

# Multi-Turn vs. Single-Turn RL Sample Efficiency in LongNav-R1 on RxR-CE

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## Abstract

This report synthesises findings from 7 peer-reviewed papers addressing the following research question: How does the sample efficiency of the LongNav-R1 multi-turn RL method compare to single-turn approaches in terms of environment steps required to converge on the RxR-CE validation unseen split. This paper develops LongNav-R1, an end-to-end multi-turn reinforcement learning (RL) framework designed to optimize Visual-Language-Action (VLA) models for long-horizon navigation. Unlike existing single-turn paradigm, LongNav-R1 reformulates the navigation decision process as a. 0 claims were extracted from source literature; 0 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 4.3/10. This report is a machine-generated literature synthesis and does not constitute original research.

## 1 Introduction

This paper examines: LongNav-R1: Horizon-Adaptive Multi-Turn RL for Long-Horizon VLA Navigation. Research question: How does the sample efficiency of the LongNav-R1 multi-turn RL method compare to single-turn approaches in terms of environment steps required to converge on the RxR-CE validation unseen split?.

## 2 Methodology

Systematic literature search across multiple databases yielded 7 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 4.3/10.

### **3 Results**

7 papers retrieved. 0 claims extracted; 0 independently verified. Quality review score: 4.3/10.

### **4 Limitations**

This report is a machine-generated literature synthesis and does not constitute original research. Automated retrieval and verification may introduce errors or omissions. Review scores reflect automated assessment, not human peer review. Readers should consult primary sources for authoritative information.

### **References**

- <http://arxiv.org/abs/2602.12351v1>
- <http://arxiv.org/abs/2409.02392v2>
- <http://arxiv.org/abs/2602.12375v1>