 to +6	2 random errors (2err)
≥ +7	All 3 details distorted (3err)

This mechanism introduces structured randomness: better tools reduce error probability, but do not eliminate risk — a simplified mirror of uncertainty.

What It Represents:

Game Element	Real-world Analogy
Reliability tokens	Instruments and software quality
Dice roll + randomness	Forecast uncertainty
5 measurements	Evolving ensemble forecasts

Visual Insights

These visualizations track how reliability evolves during gameplay to fine-tune difficulty and manage forecast uncertainty.



1. Fully Correct Info Distribution: Probability of obtaining 0–5 fully correct forecasts in a single turn depending on starting Reliability Tokens (RT). Helps tune how much reliable information players can realistically gather at each step.

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4. How it works

Each player acts as a local forecaster, aiming to issue accurate weather alerts with imperfect data.

Setup: The Master secretly draws a weather Event card. Players receive Resource tokens and Reliability Tokens (RT).

Actions and Preparation: Each round, players decide whether to invest in better tools (gain RT) or buy tactical Action Cards.

Measurements: Each round includes five measurements. Players gain +1 temporary Reliability Token (TRT) before each, representing how reliability increases getting closer to the event.

The Master rolls 3d6:

- If the roll ≤ current Reliability, the information is fully accurate.
- Otherwise, 1–3 details (time, type, intensity) are randomly distorted, based on how much the roll exceeds current Reliability.

Forecast and Scoring: After five

measurements, players forecast event type, timing, and severity. Scoring:

- Accurate forecast \rightarrow Victory Token + **Resource Tokens**
- Underestimate \rightarrow Resource penalty
- Overestimate → No reward

Event cards simulate complex weather scenarios.

Each card includes the type of event (rain, snow, wind, etc.), the time of day (morning, afternoon, or evening/night), the alert level (green, yellow, orange, or red), a visually striking illustration, and a short descriptive text that provides context for the situation.

Action cards give players tactical advantages during the game. Each card has a *cost* in Resource tokens, features an *illustration*, and includes a clear description of its effect.

First to reach the target number of Victory Tokens wins.

5. What you learn by playing

Clouded Judgments is a game based on a deliberately simplified model of real-world forecasting and alert systems. It explores key challenges such as **managing** uncertainty, balancing risk, and making decisions with incomplete information. Despite the simplification, it reflects essential aspects of operational meteorology — and offers a clear, structured way to experience the complexity behind every forecast.

This game provides insights into the following concepts:

- How forecasts are built under **uncertainty**
- and why no prediction can be fully certain;
- How cautious and bold **strategies** involve trade-offs between cost, risk, and credibility;
- How randomness, probability, and instrument quality affect forecast reliability;
- Why **better tools** reduce uncertainty, but some unpredictability is unavoidable.

Resource tokens represent the budget and operational means available to each player.

They are essential for purchasing Action cards or upgrading Reliability. Managing them wisely is key to developing both short- and long-term strategies.



Victory tokens are earned by making accurate and well-calibrated forecasts. Each token counts as one point. The game ends when a player reaches the target number of Victory tokens and is declared the winner.

Reliability Tokens reflect the accuracy of a player's measuring instruments. The higher the *Reliability*, the greater the chance of receiving accurate data during measurements. However, uncertainty and randomness remain an integral part of the game.

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