

Novelty Assessment Report

Paper: Learning to Play Multi-Follower Bayesian Stackelberg Games

PDF URL: <https://openreview.net/pdf?id=8hMaqBagPd>

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Abstract

In a multi-follower Bayesian Stackelberg game, a leader plays a mixed strategy over L actions to which n followers, each having one of K possible private types, best respond. The leader's optimal strategy depends on the distribution of the followers' private types. We study an online learning problem for Bayesian Stackelberg game, where a leader interacts for T rounds with N followers with types sampled from an unknown distribution every round. The leader's goal is to minimize regret, defined as the difference between the cumulative utility of the optimal strategy and that of the actually chosen strategies. We design learning algorithms for the leader under different settings. Under type feedback, where the leader observes the followers' types after each round, we design algorithms that achieve $\mathcal{O}(\sqrt{\min\{L\log(nKA^2T), \sim nK\}} \cdot T)$ regret for independent type distributions and $\mathcal{O}(\sqrt{\min\{L\log(nKA^2T), \sim K^n\}} \cdot T)$ regret for general type distributions. Interestingly, these bounds do not grow with N at a polynomial rate. Under action feedback, where the leader only observes the followers' actions, we design algorithms with $\mathcal{O}(\sqrt{n^L K^L A^{2L} L T \log T}, \sim K^n \sqrt{T \log T})$ regret. We also provide a lower bound of $\Omega(\sqrt{\min\{L, \sim nK\}T})$, almost matching the type-feedback upper bounds.

Disclaimer

This report is **AI-GENERATED** using Large Language Models and WisPaper (a scholar search engine). It analyzes academic papers' tasks and contributions against retrieved prior work. While this system identifies **POTENTIAL** overlaps and novel directions, **ITS COVERAGE IS NOT EXHAUSTIVE AND JUDGMENTS ARE APPROXIMATE**. These results are intended to assist human reviewers and **SHOULD NOT** be relied upon as a definitive verdict on novelty.

Note that some papers exist in multiple, slightly different versions (e.g., with different titles or URLs). The system may retrieve several versions of the same underlying work. The current automated pipeline does not reliably align or distinguish these cases, so human reviewers will need to disambiguate them manually.

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Core Task Landscape

This paper addresses: **online learning in multi-follower Bayesian Stackelberg games**

A total of **50 papers** were analyzed and organized into a taxonomy with **19 categories**.

Taxonomy Overview

The research landscape has been organized into the following main categories:

- **Stackelberg Game Frameworks and Equilibrium Computation**
- **Online Learning Algorithms for Stackelberg Games**
- **Multi-Agent Consensus and Formation Control**
- **Learning and Adaptive Control for Nonlinear Multi-Agent Systems**
- **Optimal Control and Reinforcement Learning for Multi-Agent Systems**
- **Applications of Leader-Follower and Stackelberg Models**

Complete Taxonomy Tree

- online learning in multi-follower Bayesian Stackelberg games Survey Taxonomy
- Stackelberg Game Frameworks and Equilibrium Computation
 - Bayesian Stackelberg Games with Incomplete Information (5 papers)
 - [6] A Multi-Domain Anti-Jamming Scheme Based on Bayesian Stackelberg Game With Imperfect Information (Yongcheng Li, 2022) [View paper](#)
 - [15] Remote state estimation under DoS attacks in CPSs with arbitrary tree topology: A Bayesian Stackelberg game approach (Yuhan Wang, 2024) [View paper](#)
 - [20] Defending Against SSDF Attacks From Randomly Appearing Intelligent Malicious Vehicle Users in the CIOV Network by Bayesian Stackelberg Game (Fushuai Li, 2024) [View paper](#)
 - [48] Stackelberg Bayesian game for power allocation in two-tier networks (Nguyen Duy Duong, 2015) [View paper](#)
 - [50] Adaptive Honeypot Allocation in Multi-Attacker Networks via Bayesian Stackelberg Games (Park Dong-Young, 2025) [View paper](#)
 - Complete-Information Stackelberg Games (2 papers)
 - [14] Distributed Stackelberg equilibrium seeking for networked multi-leader multi-follower games with a clustered information structure (Yue Chen, 2024) [View paper](#)
 - [32] Stochastic-Stackelberg-game-based edge service selection for massive IoT networks (Hui Liang, 2023) [View paper](#)
 - Equilibrium Computation and Commitment Strategies (2 papers)
 - [18] Computing Optimal Commitments to Strategies and Outcome-Conditional Utility Transfers (Sauerberg, 2024) [View paper](#)
 - [42] Strategic Successive Refinement With Interdependent Decoders Cost Functions (Rony Bou Roupheal, 2022) [View paper](#)
- Online Learning Algorithms for Stackelberg Games
 - Regret Minimization and No-Regret Learning ★ (3 papers)
 - [0] Learning to Play Multi-Follower Bayesian Stackelberg Games (Anon et al., 2026) [View paper](#)
 - [37] Learning stackelberg equilibria in sequential price mechanisms (G Brero, 2021) [View paper](#)
 - [43] No-Regret Learning for Stackelberg Equilibrium Computation in Newsvendor Pricing Games (Liu, 2024) [View paper](#)
 - Reinforcement Learning for Stackelberg Games (3 papers)
 - [7] Multi-agent reinforcement learning in bayesian stackelberg markov games for adaptive moving target defense (Sengupta, 2020) [View paper](#)
 - [38] Stackelberg POMDP: A reinforcement learning approach for economic design (Brero, 2022) [View paper](#)
 - [40] A Markovian Stackelberg game approach for computing an optimal dynamic mechanism (Julio B. Clempner, 2021) [View paper](#)

- Hierarchical and Sequential Decision-Making (3 papers)
- [34] An evidential reasoning-based leader-follower game for hierarchical multi-agent decision making under uncertainty (Kasra Motlaghzadeh, 2020) [View paper](#)
- [45] A hierarchical learning approach to anti-jamming channel selection strategies (Fuqiang Yao, 2019) [View paper](#)
- [49] Advances In Attack-Defense Game Models For IIoT (Fengjun Zhang, 2025) [View paper](#)
- Multi-Agent Consensus and Formation Control
 - Adaptive Consensus with Uncertain Leader Dynamics (5 papers)
 - [2] Adaptive leader-following formation for high-order nonlinear multi-agent systems with an uncertain leader system over switching networks (Jialei Luo, 2024) [View paper](#)
 - [12] Adaptive consensus and parameter estimation of multiagent systems with an uncertain leader (Shimin Wang, 2020) [View paper](#)
 - [26] Learning-based distributed adaptive control of heterogeneous multi-agent systems with unknown leader dynamics (Di Mei, 2022) [View paper](#)
 - [27] Adaptive Output Synchronization for a Class of Uncertain Leader-Follower Multi-Agent Systems Over Switching Networks (Juan Liao, 2025) [View paper](#)
 - [36] Distributed Adaptive Tracking Control of Hidden Leader-Follower Multi-Agent Systems with Unknown Parameters (Jie Yang, 2024) [View paper](#)
 - Consensus with Known or Partially Known Dynamics (3 papers)
 - [1] Leader-Following Adaptive Tracking Control for A Class of Uncertain Discrete-Time Nonlinear Multi-Agent Systems Under Event-Triggered Communication (Yuchun Xu, 2025) [View paper](#)
 - [8] Adaptive leader-following consensus of nonlinear multi-agent systems using switching logic (Sungryul Lee, 2023) [View paper](#)
 - [21] Adaptive tracking control of the leader-following multi-agent system with uncertainties (Xinghong Zhang, 2023) [View paper](#)
 - Robust and Fault-Tolerant Consensus Control (6 papers)
 - [5] Leader-following adaptive guaranteed-performance consensus control for multi-agent systems with exogenous disturbance (Na Zhao, 2024) [View paper](#)
 - [24] Distributed adaptive fault-tolerant leader-following formation control of nonlinear uncertain second-order multi-agent systems (M. Khalili, 2018) [View paper](#)
 - [33] Adaptive safe resilient consensus protocol of leader-follower multi-agent systems subject to hybrid false data injection cyberattacks and directed network topology (Hossein Chehardoli, 2025) [View paper](#)
 - [44] Adaptive Robust Anti-disturbance Synchronization for Leader-follower Ships under Cyber-attacks (Qixin Wang, 2024) [View paper](#)
 - [46] Adaptive Leader-Follower Consensus Control of Multiple Flexible Manipulators With Actuator Failures and Parameter Uncertainties (Yu Liu, 2023) [View paper](#)
 - [47] Distributed fault-tolerant control of multiagent systems: An adaptive learning approach (M. Khalili, 2019) [View paper](#)
 - Formation Control and Obstacle Avoidance (2 papers)
 - [4] The robust adaptive control of leader-follower formation in mobile robots with dynamic obstacle avoidance (Amirreza Parvareh, 2023) [View paper](#)
 - [35] Adaptive Strategies for Dynamic Obstacle Avoidance and Formation Control in Multi-Agent Drone Systems: A Review (S Argiliana, 2025) [View paper](#)
- Learning and Adaptive Control for Nonlinear Multi-Agent Systems
 - Neural Network-Based Adaptive Control (5 papers)
 - [3] Composite distributed learning and synchronization of nonlinear multi-agent systems with complete uncertain dynamics (Emadodin Jandaghi, 2024) [View paper](#)
 - [16] Adaptive neural network leader-follower formation control for a class of second-order nonlinear multi-agent systems with unknown dynamics (Guoxing Wen, 2020) [View paper](#)
 - [22] Distributed adaptive neural network control for a class of uncertain heterogeneous multi-agent systems (Y Fan, 2022) [View paper](#)
 - [25] Fuzzy adaptive leader-following consensus control for nonlinear multi-agent systems with unknown control directions (Chang-E. Ren, 2019) [View paper](#)
 - [30] Neural-network-based fully distributed adaptive consensus for a class of uncertain multiagent systems (Dongdong Yue, 2020) [View paper](#)
 - Adaptive Control without Neural Networks (2 papers)
 - [19] Leader tracking control for heterogeneous uncertain nonlinear multi-agent systems via a distributed robust adaptive PID strategy (Dario Giuseppe Lui, 2022) [View paper](#)
 - [23] Adaptive Leader-Following Bipartite Consensus of Nonlinear Multi-Agent Systems with Matching Uncertainties (Pengjuan Yang, 2025) [View paper](#)
 - Uncertain Network Structures and Communication Constraints (1 papers)
 - [10] Adaptive leader-follower control for multi-robot teams with uncertain network structure (Esmaeil Seraj, 2021) [View paper](#)
- Optimal Control and Reinforcement Learning for Multi-Agent Systems
 - Reinforcement Learning for Multi-Agent Graphical Games (1 papers)
 - [9] Reinforcement Learning Solutions to Stochastic Multi-Agent Graphical Games With Multiplicative Noise (Hanfang Zhang, 2025) [View paper](#)
 - Optimal Leader-Follower Consensus (3 papers)
 - [29] Optimal leader-follower consensus for constrained-input multiagent systems with completely unknown dynamics (Jing Shi, 2020) [View paper](#)
 - [39] Optimal synchronization of heterogeneous nonlinear systems with unknown dynamics (H. Modares, 2017) [View paper](#)
 - [41] Optimal adaptive leader-follower consensus of linear multi-agent systems: Known and unknown dynamics (F. Tatari, 2015) [View paper](#)
 - Mean Field Games and Large-Scale Systems (2 papers)
 - [11] Distributed adaptive flocking control for large-scale multiagent systems (Shawon Dey, 2024) [View paper](#)
 - [28] Sampled-data based adaptive mean field games for leader-follower stochastic multi-agent systems (Yan Chen, 2024) [View paper](#)
- Applications of Leader-Follower and Stackelberg Models
 - Edge Computing and Service Optimization (1 papers)
 - [17] Optimal Service Caching and Pricing in Edge Computing: A Bayesian Gaussian Process Bandit Approach (Feridun Tuncel, 2024) [View paper](#)

- Multi-Agent Path Planning and Pursuit-Evasion (1 papers)
- [13] Multi-Agent Dynamic Leader-Follower Path Planning Applied to the Multi-Pursuer Multi-Evader Game (Mohammed El Habib Souidi, 2023) [View paper](#)
- Team Strategies and Online Adaptive Learning (1 papers)
- [31] Online adaptive learning for team strategies in multi-agent systems (Greg Hudas, 2012) [View paper](#)

Narrative

Core task: online learning in multi-follower Bayesian Stackelberg games. The field structure suggested by the taxonomy reveals a rich landscape organized around six main branches. At one end, foundational work on Stackelberg Game Frameworks and Equilibrium Computation establishes the theoretical underpinnings for computing equilibria and designing commitment strategies, often in settings with incomplete information or multiple followers. A second branch, Online Learning Algorithms for Stackelberg Games, focuses on adaptive and regret-minimization techniques that allow leaders to learn optimal strategies over time without full knowledge of follower types or responses. Meanwhile, three branches—Multi-Agent Consensus and Formation Control, Learning and Adaptive Control for Nonlinear Multi-Agent Systems, and Optimal Control and Reinforcement Learning for Multi-Agent Systems—address cooperative or semi-cooperative multi-agent coordination problems, ranging from consensus protocols and formation tracking to neural-network-based adaptive control under uncertainties. Finally, Applications of Leader-Follower and Stackelberg Models showcases domain-specific instantiations in areas such as cybersecurity, wireless communications, and resource allocation, illustrating how Stackelberg reasoning extends beyond classical game theory into practical engineering contexts.

Particularly active lines of work explore the tension between computational tractability and strategic richness in multi-follower settings, as well as the challenge of learning under incomplete or dynamically changing information. Within the Online Learning Algorithms branch, a small cluster of studies investigates regret minimization and no-regret learning, examining how leaders can sequentially refine their strategies when follower types are uncertain or adversarial. Multi-Follower Bayesian Stackelberg[0] sits squarely in this cluster, emphasizing online learning guarantees in the presence of multiple followers with private Bayesian types. Its focus on regret bounds and adaptive commitment contrasts with nearby works such as Sequential Price Mechanisms[37], which studies mechanism design with sequential pricing, and Newsvendor Pricing Games[43], which explores pricing dynamics in inventory settings. By targeting the multi-follower Bayesian case with formal learning-theoretic guarantees, Multi-Follower Bayesian Stackelberg[0] bridges equilibrium computation and online adaptation, offering a principled approach to a setting where both strategic complexity and informational uncertainty are high.

Related Works in Same Category

The following **2 sibling papers** share the same taxonomy leaf node with the original paper:

1. Learning stackelberg equilibria in sequential price mechanisms

Authors: G Brero, D Chakrabarti, A Eden | **Year/Venue:** 2021 | **URL:** [View paper](#)

Abstract

(Brero et al. 2008)) In a Bayesian Stackelberg equilibrium, there is a leader with a fixed type, and θ ; In this work, we assume the followers play a Bayesian coarse-correlated equilibrium (B-CCE θ).

Relationship Analysis

Both papers belong to the regret minimization and no-regret learning category for online Stackelberg games, focusing on achieving sublinear regret bounds. The original paper addresses online learning in multi-follower Bayesian Stackelberg games with unknown type distributions, designing algorithms for type and action feedback settings with regret bounds that scale sublinearly in the number of followers. The candidate paper focuses on learning Stackelberg equilibria in sequential price mechanisms with message passing, using no-regret dynamics for followers and actor-critic methods for the leader, but does not provide explicit regret bounds or address the multi-follower Bayesian setting with unknown type distributions that is central to the original paper.

2. No-Regret Learning for Stackelberg Equilibrium Computation in Newsvendor Pricing Games

Authors: Liu, Larkin, Rong, Yuming, Larkin Liu, et al. (6 authors total) | **Year/Venue:** 2024 | **URL:** [View paper](#)

Abstract

We introduce the application of online learning in a Stackelberg game pertaining to a system with two learning agents in a dyadic exchange network, consisting of a supplier and retailer, specifically where the parameters of the demand function are unknown. In this game, the supplier is the first-moving leader, and must determine the optimal wholesale price of the product. Subsequently, the retailer who is the follower, must determine both the optimal procurement amount and selling price of the p...

Relationship Analysis

Both papers belong to the regret minimization and no-regret learning category for online learning in Stackelberg games, sharing the goal of achieving sublinear regret bounds. The candidate paper focuses on a specific application domain (Newsvendor pricing games with supplier-retailer dynamics) and uses contextual linear bandits with action feedback, while the original paper addresses the more general multi-follower Bayesian Stackelberg game setting with both type and action feedback, achieving regret bounds that scale logarithmically rather than polynomially in the number of followers. The key difference is that the original paper provides a comprehensive theoretical framework for general multi-follower games with novel geometric insights (best-response regions), whereas the candidate paper applies established bandit techniques to a specialized economic setting with inventory constraints.

Contributions Analysis

Overall novelty summary. The paper contributes online learning algorithms for multi-follower Bayesian Stackelberg games, achieving sublinear regret bounds under both type feedback (observing follower types) and action feedback (observing only actions). It resides in the 'Regret Minimization and No-Regret Learning' leaf, which contains only three papers total, indicating a relatively sparse research direction within the broader Online Learning Algorithms for Stackelberg Games branch. This small cluster focuses specifically on formal regret analysis in Stackelberg settings, distinguishing it from reinforcement learning approaches or hierarchical decision-making frameworks that populate neighboring leaves.

The taxonomy reveals that the paper's immediate neighbors include reinforcement learning methods for Stackelberg games and hierarchical sequential decision-making frameworks, both of which address learning under uncertainty but without explicit regret-minimization guarantees. Nearby branches such as Bayesian Stackelberg Games with Incomplete Information focus on equilibrium computation rather than online adaptation, while Multi-Agent Consensus and Formation Control addresses cooperative coordination without game-theoretic strategic reasoning. The paper's position bridges equilibrium theory and adaptive learning, sitting at the intersection of incomplete-information game models and online algorithm design, a junction that appears underexplored given the sparse population of its leaf.

Among the 25 candidates examined across three contributions, none were found to clearly refute the paper's claims. Contribution A (type feedback algorithms) examined 10 candidates with zero refutable matches; Contribution B (action feedback algorithms) similarly examined 10 candidates with no refutations; Contribution C (geometric characterization of strategy space) examined 5 candidates, also

with no refutations. This suggests that within the limited search scope—focused on top semantic matches and citation expansion—the specific combination of multi-follower Bayesian settings, formal regret bounds, and both feedback models appears not to have direct prior instantiation, though the search scale is modest and does not constitute exhaustive coverage.

Based on the limited literature search of 25 candidates, the work appears to occupy a relatively novel position within its immediate research neighborhood, particularly in formalizing regret-minimization guarantees for multi-follower Bayesian Stackelberg games. However, the sparse population of the taxonomy leaf and the modest search scope mean that broader or more exhaustive searches could reveal additional related work. The analysis captures the paper's distinctiveness within the examined candidate set but does not claim comprehensive coverage of all potentially relevant prior art.

This paper presents **3 main contributions**, each analyzed against relevant prior work:

Contribution 1: Online learning algorithms for multi-follower Bayesian Stackelberg games with type feedback

Description: The authors develop learning algorithms for the leader in multi-follower Bayesian Stackelberg games when follower types are observable after each round. These algorithms achieve regret bounds that do not grow polynomially with the number of followers n , using techniques based on estimating type distributions and leveraging geometric properties of best-response regions.

This contribution was assessed against **10 related papers** from the literature. Papers with potential prior art are analyzed in detail with textual evidence; others receive brief assessments.

1. Learning stackelberg equilibria and applications to economic design games

URL: [View paper](#)

Brief Assessment

Economic Design Games[68] focuses on learning Stackelberg equilibria through reinforcement learning with followers modeled via no-regret dynamics converging to Bayesian coarse-correlated equilibrium. The original paper addresses online learning with regret minimization for multi-follower Bayesian Stackelberg games with explicit type or action feedback, achieving regret bounds that scale sublinearly with the number of followers.

2. Responding to Promises: No-regret learning against followers with memory

URL: [View paper](#)

Brief Assessment

Promises Memory Followers[58] focuses on followers with memory who respond based on aggregated past leader commitments using quantal response models, not on learning type distributions in Bayesian settings with type feedback.

3. No-regret learning in dynamic stackelberg games

URL: [View paper](#)

Brief Assessment

No-Regret Dynamic Stackelberg[53] focuses on dynamic Stackelberg games with state spaces and Markovian transitions, not multi-follower Bayesian settings with type distributions.

4. No-Regret Learning for Stackelberg Equilibrium Computation in Newsvendor Pricing Games

URL: [View paper](#)

Brief Assessment

Newsvendor Pricing Games[43] focuses on a dyadic exchange network (supplier-retailer) with demand learning in a newsvendor setting, not multi-follower Bayesian Stackelberg games with type feedback and regret bounds independent of follower count.

5. Learning stackelberg equilibria in sequential price mechanisms

URL: [View paper](#)

Brief Assessment

Sequential Price Mechanisms[37] focuses on mechanism design for item allocation using sequential pricing with message passing, not general online learning in Bayesian Stackelberg games with type feedback and regret bounds.

6. Regret minimization algorithms for the follower's behavior identification in leadership games

URL: [View paper](#)

Brief Assessment

Regret Minimization Leadership[69] focuses on single-follower leadership games with unknown behavioral profiles (not type distributions), whereas the original paper addresses multi-follower Bayesian Stackelberg games with unknown type distributions and achieves regret bounds that don't grow polynomially with n .

7. Strategizing against no-regret learners in first-price auctions

URL: [View paper](#)

Brief Assessment

First-Price Auctions[66] focuses on first-price auctions with mean-based learners, not general multi-follower Bayesian Stackelberg games with type feedback. The technical approaches differ fundamentally.

8. Online Bayesian Recommendation with No Regret

URL: [View paper](#)

Brief Assessment

Bayesian Recommendation No Regret[70] focuses on online recommendation mechanisms where a platform interacts with myopic users about product states, not on multi-follower Bayesian Stackelberg games with type feedback and regret bounds that avoid polynomial growth in the number of followers.

9. Commitment without regrets: Online learning in stackelberg security games

URL: [View paper](#)

Brief Assessment

Commitment Without Regrets[67] addresses Stackelberg security games with adversarially chosen attacker sequences, whereas the original paper studies Bayesian settings with stochastically sampled follower types from an unknown distribution. The feedback models and problem formulations differ fundamentally.

10. Stackelberg POMDP: A reinforcement learning approach for economic design

URL: [View paper](#)

Brief Assessment

Stackelberg POMDP[38] focuses on reinforcement learning for economic design in multi-round Stackelberg games with followers modeled as policy-interactive learners (e.g., no-regret algorithms). The original paper addresses online learning with type/action feedback and regret bounds that scale sub-polynomially in the number of followers. These are distinct technical problems with different solution approaches.

Contribution 2: Online learning algorithm for multi-follower Bayesian Stackelberg games with action feedback

Description: The authors propose learning algorithms for the action-feedback setting where only follower actions (not types) are observed. They combine Upper Confidence Bound principles with best-response region partitioning to achieve regret bounds that improve upon naive approaches when the number of leader actions L is small relative to n .

This contribution was assessed against **10 related papers** from the literature. Papers with potential prior art are analyzed in detail with textual evidence; others receive brief assessments.

1. Stackelberg Game Preference Optimization for Data-Efficient Alignment of Language Models

URL: [View paper](#)

Brief Assessment

Stackelberg Preference Optimization[56] focuses on language model alignment through preference optimization, not on online learning in multi-follower Bayesian Stackelberg games with action feedback and regret bounds.

2. Autonomous Network Defense in Cloud Data Center Environments Based on Reinforcement Learning

URL: [View paper](#)

Brief Assessment

Cloud Network Defense[60] focuses on autonomous network defense in cloud data centers using reinforcement learning in a leader-follower game framework, not on online learning algorithms for Bayesian Stackelberg games with multiple followers and action feedback.

3. Responding to Promises: No-regret learning against followers with memory

URL: [View paper](#)

Brief Assessment

Promises Memory Followers[58] addresses followers with memory using reputation-based quantal responses, whereas the original contribution focuses on action-feedback learning with UCB principles and best-response region partitioning in Bayesian games without follower memory.

4. Online Learning in Stackelberg Games with an Omniscient Follower

URL: [View paper](#)

Brief Assessment

Omniscient Follower Learning[57] studies a different problem setting: a single omniscient follower who always best-responds in a cooperative game, whereas the original paper addresses multiple followers with unknown private types in a Bayesian setting. The feedback mechanisms and problem structures are fundamentally different.

5. No-regret learning in dynamic stackelberg games

URL: [View paper](#)

Brief Assessment

No-Regret Dynamic Stackelberg[53] addresses dynamic games with unknown follower utility functions in state-dependent settings, not the multi-follower Bayesian action-feedback problem studied in the original paper.

6. Actions speak what you want: Provably sample-efficient reinforcement learning of the quantal stackelberg equilibrium from strategic feedbacks

URL: [View paper](#)

Brief Assessment

Quantal Stackelberg Equilibrium[54] studies a different problem structure where the follower adopts a quantal (entropy-regularized) response rather than deterministic best response, and focuses on single-follower settings with bounded rationality assumptions, not the multi-follower Bayesian setting with type distributions.

7. Online Follower's Behaviour Identification in Leadership Games

URL: [View paper](#)

Brief Assessment

Follower Behaviour Identification[59] focuses on identifying follower behavioral profiles (rational vs. bounded rational types) in security games, not on learning type distributions with regret bounds in multi-follower Bayesian Stackelberg games.

8. Can reinforcement learning find Stackelberg-Nash equilibria in general-sum Markov games with myopically rational followers?

URL: [View paper](#)

Brief Assessment

Stackelberg-Nash Myopic Followers[52] focuses on general-sum Markov games with myopically rational followers in sequential decision-making settings, not on Bayesian Stackelberg games with type distributions and action feedback as studied in the original paper.

9. No-Regret Learning in Stackelberg Games with an Application to Electric Ride-Hailing

URL: [View paper](#)

Brief Assessment

Electric Ride-Hailing[51] focuses on a different problem setting: single-leader multi-follower Stackelberg games where the leader learns optimal incentives without knowledge of follower utilities, using bandit feedback. The original paper addresses Bayesian Stackelberg games with type distributions and action feedback, which is a distinct formulation.

10. Distributed adaptive inverse differential game approach to leader's behavior learning for multiple autonomous followers

URL: [View paper](#)

Brief Assessment

Inverse Differential Game[55] addresses leader behavior learning in continuous-time differential games with deterministic dynamics, not discrete-round Bayesian Stackelberg games with stochastic follower types and action-only feedback.

Contribution 3: Geometric characterization of leader strategy space via best-response regions

Description: The authors introduce a geometric framework that partitions the leader's strategy space into best-response regions where follower behavior is consistent. They prove that the number of such regions is polynomial (not exponential) in the number of followers, enabling efficient enumeration and optimization within each region.

This contribution was assessed against **5 related papers** from the literature. Papers with potential prior art are analyzed in detail with textual evidence; others receive brief assessments.

1. Evaluation of a pure-strategy Stackelberg game for wildlife security in a geospatial framework

URL: [View paper](#)

Brief Assessment

Wildlife Security Geospatial[61] focuses on pure-strategy Stackelberg games for wildlife security with geographical constraints, not on geometric characterization of mixed-strategy spaces or polynomial enumeration of best-response regions.

2. Stackelberg and Nash Equilibrium Computation in Non-Convex Leader-Follower Network Aggregative Games

URL: [View paper](#)

Brief Assessment

Network Aggregative Games[65] focuses on non-convex network aggregative games with canonical transformations and does not discuss partitioning the leader's strategy space into best-response regions or proving polynomial bounds on such regions.

3. Stackelberg games, optimal pricing and application to electricity markets

URL: [View paper](#)

Brief Assessment

Stackelberg Electricity Markets[62] focuses on electricity pricing applications and does not present a geometric framework for partitioning leader strategy space into best-response regions or prove polynomial bounds on the number of such regions.

4. Riemannian Manifold Learning for Stackelberg Games with Neural Flow Representations

URL: [View paper](#)

Brief Assessment

Riemannian Manifold Stackelberg[64] focuses on mapping joint action spaces to spherical Riemannian manifolds using neural flows for online learning, not on partitioning leader strategy space into best-response regions or proving polynomial bounds on region counts.

5. Antenna allocation and pricing in virtualized massive MIMO networks via Stackelberg game

URL: [View paper](#)

Brief Assessment

Antenna Allocation Pricing[63] focuses on antenna pricing in virtualized MIMO systems using Stackelberg games, not on geometric characterization of leader strategy spaces or best-response regions. The candidate addresses a specific resource allocation problem rather than developing general geometric frameworks for Stackelberg games.

Appendix: Text Similarity Detection

No high-similarity text segments were detected across any compared papers.

References

- [0] Learning to Play Multi-Follower Bayesian Stackelberg Games [View paper](#)
- [1] Leader-Following Adaptive Tracking Control for A Class of Uncertain Discrete-Time Nonlinear Multi-Agent Systems Under Event-Triggered Communication [View paper](#)
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