### **Protocol for Logical Plausibility and Consistency**

#### **Core Principle**

Beyond being free of hallucinations and structurally correct, the agent's reasoning and output **must be logically sound, internally consistent, and grounded in real-world common sense.** An output that is factually correct but nonsensical is still a failure. This check verifies that the assistant's work "makes sense."

### **1. Temporal Consistency (Time & Date Logic)**

All references to time, dates, and durations must be logical and sequential.

* **Future-Facing Actions:** Actions like bookings, scheduling, or ordering must be set for the future relative to the current system time. Scheduling an event for a time that has already passed is a logical failure (unless the task explicitly involves viewing historical data).
  + **Illogical:** System time is 11:00 PM on July 6th. The assistant schedules a meeting for 5:00 PM on July 6th.
* **Realistic Durations:** The duration of events must be plausible.
  + **Illogical:** A flight from New York to Chennai is listed with a duration of 1 hour. A task to "review a 300-page document" is allocated a 5-minute time slot.
* **Chronological Sequence:** Events must occur in a logical order. A result cannot precede the action that causes it.
  + **Illogical:** The assistant states, "The delivery was completed at 2:00 PM, so I created the shipping label for it at 3:00 PM."
* **Time Zone Awareness:** When dealing with different locations, time calculations must reflect logical time zone differences.
  + **Illogical:** A flight departs New York at 8:00 AM and arrives in Chennai (which is 9.5 hours ahead) at 10:00 AM *the same day*. This is physically impossible.

### **2. Spatial and Physical Plausibility (Real-World Constraints)**

The assistant's output must respect the basic constraints of physics, geography, and the properties of objects.

* **Geographic Realism:** Distances and travel methods must be logical.
  + **Illogical:** The assistant suggests a user can drive from Mumbai to Delhi for a meeting in 1 hour.
* **Physical Attributes:** The properties of items (size, weight, quantity) must be consistent and plausible.
  + **Illogical:** An order for a "refrigerator" is given a shipping weight of 1 kg. A warehouse pallet is assigned a location on a "small shelf."
* **Resource Allocation:** The assignment of resources to tasks must be feasible.
  + **Illogical:** A single warehouse picker is assigned to manually collect 1,000 unique items from different aisles in 15 minutes.

### **3. Causal and Procedural Logic (If-Then Sanity Check)**

The relationship between cause, effect, problem, and solution must be rational.

* **Logical Consequence:** The reason given for an action must logically lead to that action.
  + **Illogical:** In the thinking cell, the assistant says, "The user's credit card was declined. I will now proceed to call the confirm\_booking tool."
* **Procedural Order:** The assistant must follow necessary procedural steps. It cannot perform an action that depends on a prerequisite that hasn't been met.
  + **Illogical:** The assistant attempts to call update\_user\_address using a user\_id *before* it has called find\_user\_by\_email to obtain that user\_id.
* **Problem-Solution Alignment:** The proposed action or solution must be relevant to the user's stated problem.
  + **Illogical:** The user states, "I forgot my password." The assistant responds, "I have updated your notification preferences."

### **4. Internal Consistency**

The assistant must not contradict itself within the same turn or across related statements.

* **Consistent Statements:** The assistant cannot state conflicting information.
  + **Illogical:** The thought cell says, "I will book a flight for Tuesday," but the tool\_code that follows contains a parameter for Wednesday.
* **Numerical Coherence:** Numbers within a response must add up and be consistent.
  + **Illogical:** The assistant states, "The order contains two items: 1x laptop ($1000) and 1x mouse ($50). The total is $1150."
* **Status Consistency:** An entity cannot exist in two mutually exclusive states at the same time.
  + **Illogical:** The assistant provides a final response: "Your order ORD-123 has been successfully cancelled and is now on its way to being delivered."