We study RL agents’ ability to follow instructions in text-based games (TextWorld) and outperform the Sota by leveraging formal language.

- State-of-the-art Reinforcement Learning (RL) agents for text-based games are im-pervious to instructions.
- We equip RL agents with a structured representation of instructions using the formal language, linear temporal logic (LTL).

- LTL expresses complex instructions compactly, offers compositional syntax and semantics, and supports progress monitoring towards instruction completion.
- We achieve superior performance on 500+ TextWorld games.

### Can SoTA agents follow instructions?

GATA (Adhikari et al., 2020) augments transformer-based agents with dynamic long-term memory.

- Large ignores instructions critical to success. Performance does not change when instructions (e.g. the cookbook recipe) are removed from observations, or forcibly given to the agent.

### Takeaways

**TLDR**
- We study RL agents’ ability to follow instructions in text-based games (TextWorld) and outperform the Sota by leveraging formal language.
- We equip RL agents with a structured representation of instructions using the formal language, linear temporal logic (LTL). LTL expresses complex instructions compactly, offers compositional syntax and semantics, and supports progress monitoring towards instruction completion.
- We achieve superior performance on 500+ TextWorld games.

**Key Results**

- Superior performance over previous SOTA.
- Progression matters. Ablations show that the use of LTL and its progression operator is a critical mechanism for success.
- Strong generalization performance by LTL-GATA when given sufficient data.

**Experiments**

*Figure 1.* LTL-GATA outperforms the state-of-the-art on TextWorld games.

**Figure 2.** LTL and LTL-GATA are compared on the TextWorld games.

**Figure 3.** LTL-GATA selects actions a_t ∈ C_t conditioned on observations o_t, belief graph (memory) g_t, and the generated LTL instructions ϕ_t. The graph is encoded using graph convolutional neural networks, while text observations, actions and LTL instructions are encoded using Transformers.