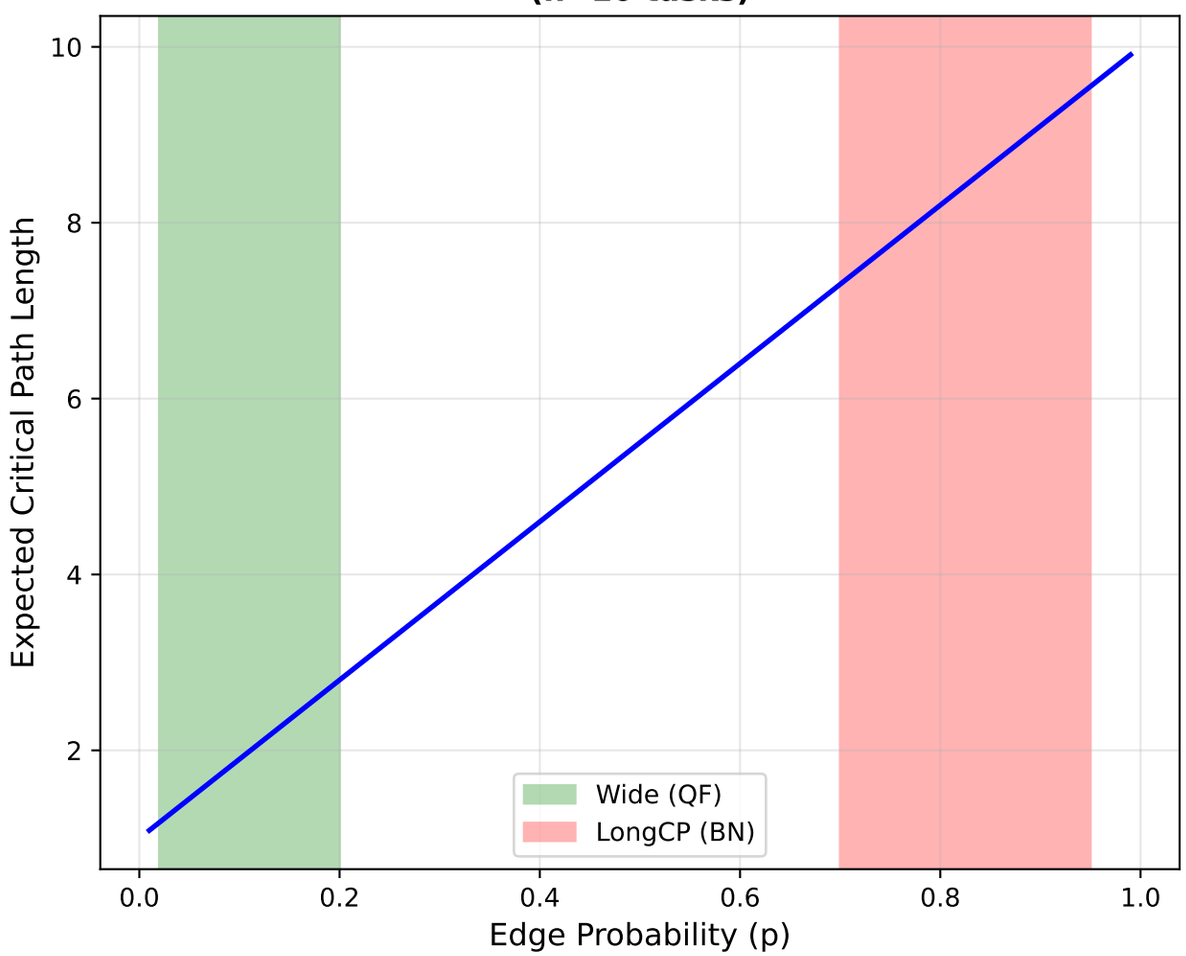

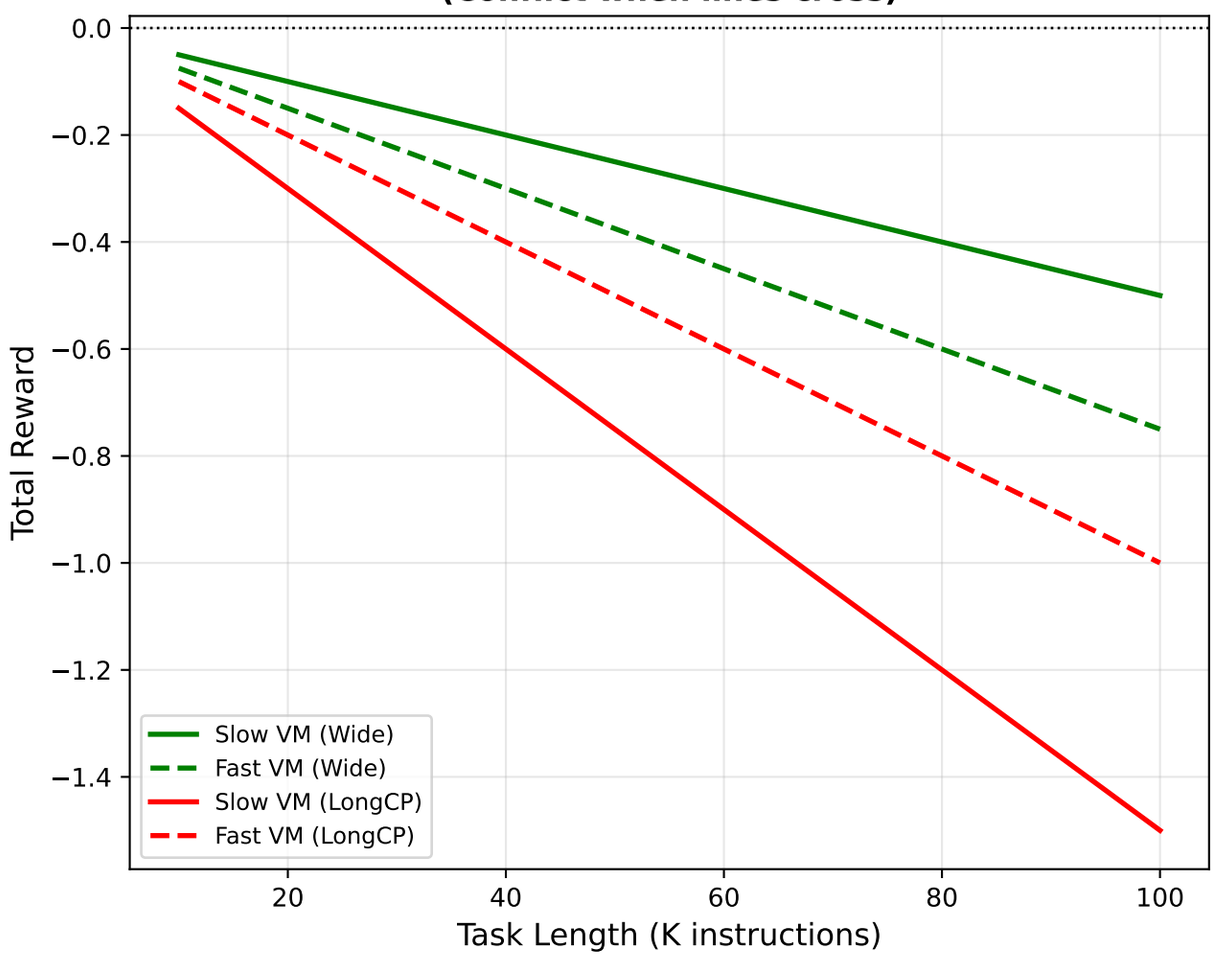

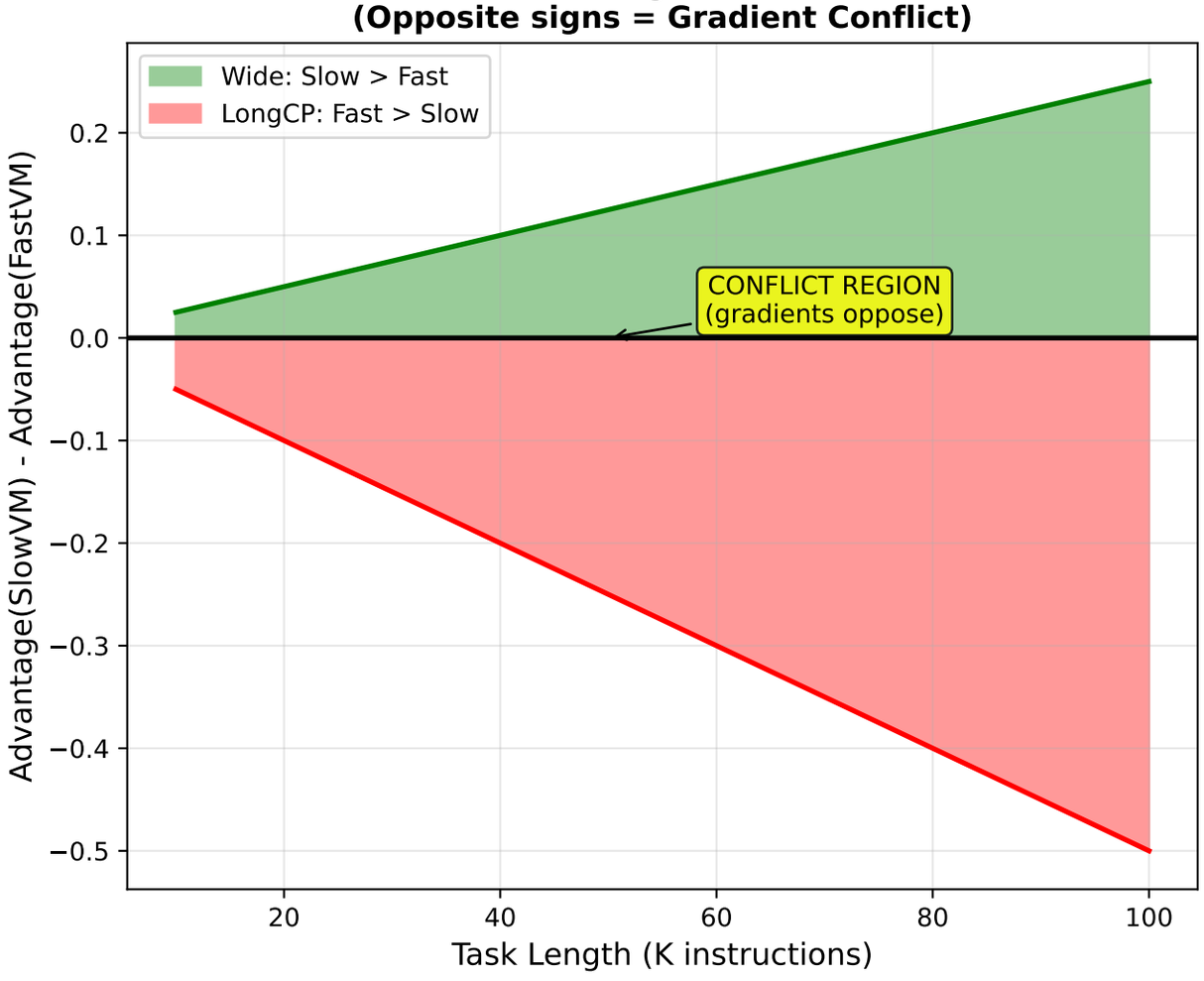


```
THEORETICAL GRADIENT CONFLICT ANALYSIS

DAG Structure (n=10 tasks):
  • Wide (p=0.1): CP ≈ 1.9, Width ≈ 5.3
  • LongCP (p=0.8): CP ≈ 8.2, Width ≈ 1.2
  • CP Ratio: 4.3x (makespan 4x more sensitive)

Reward Analysis:
  • Wide optimal: Energy-efficient VM (slow but cheap)
  • LongCP optimal: Fast VM (speed critical for CP)
  • Advantage conflict: +0.1250 vs -0.2500

Statistical Requirements:
  • Effect size (Cohen's d): 1.25
  • Min samples/domain (80% power): 11
  • Min workflows/domain: 3

CONCLUSION:

  ✓ Gradient conflict is MATHEMATICALLY GUARANTEED when:
    • Training on mixed Wide + LongCP workflows
    • With 3+ workflows of 10 tasks each per domain
    • VMs with diverse speed/power characteristics

  The conflict arises because:
    • Wide DAGs optimize for ENERGY (slow VM = good)
    • LongCP DAGs optimize for SPEED (fast VM = good)
    • These induce OPPOSITE gradient directions!
```