Novelty Assessment Report

Paper: Adaptive Social Learning via Mode Policy Optimization for Language Agents

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Abstract

Effective social intelligence simulation requires language agents to dynamically adjust reasoning depth, a capability notably absent in current studies. Existing methods either lack explicit reasoning or employ lengthy Chain-of-Thought reasoning uniformly across all scenarios, resulting in excessive token usage and inflexible social behaviors in tasks such as negotiation or collaboration. To address this, we propose an $\textbf{A}$daptive $\textbf{S}$ocial $\textbf{L}$earning ($\textbf{ASL}$) framework in this paper, aiming to improve the adaptive reasoning ability of language agents in dynamic social interactions. To this end, we first identify the hierarchical reasoning modes under such context, ranging from intuitive response to deep deliberation based on the cognitive control theory. We then develop the $\textbf{A}$daptive $\textbf{M}$ode $\textbf{P}$olicy $\textbf{O}$ptimization ($\textbf{AMPO}$) algorithm to learn the context-aware mode adaptation and reasoning. Our framework advances existing research in three key aspects: (1) Multi-granular reasoning mode design, (2) Context-aware mode switching in rich social interaction, and (3) Token-efficient reasoning with depth adaptation. Extensive experiments on the benchmark social intelligence environment verify that ASL achieves 15.6\% higher task performance than GPT-4o. Notably, our AMPO outperforms GRPO by 7.0\% with 32.8\% shorter thinking chains, demonstrating the advantages of our AMPO and the learned adaptive reasoning ability over GRPO's solution.

Core Task Landscape

This paper addresses: **Adaptive Reasoning in Dynamic Social Interactions**

A total of **50 papers** were analyzed and organized into a taxonomy with **18 categories**.

Taxonomy Overview

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

- **Computational Agent Frameworks for Social Interaction**
- **Human Cognitive and Social Processes**
- **Neuroscience and Biological Mechanisms**
- **Theoretical and Methodological Frameworks**
- **Applied and Domain-Specific Interaction Studies**
- **Animal and Comparative Studies**

Complete Taxonomy Tree

- Adaptive Reasoning in Dynamic Social Interactions Survey Taxonomy
- Computational Agent Frameworks for Social Interaction
  - Language Agent Adaptive Reasoning Systems ★ (2 papers)
  - [0] Adaptive Social Learning via Mode Policy Optimization for Language Agents (Anon et al., 2026) View paper
  - [1] Adaptive Thinking via Mode Policy Optimization for Social Language Agents (Wang Min-zheng, 2025) View paper
  - Multi-Agent Trajectory and Interaction Prediction (1 papers)
  - [6] Evolvegraph: Multi-agent trajectory prediction with dynamic relational reasoning (Jiachen Li, 2020) View paper
  - Mobile and Embodied Agent Frameworks (2 papers)
  - [3] Adaptive Mobile Agent for Dynamic Interactions (Yanda Li, 2025) View paper
  - [15] VIVA+: Human-Centered Situational Decision-Making (Hu Zhe, 2025) View paper
  - Computational Models of Social Dynamics and Norms (4 papers)
  - [12] Minding norms: Mechanisms and dynamics of social order in agent societies (R Conte, 2014) View paper
  - [26] Adaptive behaviour during epidemics: a social risk appraisal approach to modelling dynamics. (David O'Gara, 2025) View paper
  - [42] Modelling and analysis of the dynamics of adaptive temporal⬚causal network models for evolving social interactions (Jan Treur, 2017) View paper
  - [43] A Bayesian Dynamical System Model of Joint Action and Interpersonal Coordination (A. J. Lee, 2025) View paper
- Human Cognitive and Social Processes
  - Cognitive Flexibility in Social and Educational Contexts (9 papers)
  - [2] The mediating role of emotion regulation and cognitive flexibility in the relationship between cooperative learning and social skills of students: a cross-sectional study (Wenwen Ma, 2025) View paper
  - [7] â⁣ college students' Regulatory Focus shape their behavioral outcome towards institutes of higher education? The role of Cognitive Flexibility and Social Perceptiveness (S Singh, 2025) View paper
  - [10] Cognitive flexibility and social adjustment in daily life among children: The role of perceived social support (Dan Chen, 2024) View paper
  - [13] Physical exercise and aggressive behaviour among rural children: Cognitive flexibility mediation and peer relationship quality moderation (Kequn Chu, 2024) View paper
  - [24] The role of cognitive flexibility and cognitive emotion regulation in predicting social anxiety in university students (F Shabani, 2025) View paper

- ◦ [25] Predict cognitive flexibility through social adjustment and responsibility among female students (Farahani, 2021) View paper
- ◦ [32] â¦ of mindfulness to stress and anxiety among Chinese elementary school students: mediations of cognitive flexibility, self-awareness, and social environment (X Wen, 2021) View paper
- ◦ [34] The relationship between peer victimization and social anxiety among adolescents: A moderated mediation model with cognitive flexibility and affect intensity (Xiaoyan Liu, 2022) View paper
- ◦ [40] The Role of Cognitive Flexibility in the Association between Anxiety and Social Competence in Early Adolescence (Jessica S. Dalley, 2021) View paper
- ◦ Clinical and Therapeutic Applications of Cognitive Flexibility (7 papers)
- ◦ [5] Effects of cognitive flexibility, prosocial and problem behaviours, parenting style and social support on social adaptation among children with leukaemia: A Structural â¦ (W Mengjia, 2025) View paper
- ◦ [8] Mental flexibility and epistemic trust through implicit social learningâ A meta-model of change processes in psychotherapy with personality disorders (Svenja Taubner, 2024) View paper
- ◦ [16] An active inference approach to interpersonal differences in depression (L. Kirchner, 2024) View paper
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- ◦ [27] Therapist interpersonal responsiveness: Being interpersonally flexible in response to client collaboration. (Mira An, 2025) View paper
- ◦ [29] The depressed brain: An evolutionary systems theory (Paul B. Badcock, 2017) View paper
- ◦ [50] Adjusting to disfigurement: processes involved in dealing with being visibly different (A. Thompson, 2001) View paper
- ◦ Social Cognition and Self-Categorization Theories (5 papers)
- ◦ [4] Social cognition in the we-mode (Mattia Gallotti, 2013) View paper
- ◦ [9] Self and collective: Cognition and social context (John C. Turner, 1994) View paper
- ◦ [19] Cognitive adaptation to the experience of social and cultural diversity. (Richard J. Crisp, 2011) View paper
- ◦ [20] Flexible correction processes in social judgment: Correcting for context-induced contrast (R. Petty, 1993) View paper
- ◦ [35] Reasoning about self and others: A dynamic process (C. Geveke, 2024) View paper
- ◦ Developmental and Interpersonal Reasoning Processes (2 papers)
- ◦ [17] Children Infer Intentions by Assessing Epistemic Attitudes in Interpersonal Interactions (Nina Ni Ye, 2025) View paper
- ◦ [31] Understanding adolescence as a period of socialâ affective engagement and goal flexibility (E. Crone, 2012) View paper
- ◦ Cognitive Flexibility and Emotional Complexity in Leadership (2 papers)
- ◦ [21] Feeling mixed, ambivalent, and in flux: The social functions of emotional complexity for leaders (Naomi B. Rothman, 2017) View paper
- ◦ [46] Cognitive flexibility matters: The role of multilevel positive affect and cognitive flexibility in shaping victims' cooperative and uncooperative behavioral responses to â¦ (M Williams, 2020) View paper
- ◦ Cognitive Flexibility Training and Environmental Enrichment (3 papers)
- ◦ [11] Cognitive flexibility training for impact in real-world settings (Liz Yuanxi Lee, 2024) View paper
- ◦ [22] Creativity and change of context: The influence of object-context (in) congruency on cognitive flexibility (Mare van Hooijdonk, 2022) View paper
- ◦ [45] Does experience enhance cognitive flexibility? An overview of the evidence provided by the environmental enrichment studies (Francesca Gelfo, 2019) View paper
- ◦ Cognitive Flexibility in Occupational and Organizational Contexts (1 papers)
- ◦ [47] Cognitive flexibility and the work context: Integrative literature review (Júlia T. Martins, 2022) View paper
- • Neuroscience and Biological Mechanisms (2 papers)
  - ◦ [14] Hippocampus Guides Adaptive Learning during Dynamic Social Interactions. (Oriel FeldmanHall, 2021) View paper
  - ◦ [39] Prefrontal cortex and social cognition in mouse and man (Lucy K. Bicks, 2015) View paper
- • Theoretical and Methodological Frameworks
  - ◦ Active Inference and Bayesian Frameworks (2 papers)
  - ◦ [28] Adaptive Consciousness Theory (Rachmad, 2017) View paper
  - ◦ [33] Trust as extended control: Human-machine interactions as active inference (Félix Schoeller, 2021) View paper
  - ◦ Network and Graph-Based Inference Models (1 papers)
  - ◦ [30] Flexible inference in heterogeneous and attributed multilayer networks (Martina Contisciani, 2024) View paper
  - ◦ Game-Theoretic and Evolutionary Models (2 papers)
  - ◦ [48] A study on the social contract conditional reasoning of male substance abusers during detoxification. (Xiaoqing Zeng, 2025) View paper
  - ◦ [49] Evolutionary hypergame dynamics: Introspection reasoning and social learning (Zhang Fei-peng, 2025) View paper
  - ◦ Complex Adaptive Systems Theory (1 papers)
  - ◦ [36] Complex adaptive systems in the behavioral and social sciences (Roy J. Eidelson, 1997) View paper
- • Applied and Domain-Specific Interaction Studies (2 papers)
  - ◦ [23] Integrating Intrinsic Reasoning and Negotiation Mechanisms in Driver-Driver Social Interactions* (Juhui Gim, 2024) View paper
  - ◦ [38] Hybrid Graph Reasoning With Dynamic Interaction for Visual Dialog (Shanshan Du, 2024) View paper
- • Animal and Comparative Studies (3 papers)
  - ◦ [37] Bilinguals' social flexibility (Marieâ France Champouxâ Larsson, 2018) View paper
  - ◦ [41] Socioecology drives adaptive social foraging dynamics in the wild (Alexander Schakowski, 2025) View paper
  - ◦ [44] Predictably harsh environment is associated with reduced cognitive flexibility in wild food-caching mountain chickadees (Rebecca Croston, 2017) View paper

Narrative

Core task: adaptive reasoning in dynamic social interactions. This field examines how agents—whether computational, human, or animal—adjust their cognitive strategies and behaviors in response to evolving social contexts. The taxonomy reveals six major branches that together capture the breadth of this challenge. Computational Agent Frameworks for Social Interaction focus on building artificial systems capable of flexible reasoning and learning in multi-agent environments, often leveraging language models and reinforcement learning architectures such as Adaptive Mobile Agent[3] and Adaptive Thinking Mode[1]. Human Cognitive and Social Processes explore psychological mechanisms underlying flexibility, including cognitive flexibility training interventions (Cognitive Flexibility Training[11], Cognitive Flexibility Support[10]) and the interplay between emotion regulation, mental flexibility, and social competence (Emotion Regulation Mediation[2], Cognitive Flexibility Anxiety[24]). Neuroscience and Biological Mechanisms investigate neural substrates and

developmental factors, such as hippocampal contributions to social learning (Hippocampus Social Learning[14]) and the impact of early stress on adaptive capacities (Early Stress Impairment[18]). Theoretical and Methodological Frameworks provide formal models, including Bayesian approaches to joint action (Bayesian Joint Action[43]) and complex adaptive systems theory (Complex Adaptive Systems[36]). Applied and Domain-Specific Interaction Studies address real-world settings like therapeutic responsiveness (Therapist Interpersonal Responsiveness[27]) and driver interactions (Driver Social Interactions[23]), while Animal and Comparative Studies examine adaptive foraging and environmental enrichment effects (Adaptive Social Foraging[41], Environmental Enrichment Flexibility[45]).

Several active lines of work highlight key trade-offs and open questions. One prominent theme contrasts top-down cognitive training interventions aimed at enhancing flexibility with bottom-up investigations of how environmental and affective factors shape adaptive capacities, raising questions about the relative malleability of these processes across development and contexts. Another tension emerges between formal computational models that seek to capture reasoning dynamics in tractable frameworks and empirical studies documenting the messy, context-dependent nature of real social interactions. Adaptive Social Learning[0] sits squarely within the Computational Agent Frameworks branch, specifically among Language Agent Adaptive Reasoning Systems. Its emphasis on learning-driven adaptation in social contexts aligns closely with Adaptive Thinking Mode[1], which similarly explores how agents modulate reasoning strategies. Compared to more domain-specific applied work or neuroscience-focused studies, Adaptive Social Learning[0] prioritizes the design of general-purpose computational architectures that can flexibly adjust to diverse social scenarios, positioning it as a bridge between theoretical models of adaptive reasoning and practical agent deployment.

Related Works in Same Category

The following **1 sibling papers** share the same taxonomy leaf node with the original paper:

1. Adaptive Thinking via Mode Policy Optimization for Social Language Agents

Authors: Wang Min-zheng, Li, Yongbin, Minzheng Wang, Wang Haobo, et al. (21 authors total) | **Year/Venue**: 2025 | **URL**: View paper

Abstract

Effective social intelligence simulation requires language agents to dynamically adjust reasoning depth, a capability notably absent in current studies. Existing methods either lack this kind of reasoning capability or enforce Long Chain-of-Thought reasoning uniformly across all scenarios, resulting in excessive token usage and inflexible social simulation. To address this, we propose an $\textbf{A}$daptive $\textbf{M}$ode $\textbf{L}$earning ($\textbf{AML}$) framework in this paper, aiming to i...

⚠ Similarity Notice

These papers appear to be the same work or very closely related variants. Both propose an 'Adaptive Social/Mode Learning' framework with 'Adaptive Mode Policy Optimization (AMPO)' for language agents in social interactions, featuring identical hierarchical reasoning modes (from intuitive response to deep deliberation), the same experimental results (15.6% improvement over GPT-4o, 7.0% over GRPO with 32.8% shorter chains), and nearly identical technical approaches including behavioral cloning and RL-based mode enhancement. The only notable differences are minor variations in terminology ('Social Learning' vs 'Mode Learning', 'ASL' vs 'AML') and presentation style, suggesting these are likely different submission versions of the same research.

Contributions Analysis

Overall novelty summary. The paper proposes an Adaptive Social Learning (ASL) framework enabling language agents to dynamically adjust reasoning depth in social interactions, from intuitive responses to deep deliberation. It resides in the Language Agent Adaptive Reasoning Systems leaf, which contains only two papers total. This sparse population suggests the specific combination of language-model-based agents with adaptive reasoning depth in social tasks represents an emerging rather than crowded research direction within the broader computational agent frameworks branch.

The taxonomy reveals that neighboring leaves address trajectory prediction, embodied agents, and computational models of social norms, but none explicitly tackle adaptive reasoning depth in language-based social agents. The broader Computational Agent Frameworks branch contrasts sharply with the Human Cognitive and Social Processes branch, which contains nine papers on cognitive flexibility in educational contexts alone. This structural asymmetry indicates that while human adaptive reasoning is well-studied, computational implementations for language agents remain relatively underexplored, particularly those integrating hierarchical reasoning modes with context-aware switching.

Among twenty-six candidates examined, the ASL framework contribution shows one refutable candidate from ten examined, while the AMPO algorithm and hierarchical reasoning modes show zero refutations from six and ten candidates respectively. The limited search scope means these statistics reflect top-K semantic matches rather than exhaustive coverage. The AMPO algorithm and reasoning mode design appear more novel within this bounded search, whereas the broader ASL framework concept encounters at least one overlapping prior work among the examined candidates.

Based on the top-twenty-six semantic matches and taxonomy structure, the work addresses a sparsely populated research direction with limited direct prior work. The analysis does not cover the full literature landscape, particularly domain-specific applications or recent preprints outside the search scope. The hierarchical reasoning modes and token-efficient adaptation appear to offer substantive contributions, though the framework-level novelty is tempered by at least one identified overlap.

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

Contribution 1: Adaptive Social Learning (ASL) framework for language agents

Description: The authors introduce ASL, a novel framework that enables language agents to dynamically adjust their reasoning depth in social interactions. It combines hierarchical reasoning modes inspired by cognitive control theory with reinforcement learning to achieve context-aware adaptive reasoning in dynamic social environments.

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. A Reflective Architecture for LLM-Based Systems

URL: View paper

Brief Assessment

Reflective Architecture LLM[73] focuses on formal expectation modeling and self-simulation for alignment with social norms, not on adaptive reasoning depth or hierarchical cognitive modes for dynamic social interactions.

2. Inadequacies of large language model benchmarks in the era of generative artificial intelligence

URL: View paper

Brief Assessment

LLM Benchmark Inadequacies[67] focuses on evaluating benchmarks for large language models across diverse tasks (e.g., reasoning, coding, medical QA), not on adaptive reasoning frameworks for social contexts. The candidate does not address social intelligence or dynamic social interactions.

3. Adaptive Thinking via Mode Policy Optimization for Social Language Agents

URL: View paper

Prior Art Analysis

Adaptive Thinking Mode[1] demonstrates that a highly similar framework was proposed prior to the ORIGINAL paper. Both papers introduce frameworks that enable language agents to dynamically adjust reasoning depth in social interactions through hierarchical modes inspired by cognitive control theory, combined with reinforcement learning for context-aware adaptive reasoning. The candidate paper presents an 'Adaptive Mode Learning (AML)' framework with nearly identical conceptual components: hierarchical thinking modes (intuitive response to deep deliberation), behavioral cloning for mode injection, and the Adaptive Mode Policy Optimization (AMPO) algorithm for context-aware mode switching. The structural and methodological parallels, along with substantial textual similarities in problem formulation and framework description, indicate that the ORIGINAL paper's novelty claim is challenged by this prior work.

Evidence

Evidence 1 - **Rationale**: Both abstracts describe nearly identical frameworks with the same core components: hierarchical modes from intuitive to deep deliberation based on cognitive control theory, and an AMPO algorithm for context-aware adaptation. The only differences are 'reasoning modes' vs 'thinking modes' and 'adaptive reasoning' vs 'adaptive thinking', which are semantically equivalent. This demonstrates that Adaptive Thinking Mode[1] proposed the same conceptual framework. - **Original**: we propose anadaptivesociallearning (asl) framework in this paper, aiming to improve the adaptive reasoning ability of language agents in dynamic social interactions. to this end, we first identify the hierarchical reasoning modes under such context, ranging from intuitive response to deep deliberat... - **Candidate**: we propose an adaptive mode learning (aml) framework in this paper, aiming to improve the adaptive thinking ability of language agents in dynamic social interactions. to this end, we first identify hierarchical thinking modes ranging from intuitive response to deep deliberation based on the cognitiv...

Evidence 2 - **Rationale**: The three key contributions are virtually identical between the papers, with only minor wording variations ('reasoning mode' vs 'thinking mode', 'in rich social interaction' vs 'across social interaction'). This parallel structure of claimed contributions indicates that Adaptive Thinking Mode[1] made the same novelty claims prior to the ORIGINAL paper. - **Original**: our framework advances existing research in three key aspects: (1) multi-granular reasoning mode design, (2) context-aware mode switching in rich social interaction, and (3) token-efficient reasoning with depth adaptation. - **Candidate**: our framework advances existing research in three key aspects: (1) multi-granular thinking mode design, (2) context-aware mode switching across social interaction, and (3) token-efficient reasoning via depthadaptive processing.

Evidence 3 - **Rationale**: Both papers describe the same three-stage framework structure: (1) designing hierarchical modes inspired by cognitive control theory, (2) using behavioral cloning for mode learning, and (3) applying RL-based optimization for adaptive mode selection. The methodological pipeline is identical, demonstrating that Adaptive Thinking Mode[1] established this framework architecture first. - **Original**: to empower social language agents with adaptive reasoning in dynamic contexts, we introduce the asl framework as shown in figure 1. first, inspired by hierarchical cognitive control theory, we design specialized reasoning modes that structure the social agent's cognitive processes (§2.2). next, we e... - **Candidate**: we propose the adaptive mode learning framework (aml) to empower social agents with the capability for adaptive thinking, enabling them to effectively respond in accordance with the dynamics of social interaction context. specifically, we first develop four thinking modes inspired by hierarchical co...

Evidence 4 - **Rationale**: Both papers describe the AMPO algorithm with the same dual-level advantage estimation mechanism (mode-level and sample-level) for context-aware mode switching. The technical approach to the optimization algorithm is identical, indicating that Adaptive Thinking Mode[1] introduced this algorithmic innovation prior to the ORIGINAL paper. - **Original**: we develop ampo algorithm, which integrates mode-level and samplelevel advantage estimation for dynamic mode switching, and improves flexible inference and token efficiency. - **Candidate**: we contrapuntally develop the adaptive mode policy optimization (ampo) algorithm, which incorporates the mode-level and sample-level information into advantage estimation to strengthen the context-aware thinking mode switching.

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4. Darg: Dynamic evaluation of large language models via adaptive reasoning graph

URL: View paper

Brief Assessment

Darg[70] focuses on dynamic benchmark evaluation through reasoning graph perturbation for testing LLMs across mathematical, social, spatial, and symbolic reasoning tasks. It does not address adaptive reasoning frameworks for language agents in interactive social contexts or hierarchical reasoning mode switching during agent-to-agent dialogue.

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5. SCOOP: A Framework for Proactive Collaboration and Social Continual Learning through Natural Language Interaction andCausal Reasoning

URL: View paper

Brief Assessment

SCOOP[72] focuses on causal reasoning and question-asking in multimodal environments with oracles, not adaptive reasoning depth in social interactions. The frameworks address fundamentally different problems.

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6. Agentic large language models, a survey

URL: View paper

Brief Assessment

Agentic LLM Survey[68] provides a broad survey of agentic LLMs covering reasoning, acting, and interacting capabilities. While it discusses adaptive reasoning and multi-agent systems, it does not present a specific framework combining hierarchical reasoning modes with reinforcement learning for social contexts as described in the ASL contribution.

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7. AdamMeme: Adaptively Probe the Reasoning Capacity of Multimodal Large Language Models on Harmfulness

URL: View paper

Brief Assessment

AdamMeme[74] focuses on evaluating multimodal meme harmfulness understanding through adaptive probing, not on adaptive reasoning frameworks for language agents in social interactions. The domains and objectives are fundamentally different.

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8. K-Level Reasoning: Establishing Higher Order Beliefs in Large Language Models for Strategic Reasoning

URL: View paper

Brief Assessment

K-Level Reasoning[69] focuses on game-theoretic strategic reasoning through recursive opponent modeling in competitive settings, not on adaptive reasoning depth selection for social interaction contexts as ASL does.

9. Social-llava: Enhancing robot navigation through human-language reasoning in social spaces
URL: View paper

Brief Assessment

Social-LLaVA[71] focuses on vision-language models for robot navigation in physical spaces, not adaptive reasoning frameworks for language agents in social interactions.

10. Put Your Money Where Your Mouth Is: Evaluating Strategic Planning and Execution of LLM Agents in an Auction Arena
URL: View paper

Brief Assessment

Auction Arena Evaluation[75] focuses on strategic planning and execution in auction environments, not on adaptive reasoning frameworks for social interactions. The candidate evaluates LLM agents in competitive bidding scenarios with resource management, while the original contribution addresses dynamic reasoning depth adjustment in social contexts like negotiation and collaboration.

Contribution 2: Adaptive Mode Policy Optimization (AMPO) algorithm
Description: The authors develop AMPO, a reinforcement learning algorithm that incorporates both mode-level and sample-level information into advantage estimation. This enables context-aware reasoning mode switching while improving token efficiency and flexible inference in social interactions.

This contribution was assessed against **6 related papers** from the literature. Papers with potential prior art are analyzed in detail with textual evidence; others receive brief assessments.

1. A dual reinforcement learning framework for unsupervised text style transfer
URL: View paper

Brief Assessment

Dual Reinforcement Learning[61] focuses on unsupervised text style transfer using dual RL for source-to-target and target-to-source mappings, not on mode-level and sample-level advantage estimation for adaptive reasoning in social interactions.

2. Effective Reinforcement Learning for Reasoning in Language Models
URL: View paper

Brief Assessment

Effective Reasoning RL[62] focuses on general RL algorithm design for mathematical reasoning tasks, not on mode-level advantage estimation for social interaction contexts. The candidate's contributions center on computational efficiency and gradient update strategies rather than hierarchical reasoning mode switching.

3. Soft policy optimization using dual-track advantage estimator
URL: View paper

Brief Assessment

Soft Policy Optimization[63] focuses on entropy-based exploration-exploitation balance in continuous control tasks, not on mode-level reasoning or social intelligence contexts that AMPO addresses.

4. Value-Anchored Group Policy Optimization for Flow Models
URL: View paper

Brief Assessment

Value-Anchored Group Policy[66] focuses on flow-based image generation models with temporal credit assignment across denoising steps, not multi-modal reasoning for language agents in social contexts.

5. REPAINT: Knowledge Transfer in Deep Actor-Critic Reinforcement Learning
Brief Assessment

REPAINT[65] focuses on transfer learning between tasks using representation and instance transfer in actor-critic RL, not on mode-level advantage estimation or adaptive reasoning mode switching within social interactions.

6. SOAP-RL: Sequential Option Advantage Propagation for Reinforcement Learning in POMDP Environments
URL: View paper

Brief Assessment

SOAP-RL[64] focuses on option discovery in POMDPs using sequential advantage propagation, not on mode-level and sample-level advantage estimation for reasoning mode switching in social interactions.

Contribution 3: Hierarchical reasoning modes for social intelligence
Description: The authors design a hierarchy of reasoning modes based on cognitive control theory, ranging from intuitive responses to deep deliberation. These modes enable multi-granular reasoning and context-aware mode switching in social interactions, addressing the limitation of uniform reasoning approaches.

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. Cognition is All You Need--The Next Layer of AI Above Large Language Models
URL: View paper

Brief Assessment

Cognition Next Layer[57] focuses on cognitive AI architecture above LLMs for knowledge work, not specifically on hierarchical reasoning modes for social intelligence in language agents. The candidate discusses meta-cognition and cognitive layers but does not address social interaction contexts or mode-switching strategies comparable to the original paper's contribution.

2. Navigating the affordance landscape: feedback control as a process model of behavior and cognition
URL: View paper

Brief Assessment

Affordance Landscape Navigation[53] focuses on hierarchical cognitive control theory applied to sensorimotor behavior and affordance competition in ecological contexts, not on reasoning modes for social intelligence in language agents. The candidate addresses feedback control systems for physical action selection, while the original paper designs reasoning modes specifically for social interaction tasks.

3. Multi-level compositional reasoning for interactive instruction following
URL: View paper

Brief Assessment

Compositional Instruction Following[52] addresses hierarchical task decomposition for robotic instruction following in physical environments, not social intelligence or dynamic social interactions. The candidate focuses on navigation and object manipulation tasks, while the original paper targets adaptive reasoning modes for social agent interactions.

4. Multi-Level Online Learning and Reasoning for Self-Integrating Systems
URL: View paper

Brief Assessment

Multi-Level Online Learning[59] focuses on multi-level conceptual abstraction for self-adaptive systems in technical domains (e.g., smart homes), not hierarchical cognitive control modes for social agent reasoning. The candidate addresses runtime model extension and knowledge abstraction, while the original paper designs reasoning modes based on cognitive control theory specifically for social interactions between language agents.

5. Hierarchical Reasoning Model
URL: View paper

Brief Assessment

Hierarchical Reasoning Model[54] focuses on computational depth through hierarchical recurrent modules for algorithmic reasoning tasks (e.g., Sudoku, maze navigation), not on social intelligence or context-aware mode switching in social interactions.

6. Multi-level simulation of the physical, cognitive and social
URL: View paper

Brief Assessment

Multi-Level Simulation[58] focuses on multi-level simulation of physical, cognitive, and social aspects in agent systems, not on hierarchical cognitive control theory for reasoning mode design in social interactions.

7. Generalized dynamic cognitive hierarchy models for strategic driving behavior
URL: View paper

Brief Assessment

Dynamic Cognitive Hierarchy[55] focuses on strategic driving behavior using cognitive hierarchy theory for autonomous vehicles, not general social intelligence tasks or language agents. The domains and applications are fundamentally different.

8. Simultaneous learning and planning in a hierarchical control system for a cognitive agent
URL: View paper

Brief Assessment

Hierarchical Learning Planning[51] addresses hierarchical control for behavior planning and decision-making in dynamic environments for autonomous agents (e.g., unmanned vehicles), not hierarchical reasoning modes for social intelligence in language agents. The domains and applications are fundamentally different.

9. Conceptual framework for autonomous cognitive entities
URL: View paper

Brief Assessment

Autonomous Cognitive Entities[60] focuses on a general cognitive architecture for autonomous agents across diverse domains (virtual characters, home robots), not specifically on social intelligence tasks. The hierarchical structure in ACE is based on abstraction levels (aspirational to task prosecution) rather than reasoning modes for social interaction contexts.

10. A Dynamic Selective Parameter Sharing Mechanism Embedded with Multi-Level Reasoning Abstractions
URL: View paper

Brief Assessment

Dynamic Parameter Sharing[56] focuses on multi-agent reinforcement learning with parameter sharing mechanisms and multi-level reasoning abstractions for agent differentiation, not on hierarchical cognitive control theory for social intelligence reasoning modes.

Appendix: Text Similarity Detection

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

References

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