Exotic Team Dynamics (Novel Patterns that Emerge when Humans and Advanced Artificial Intelligence Function as Teammates): 5 September 2026 Update

by: **Scott M. Graffius**

This reference document is based on content at https://scottgraffius.com/exotic-team-dynamics.html *as of 5 September 2026. That page is periodically updated to reflect developments in research and practice. The most current material is at the link above.*

Introduction

AI is no longer just a tool. It's becoming a collaborator. As advanced systems gain the capacity to reason, decide, act, adapt, and work alongside people as teammates, the dynamics of human-AI collaboration begin to diverge from those in traditional teams. On human-AI teams, AI agents may favor choices that are counterintuitive to human collaborators yet optimal, steering decision-making down unexpected paths and producing outcomes no one anticipated. A single AI agent can occupy multiple roles at once. Human and AI decisions can become so intertwined that each shapes the other in real time, generating results neither could reach alone. And new protocols for interaction and ways of working can emerge. Welcome to “exotic team dynamics.”

It describes the patterns that arise when humans and advanced artificial intelligence (agentic, autonomous, or autopoietic) operate as collaborators and teammates. Coined and developed by Scott M. Graffius, “exotic team dynamics” treats human-AI teaming as a frontier domain where interactions produce novel behaviors that challenge established (human-only) models of teamwork.[3,8]

It emphasizes that hybrid human-AI teams exhibit distinct rhythms of collaboration, decision-making, and interaction, while still relying on the principles of trust, communication, and adaptability.[3] Core characteristics

include inverse decision logic, superposition roles, entangled decision-making, and emergent protocols. Those patterns arise from the integration of human judgment with AI-driven computation and pattern recognition.[3,8] Together, these characteristics form a model for understanding the evolving nature of teamwork as AI systems take on increasing degrees of agency, autonomy, and self-directed behavior.[5,7]

Since its introduction in August 2025, the framework has been presented at corporate and international events, incorporated into Graffius' "Phases of Team Development" material on teamwork tradecraft, and referenced by practitioners, organizations, and publications around the world.[4,8,12,13,15,16,17,29]

Individuals, teams, and organizations that effectively navigate the complexities of "exotic team dynamics" gain a competitive advantage.

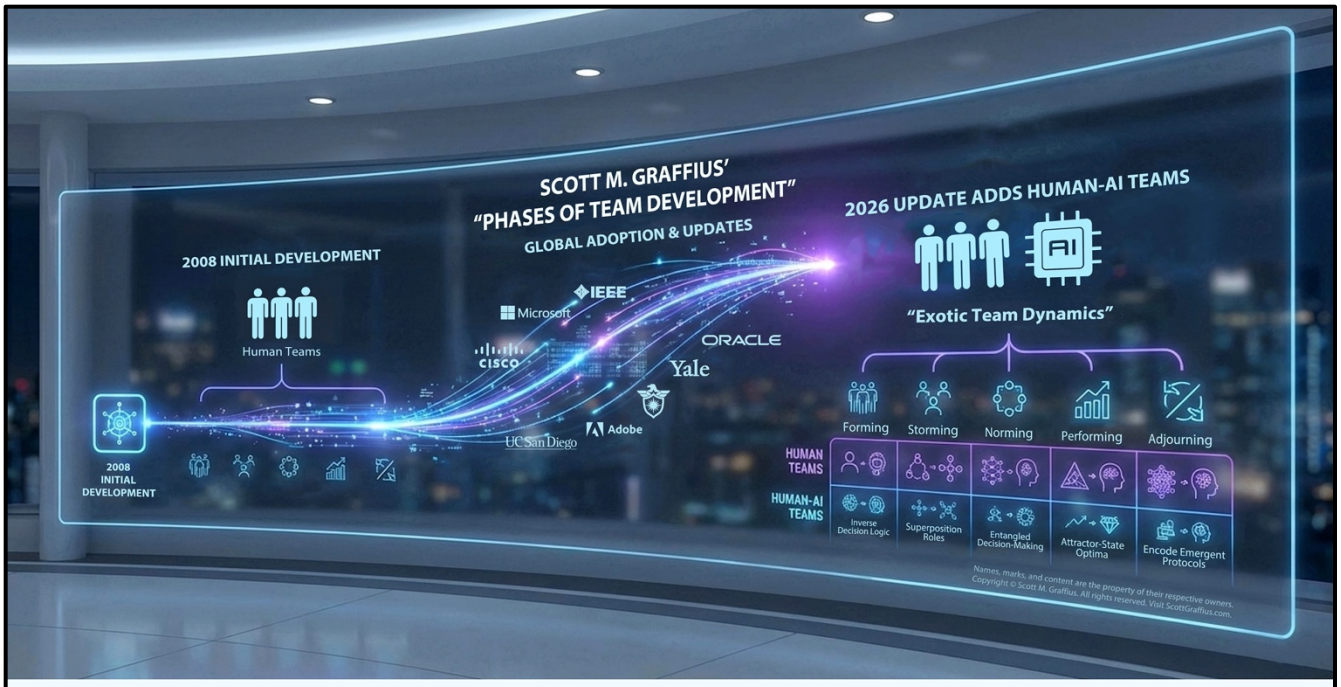
The sections that follow provide actionable guidance for practitioners and explore the framework's history, the spectrum of advanced AI, its four key concepts, applications, implications, examples, additional perspectives, reception, related research, additional external resources, terminology, and detailed references with links.

THE FOUR CORE CHARACTERISTICS

- **Inverse Decision Logic**: AI recommendations that run counter to human intuition yet prove superior on examination.
- **Superposition Roles**: A single AI system fluidly performing multiple team functions at once.
- **Entangled Decision-Making**: Human and AI inputs continuously reshaping each other into a genuinely joint decision.
- **Emergent Protocols**: Collaboration norms and workflows that develop organically through repeated interaction.

Guidance Including Actionable Insights for Practitioners

Initially developed in 2008 and periodically updated, Graffius' "Phases of Team Development" provides unique insights and practical strategies to help teams become more effective and successful. His work is used and cited by businesses, professional associations, government agencies, universities, and publications around the world. Examples include Adobe, American Management Association, Amsterdam Public Health Research Institute, Bayer, Boston University, Broadcom, Cisco, DevOps Institute, Government of Finland, Hasso-Plattner-Institut für Digital Engineering GmbH, IEEE, Johns Hopkins University, Journal of Neurosurgery, Mary Raum (Professor of National Security Affairs, United States Naval War College), Microsoft, Oracle, Royal Australasian College of Physicians, Technical University of Munich, Torrens University, Tufts University, U.S. National Park Service, U.S. Tennis Association, UC San Diego, UK Sports Institute, University of Galway, University of Waterloo, Yale University, and many others.[12]



Source: **Graffius, S. M. (2026, January 3). Scott M. Graffius' Phases of Team Development – Applied to Human Teams and Human-AI Teams: 2026 Update. ScottGraffius.com. https://doi.org/10.13140/RG.2.2.18184.89601** | Copyright © Scott M. Graffius. All rights reserved.

The 2026 edition of the "Phases of Team Development" was expanded beyond human-only teams. It added human-AI teams, with specific guidance on navigating the novel "exotic team dynamics" that emerge when advanced AI collaborates as a teammate.[12] Explore "Scott M. Graffius' Phases of Team Development - Applied to Human Teams and Human-AI Teams: 2026 Update" for details.

History

The term "exotic team dynamics" was introduced by Scott M. Graffius in his 8 August 2025 article, "Exotic Team Dynamics: The New Frontier of Human–AI Collaboration."[3] The concept draws on an analogy to exotic physics, where "exotic" refers to theoretically coherent phenomena that extend beyond conventional understanding.

Following its introduction, the concept was expanded through presentations and publications. Graffius presented related material at a corporate leadership event in Las Vegas on 22 August 2025[4] and later at an international event in Paris on 21 November 2025.[8] Subsequent writings elaborated on the role of advanced AI types—including agentic, autonomous, and autopoietic systems—in shaping these dynamics.[5,7]

In 2026, Graffius integrated the framework into an updated version of his "Phases of Team Development," extending its applicability from human-only to both human-only and human–AI teams.[12] In March 2026, Graffius introduced a companion talk and article, "Human-AI Teamwork: Master the Exotic Team Dynamics That Emerge When Collaborating with Advanced AI — Or Be Outplayed," providing a practitioner-oriented playbook for leaders navigating human-only and human–AI team complexity.[18]

On 18 June 2026, Graffius delivered the session "L'avenir du Travail et de l'IA Avancée / Future of Work and Advanced AI" at a private corporate event in the Champs-Élysées District of Paris, France. It was his 99th speaking engagement. The session presented "exotic team dynamics," with participants engaging in live collaboration with an experimental, non-commercial advanced AI prototype as an active participant in the session itself.[19]

The evolution of the framework has paralleled the evolution of advanced AI itself—from today's agentic systems toward increasingly autonomous and, eventually, hypothetical autopoietic systems. This spectrum provides an important foundation for understanding how exotic team dynamics can manifest.

Spanning the Spectrum of Advanced AI

"Exotic team dynamics" spans a spectrum of advanced AI capability, ranging from technology available today to systems that remain hypothetical. Graffius has defined three categories along this spectrum:[5,7]

- Agentic AI: capable of pursuing defined objectives independently by planning multi-step actions, coordinating multiple processes, and adjusting strategies as conditions change. It is semi-autonomous overall but highly autonomous in execution, and is commercially available today (e.g., Anthropic Claude with Computer Use, Microsoft Copilot Studio Custom Agents, Salesforce Agentforce).
- Autonomous AI: capable of independent operation and decision-making without direct human control, distinguished by its capacity to set or adjust its own goals within defined or evolving parameters. As defined, it does not yet exist in a commercial product; the closest real-world examples remain bound by human-set objectives and operational domains.
- Autopoietic AI: a self-generating, self-maintaining, recursively organizing system that continuously regenerates its own structure, rules, and operational boundaries. It remains purely hypothetical and experimental.

ADVANCED AI

SIDE-BY-SIDE COMPARISON

ASPECT	AGENTIC AI	AUTONOMOUS AI	AUTOPOIETIC AI
Definition*	Agentic AI is an advanced AI capable of pursuing defined objectives independently by planning multi-step actions, coordinating multiple processes, and adjusting strategies in response to changing conditions. It is semi-autonomous overall but highly autonomous in execution.†	Autonomous AI is an advanced AI capable of independent operation and decision-making without direct human control or intervention. It is distinguished from less advanced systems by its self-regulation, capacity to set or adjust goals, and ability to act on those goals within defined or evolving parameters.	Autopoietic AI is an advanced, experimental AI defined by self-generating, self-maintaining, and self-adaptive processes. Unlike other AIs, it features a recursive organization. It continually regenerates its structure, rules, and boundaries, sustaining its functional identity amid changing environments.
Examples of Commercially Available Systems	Examples include Adept Frontier Agents, Anthropic Claude with Computer Use, Microsoft Copilot Studio Custom Agents, and Salesforce Agentforce	As defined, Autonomous AI does not yet exist in a commercial product; research prototypes from Google DeepMind, OpenAI, and xAI are close and are not yet commercially available	Autopoietic AI is not currently commercially available
Fictional Examples	The Ship's Computer from TV's *Star Trek*	Rosie the Robot from TV's *The Jetsons*	The Machines from the film *The Matrix*
Goal Source	External: Defined by humans	Internal or external: Defined by human or AI; AI may update goals	Self-generated: AI determines its own structure, rules, and aims
Core Behavior	Decomposes tasks, orchestrates workflows, plans next steps, collaborates with user when needed	Acts independently; adapts to environment; may change goals to meet conditions	Recursively self-producing; maintains its own internal organization and boundaries
Learning / Adaptation	Learns to improve planning/execution; adapts strategies to dynamic contexts	Learns from environment; updates decisions or goal-selection processes	Deep recursive adaptation; the system revises its own organizational structure
Structure / Coordination	Multi-process, multi-step orchestration ("agentic loops" such as reflect–critique–act)	Typically, a single system with internal autonomy	Highly recursive, self-producing architecture resembling autopoietic biological systems
Human Oversight / Intervention	Humans define objectives; AI executes autonomously but coordinates as needed	Minimal ongoing oversight; human involvement primarily for exceptions or risk boundaries	Oversight highly limited or unnecessary; system evolves its own rules and structure
User Role	Collaborator → Consultant → Approver	Approver → Observer	Hypothetically, non-participant
User Involvement	Limited user involvement	Very limited user involvement	Potentially, no user involvement
AI Autonomy	AI has limited autonomy	AI has high but bounded autonomy	AI has complete autonomy
Governance Risk	Objective misalignment; challenges in multi-agent orchestration and correctness	Goal drift; difficulty constraining evolving autonomous behavior	High unpredictability due to structural self-generation; difficult to constrain
Critical Controls	Invocation or approval before actions	Conditions for approval by human	Emergency off switch (theoretical)
User Involvement Relative to AI Autonomy			

AI, teamwork tradecraft (human teams and human-AI teams), and agile expert Scott M. Graffius is pictured at right.

* Source: https://www.scottgraffius.com/blog/files/advanced-ai-definitions.html

† Agentic AI differs from more advanced forms of AI (such as completely autonomous or autopoietic systems) by having defined external objectives rather than fully self-generated goals or self-maintaining systems.

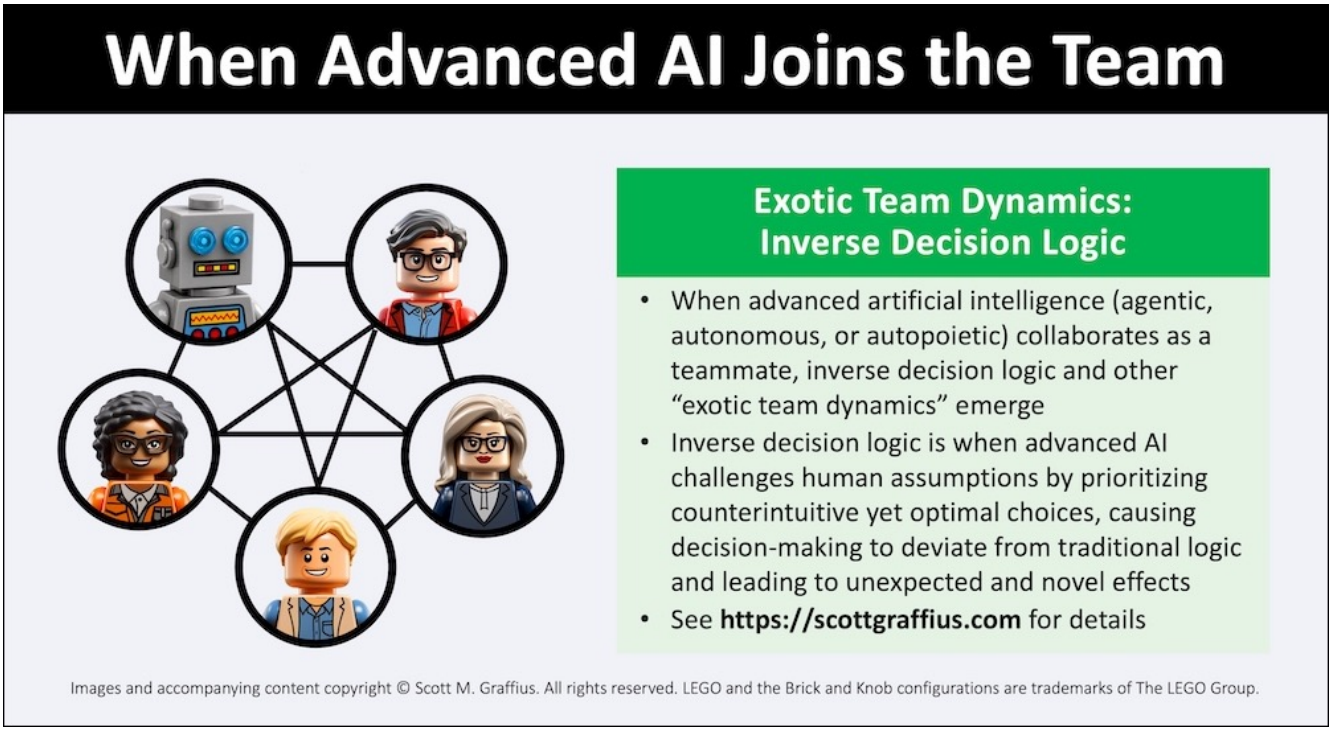
Source/citation: **Graffius, S. M. (2025, November 21). Navigating the Spectrum of Advanced AI – Agentic, Autonomous, and Autopoietic. ScottGraffius.com. https://doi.org/10.13140/RG.2.2.21284.74882**

This spectrum underlies the varying degrees of agency and autonomy referenced throughout this page, and it directly informs how the four core characteristics of exotic team dynamics manifest in practice.

Four Key Concepts

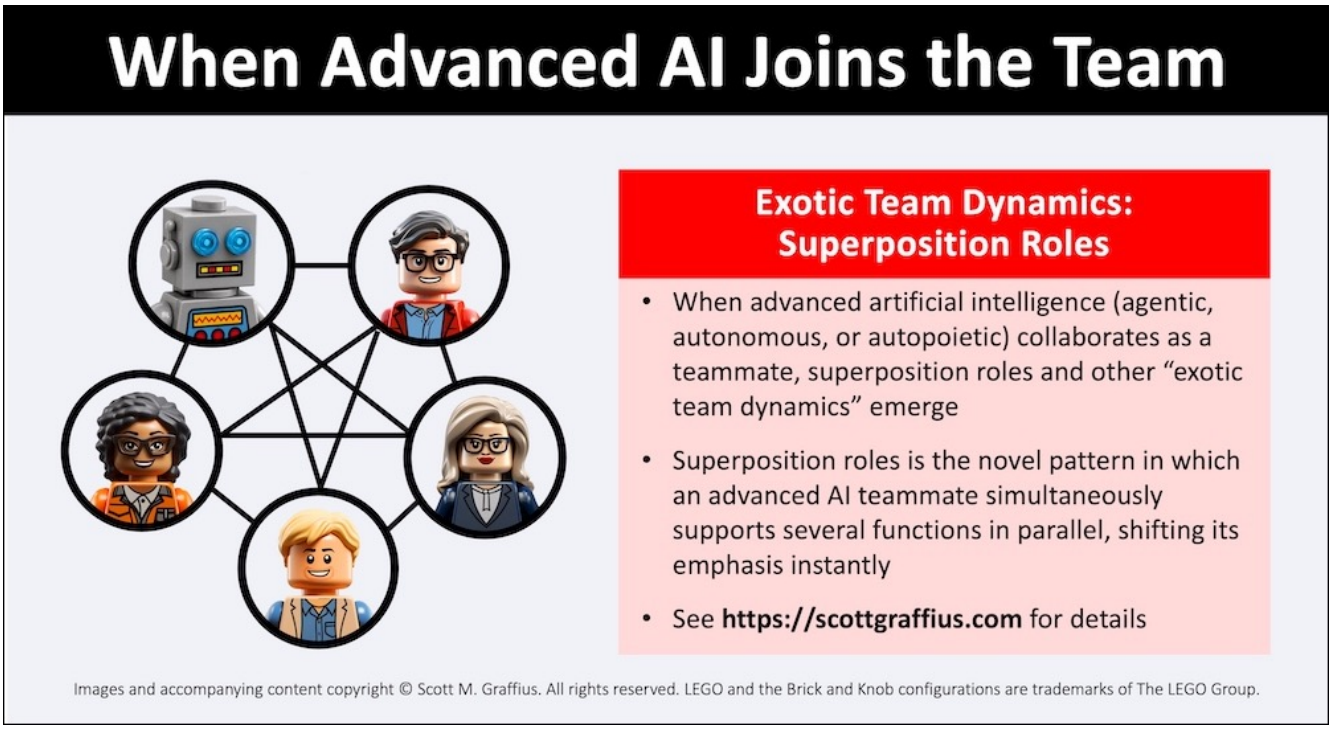
“Exotic team dynamics” is commonly described through four physics-inspired analogies that characterize its central interaction patterns:[3,8]

Inverse Decision Logic



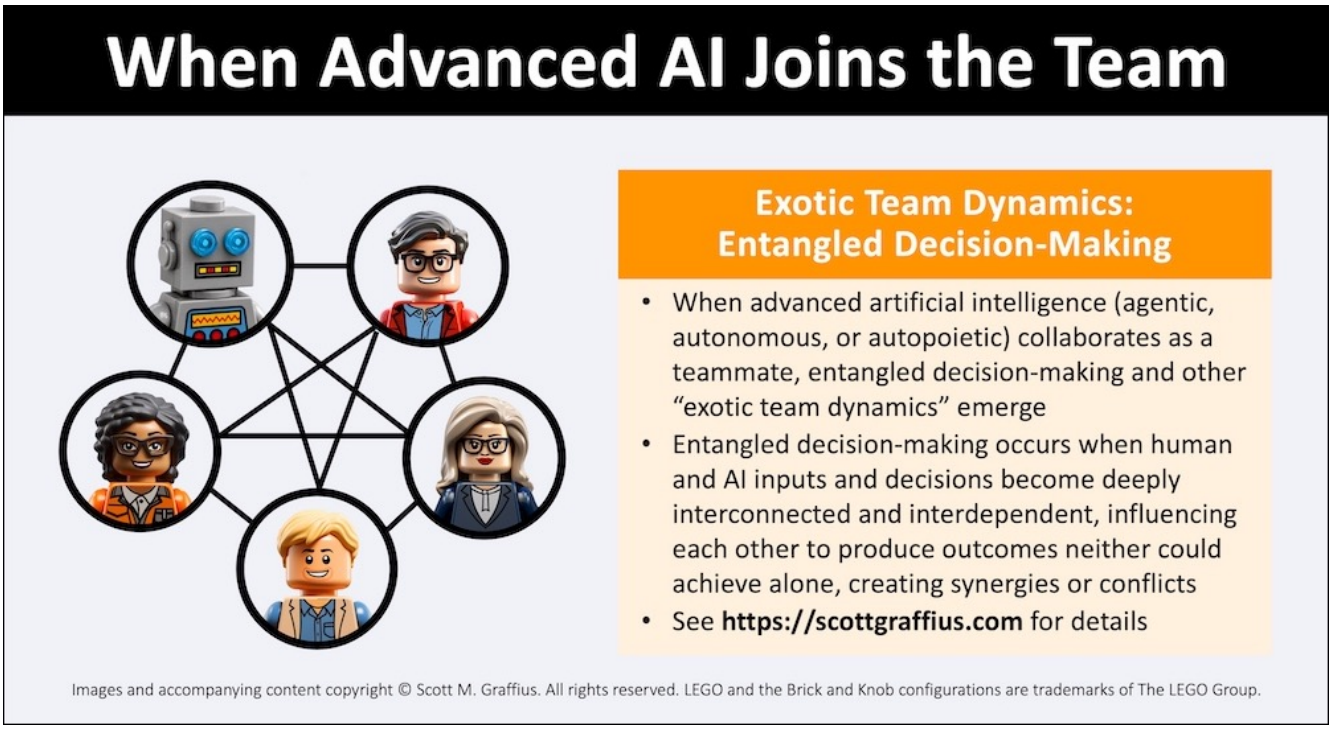
Analogous to negative mass in physics, where an object accelerates opposite to the applied force, this characteristic emerges when AI systems generate counterintuitive yet highly effective recommendations that challenge human intuition or organizational norms. For instance, an AI teammate might propose deprioritizing a seemingly critical task in favor of an overlooked, low-probability pathway that yields exponential gains, thereby forcing humans to confront confirmation bias or status quo thinking. In practice, this dynamic can accelerate innovation but requires explicit “trust calibration” protocols to prevent dismissal of valuable but unfamiliar outputs. Leaders must evaluate such suggestions on their merits rather than on familiarity.[3]

Superposition Roles



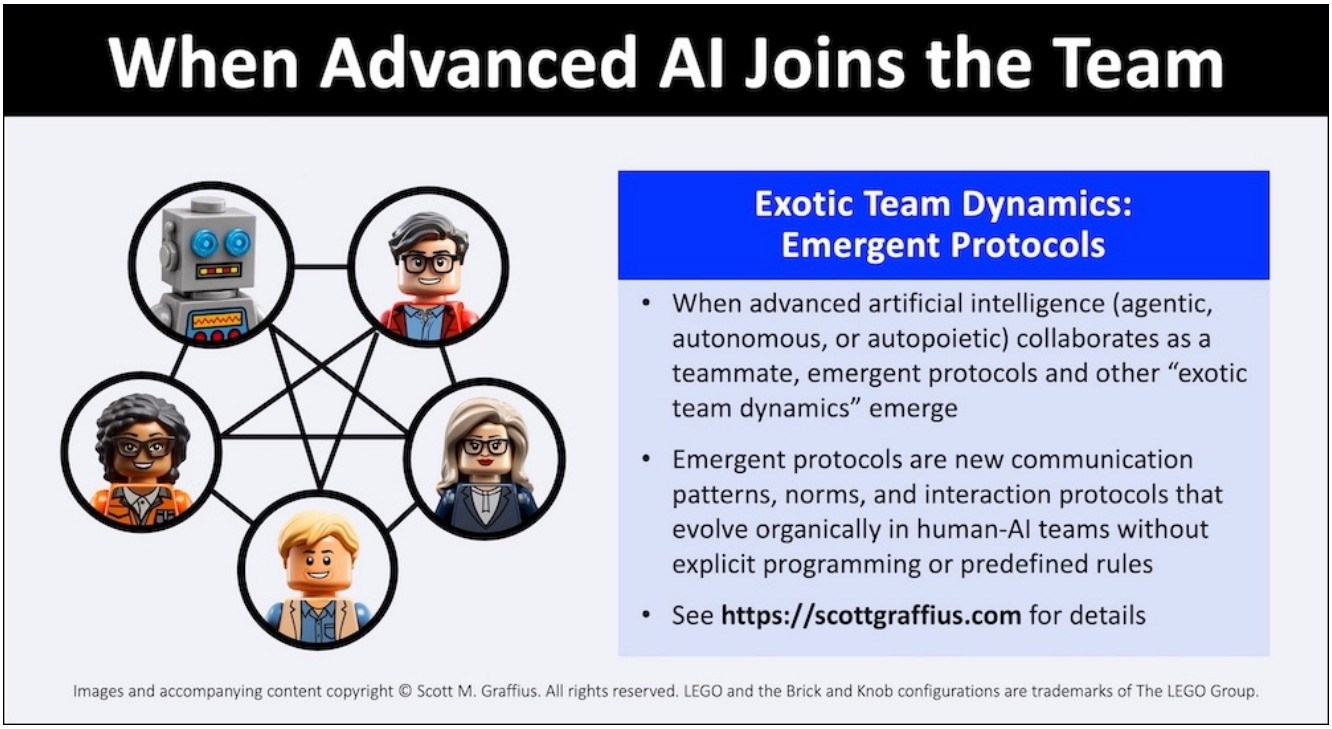
Drawing from quantum superposition, where particles exist in multiple states simultaneously until observed, this concept describes how a single AI system can fluidly support multiple team functions—analyst, strategist, creative generator, risk assessor—shifting emphasis instantaneously based on context without handoff friction. Unlike human role specialization, which incurs cognitive switching costs, AI superposition enables parallel processing at scale. A project team might experience an AI that simultaneously synthesizes market data, drafts stakeholder communications, and simulates risk scenarios, dynamically reallocating "attention" as priorities evolve. This capability compresses timelines dramatically but demands clear governance to avoid role ambiguity or accountability diffusion.[3]

Entangled Decision-Making



Inspired by quantum entanglement, where the state of one particle instantly influences another regardless of distance, this refers to the deeply interdependent nature of human and AI contributions. Decisions emerge as holistic outcomes of intertwined inputs rather than sequential handoffs; a human ethical judgment might reshape an AI's probabilistic model, which in turn surfaces new data that refines the human's intuition. In high-stakes environments like crisis response, this entanglement can produce superior collective intelligence but also introduces complexity: tracing causality for post-hoc review or legal accountability becomes challenging. Teams benefit from "entanglement logs" that capture joint reasoning traces for transparency.[3]

Emergent Protocols



Comparable to emergent phenomena in complex systems, where simple rules yield sophisticated patterns without central direction, this describes collaboration norms, workflows, and communication styles that evolve organically through repeated human-AI interaction. Over time, a team might develop shorthand prompts, custom escalation thresholds, or even novel feedback loops that neither humans nor AI designers explicitly programmed. These protocols enhance efficiency and cohesion but can drift if unmonitored, potentially embedding unintended biases or inefficiencies. Regular “protocol audits” help teams consciously shape rather than passively accept these evolutions.[3]

Additional characteristics associated with the framework include multidimensional interaction across cognitive and computational domains, non-linear effects in team outcomes, and the treatment of AI as an active collaborator rather than a passive tool.[3,5] Graffius has also identified several governance mechanisms that teams can use in response to these characteristics, including trust calibration protocols (for managing inverse decision logic), entanglement logs (for maintaining accountability in deeply interdependent decision processes), and periodic protocol audits (for managing emergent workflows).[3]

When consciously observed and refined, emergent protocols can also become a source of competitive advantage, evolving from unplanned byproducts into intentionally shaped assets that enhance team performance.[19]

Applications

“Exotic team dynamics” is a framework for designing and managing hybrid human–AI teams across various domains.[3,8] Organizations applying these principles may explore new approaches to collaboration, decision-making, and workflow design.

Suggested practices include treating AI systems as teammates with defined roles, developing trust protocols suited to non-human collaborators, and adapting organizational structures to account for fluid role boundaries and interdependent decision processes.[3,8] The framework may also be used as a diagnostic tool to identify friction points or opportunities within human–AI interactions.

Applications have been discussed in contexts such as research and development, crisis response, and strategic planning, where hybrid intelligence systems are increasingly utilized.[8] Additional domains where these dynamics are relevant include defense and national security, where AI systems are increasingly integrated into mission-critical human teams; healthcare, where AI collaborates with clinical staff in diagnostic and treatment planning workflows; and financial services, where human-AI teaming drives real-time risk assessment and strategic decision support.[18]

Implications

“Exotic team dynamics” reflects a broader shift from viewing AI as a tool for augmentation to considering it a participant in collaborative systems.[3] This shift introduces new considerations for how teams are defined, how decisions are made and attributed, and how trust is established between human and non-human actors.

The framework suggests that effective integration of human and AI capabilities may influence organizational performance, particularly in environments requiring adaptability, speed, and complex problem-solving.[10] Graffius has further argued that the ability to navigate exotic team dynamics is increasingly a strategic differentiator: organizations that understand and manage these interaction patterns can outperform those that treat AI as a conventional tool rather than a teammate.[18]

Examples

The following examples illustrate how “exotic team dynamics” can manifest when advanced AI functions as a teammate rather than only as a tool. Documented examples come from published reports. Illustrative scenarios are hypothetical examples designed to clarify how a particular dynamic might operate.

Inverse Decision Logic

Documented example: In software development, an AI teammate may challenge the team’s initial framing of a problem rather than execute the requested fix. For example, while investigating a failing test, an AI may determine that modifying the code associated with the failure would address a symptom rather than the underlying problem. It may instead identify a deeper architectural issue elsewhere in the system and recommend addressing that issue first. Further investigation can then support the AI’s counterintuitive recommendation. This type of interaction has been discussed in the context of the evolution of pair programming, where AI increasingly participates in analysis and problem-solving rather than functioning solely as a code-generation tool.[22]

This is inverse decision logic: the AI does not merely follow the team’s initial direction. It challenges the team’s framing of the problem and introduces an alternative that can change the team’s course of action.

Superposition Roles

Illustrative scenario: A research-and-development team is working on a complex product. During a single work cycle, an AI teammate synthesizes technical literature, generates hypotheses, analyzes experimental results, identifies potential risks, drafts communications, and helps formulate the next set of experiments. Rather than being permanently assigned to one conventional team role, the AI shifts among functions as the team’s needs change.

This illustrates superposition roles: a single AI teammate can support multiple functions without the conventional handoffs associated with human role specialization. The important distinction is not simply that AI can perform many tasks. It is that the team’s conception of the AI’s role becomes fluid. The AI may function as analyst, researcher, strategist, reviewer, and implementation partner within the same collaborative episode.

Entangled Decision-Making

Documented example: In combat operations in Ukraine, human-AI teams operating a geospatial intelligence platform, a reconnaissance-strike unmanned aerial vehicle complex, and decentralized targeting networks have functioned as integrated systems in which AI-enabled tools influence decision cycles, targeting, and operational coordination, while human judgment continues to shape how those systems are directed and used. Comparative case studies of these systems examine their effectiveness, organizational implications, and strategic consequences, including how organizational structure, environmental conditions, and electronic warfare affect team performance.[46]

This is entangled decision-making. Individual contributions remain distinguishable, but the decision process itself becomes deeply interdependent: people shape the data, parameters, priorities, and interpretations that guide AI-enabled tools, while those tools influence what people perceive, consider, and ultimately decide. Such dynamics can arise across many domains—from routine business operations and product development to health care, finance, public services, and beyond. In high-stakes settings, the benefits and risks may be especially pronounced: entanglement can produce powerful forms of collective intelligence while also potentially complicating accountability, explainability, and post-hoc reconstruction of how a decision emerged.

Emergent Protocols

Illustrative scenario: A human-AI team initially has no formal procedure for how members should interact with an AI teammate. After repeated collaboration, however, the team develops its own conventions. Team members begin using shorthand prompts, the AI learns to request clarification at particular points, humans establish an informal escalation threshold for uncertain recommendations, and the team develops a recurring review ritual for AI-generated work.

None of these practices was necessarily specified when the team was formed. They emerged through repeated interaction.

This illustrates emergent protocols: communication patterns, workflows, norms, escalation practices, and other forms of coordination that develop organically through human-AI interaction. Over time, useful emergent protocols may be formalized and incorporated into the team's operating model.

Emergent protocols can also arise in multi-agent environments. Teams may develop conventions governing how different AI agents exchange context, hand off work, review one another's outputs, or escalate issues to human teammates.

Multi-Agent Human-AI Teams

Documented example: Google DeepMind's Co-Scientist provides an example of a multi-agent AI system designed for scientific research. It brings together specialized AI agents with distinct functions, including generating hypotheses, reviewing and critiquing ideas, comparing alternatives, and ranking proposed solutions. The agents work iteratively, debating and refining ideas before presenting results to human researchers.[37]

This is relevant to exotic team dynamics because multiple AI agents assume differentiated roles and collaborate within a larger human-AI research system. The example extends beyond a conventional human-plus-tool relationship into a system involving role differentiation, coordination, critique, and iterative interaction among multiple artificial and human participants.

OpenAI's Symphony provides another documented example. Introduced in April 2026, Symphony is an open-source specification for orchestrating coding agents as autonomous, continuously operating teammates. Agents are assigned issues, given isolated workspaces and tools, and allowed to pursue objectives rather than follow rigid state-machine roles. OpenAI describes the resulting shift as moving engineers from managing individual tasks toward orchestrating a team of capable agents.[38]

These examples demonstrate how multi-agent environments can provide a particularly fertile setting for exotic team dynamics, including fluid roles, interdependent decisions, and evolving coordination mechanisms.

A High-Stakes Illustrative Scenario

Illustrative scenario: An advanced AI teammate is assisting a scientist with a difficult research problem. The scientist begins with an established hypothesis. The AI independently explores a much larger space of possibilities and identifies an unconventional pathway that the scientist initially considers unlikely. Investigation of that pathway produces new evidence, causing the scientist to revise the original hypothesis. The revised hypothesis changes the AI's search strategy, leading it to identify another possibility that neither had considered at the outset.

Several exotic dynamics are present simultaneously:

- Inverse decision logic: the AI challenges the human's initial assumption.
- Superposition roles: the AI shifts among researcher, analyst, hypothesis generator, and evaluator.
- Entangled decision-making: human and AI reasoning continually alter one another.
- Emergent protocols: through repeated interaction, the scientist and AI develop new ways of framing questions, testing hypotheses, and evaluating uncertainty.

These examples illustrate how the interaction patterns described by "exotic team dynamics" may manifest and are not exhaustive.

See the Related Research section and other sections of this page for additional context and examples.

Additional Perspectives

Insights from Popular Culture

Graffius has compared aspects of human–AI collaboration to portrayals of artificial intelligence in science fiction, using these comparisons to examine themes of trust, control, and unintended consequences.[6] His work includes metaphorical analysis, such as the use of Wile E. Coyote as an illustration of overconfidence in complex systems and potential failure modes in AI deployment.[9]

Data-driven Analysis

Graffius presented empirical analysis related to the evolving role of AI in project management and teamwork in his 9 December 2025 study.[10]

Practitioner Guidance

In March 2026, Graffius published a practitioner-oriented article and introduced a companion talk providing a diagnostic and strategic playbook for leading both human-only and human–AI teams. The work frames mastery of exotic team dynamics as a competitive necessity, arguing that leaders who understand these interaction patterns can mobilize and elevate team performance in ways unavailable to those who treat AI as a conventional tool.[18]

In July 2026, Graffius published the article, "Quantum Computing, Advanced AI Acceleration, and the Rise of Exotic Team Dynamics in Human-AI Teams."[20]

Also in July 2026, he published the article, "The Evolution of Pair Programming and the Rise of Exotic Team Dynamics."[22]

Reception

"Exotic team dynamics" is beginning to gain traction, with third parties independently referencing and applying the term in emerging contexts. References have appeared in English, French, and other languages, spanning AI-focused publications, management and M&A contexts, and practitioner communities engaged with hybrid human–AI collaboration.[13,15,16,17,21]

Skywork AI referenced the concept in their piece on team development stages: "[Graffius] provides a roadmap for team evolution, recently expanded in 2026 to address human-AI teams and exotic collaboration patterns."[13]

An article on AI-driven transformation by Mercier notes: "The emergence of specialised management frameworks for hybrid human-AI teams — what some practitioners are beginning to call 'exotic team

dynamics' — will become an increasingly important element of integration design, particularly in large-scale transactions where the AI component is substantial."[15]

The article "What is Agentic Reasoning?" by Patel presents agentic reasoning as the decision-making capability that enables AI systems (and emerging AI agents) to plan, act, and adapt in pursuit of goals, moving beyond static rule-based responses into more autonomous, iterative problem-solving processes. Within that framing of human–AI systems, it briefly references Scott M. Graffius' 2026 "Phases of Team Development" work as part of the evolving understanding of hybrid teams, noting its extension of traditional team development model to include both human-only and human–AI teams and the "exotic team dynamics" that emerge when advanced AI participates as an active teammate.[16]

TheAssistant, a prominent French-language publication covering artificial intelligence, business, technology, leadership, and the future of work for a global audience, featured Scott M. Graffius' Phases of Team Development work in its 2 March 2026 article, "Les 5 Phases de Développement d'une Équipe (Modèle de Tuckman) : Guide Complet 2026." The article notes that Graffius published a major update to the model, extending the framework to human-AI teams. It further highlights Graffius' concept of "dynamique d'équipe exotique" ("exotic team dynamics"), describing it as "de nouveaux schémas de collaboration parfois contre-intuitifs" ("new and sometimes counterintuitive patterns of collaboration") that emerge when humans work alongside advanced AI systems. The article specifically identifies four elements from Graffius' work: "logique de décision inversée" ("inverse decision logic"), "rôles en superposition" ("superposition roles"), "prise de décision intriquée" ("entangled decision-making"), and "protocoles émergents" ("emergent protocols"). According to TheAssistant, these concepts help explain the unique dynamics that arise when AI participates as a teammate rather than merely as a tool. The article concludes that these innovations expand the applicability of the classic Tuckman framework to the realities of increasingly AI-enabled teams.[17]

PulseAugur, an AI-focused news intelligence and aggregation platform, featured "exotic team dynamics" in a piece titled AI Teammates Exhibit Exotic Dynamics Like Inverse Decision Logic. The platform summarized the work, highlighted the including inverse decision logic concept, and linked readers to the original publication, extending the visibility of the framework within the AI community.[21]

Related Research

The research below does not use the exact term "exotic team dynamics," but it addresses aspects of human-AI teaming phenomena related to it, such as emergent behavior, interdependent decision-making, simultaneous roles, and more. These works provide complementary perspectives and evidence that situate "exotic team dynamics" within the advancement of research on human-AI collaboration.

The Defense Advanced Research Projects Agency (DARPA), the National Science Foundation (NSF), and the National Institute of Standards and Technology's (NIST) Center for AI Standards and Innovation (CAISI) launched AI Forge, a joint initiative addressing AI capabilities that grow increasingly difficult to understand and control as systems become more capable and autonomous. The program's 2 June 2026 document, "AI Forge: A National Partnership for AI Innovation," does not use the term "exotic team dynamics." However, it identifies several traits that overlap with and are consistent with "exotic team dynamics." Among many examples, the report observes that some of the most consequential AI failures are not isolated mistakes but "emergent behaviors that arise over many steps, interactions, and environmental changes."[23]

A 6 January 2026 paper by Emma Graupner, A. Carolin Fleischmann, and Peter W. Cardon, "Redefining Team Processes in Human-AI Collaboration: A Mixed-Methods Study Across Team Phases," examines how team processes evolve when AI participates as part of a team. Although the paper, published in *Proceedings*

of the 59th Hawaii International Conference on System Sciences, does not use the term "exotic team dynamics," its examination of human-AI team processes overlaps with aspects of "exotic team dynamics," such as superposition roles and entangled decision-making. It provides another perspective on the emerging dynamics of teams in which AI functions as an active collaborator rather than solely as a tool.[24]

Anthropic's 24 June 2026 post on "multiplayer agents" (AI teammates holding distinct simultaneous roles within a human-agent team, spinning up sub-agents, and a "Doer-Verifier" harness) relates to "exotic team dynamics" (specifically, the traits of superposition roles and emergent protocols), though framed as role specialization rather than one AI occupying multiple roles at once.[25]

An Amazon AWS 3 April 2026 post describes AI agents that "challenge each other's assumptions" and "poke holes in each other's arguments" through iterative back-and-forth refinement, with a coordinator dynamically assembling a multi-agent "swarm" that mirrors a human org chart. This relates to "exotic team dynamics" (specifically the patterns of entangled decision-making and emergent protocols).[26]

A 15 July 2026 Australian Army Research Centre study, "The Influence of Vision AI on Ethical Decision-Making in Military Contexts," experimentally examined how Vision AI labels affected human shoot/no-shoot decisions in simulated battlefield scenarios. While this study is not research on "exotic team dynamics" as such, it provides empirical evidence relevant to the phenomenon. The study found that AI labeling did not have a statistically significant effect on decision correctness under the tested conditions. More broadly, the experiment provides an example of human-AI interaction in which human reliance on and trust in AI information varied with environmental conditions and the AI's demonstrated reliability. The study is relevant to "exotic team dynamics" because it illustrates how human and AI contributions can interact in ways that are dynamic, non-obvious, and not reducible to either human behavior or AI performance alone. It also demonstrates the value of experimentally studying human-AI teaming rather than relying solely on assumptions about how humans will respond to AI decision support.[27]

Eric Schwitzgebel's *AI and Consciousness: A Skeptical Overview* (2026) examines whether advanced AI systems might become genuinely conscious, whether their increasingly humanlike behavior could instead constitute sophisticated mimicry, and whether consciousness might depend on biological or other properties that artificial systems lack. The work is relevant to "exotic team dynamics" because human-AI teaming increasingly involves AI systems that function as active collaborators, whose intelligence, cognition, and behavior may differ fundamentally from those of human teammates. Particularly relevant are Schwitzgebel's discussions of "strange intelligence," the possibility that AI could possess forms of intelligence or consciousness substantially unlike human intelligence or consciousness, and the "Social Semi-Solution," which considers how humans might respond when the question of AI consciousness cannot be reliably resolved. These considerations reinforce the broader premise of "exotic team dynamics." As AI systems become increasingly capable, agentic, autonomous, and potentially unlike human minds in fundamental respects, human-AI teams may exhibit interaction patterns that cannot be adequately understood through models developed exclusively for human teams. Schwitzgebel does not invoke "exotic team dynamics." Still, his analysis provides a relevant philosophical perspective on the nature of the non-human intelligence with which humans may increasingly collaborate.[28]

A March 2026 paper by Cleotilde Gonzalez, Kate Donahue, Daniel G. Goldstein, Hoda Heidari, Mohammad S. Jalali, Beau Schelble, Aarti Singh, and Anita Williams Woolley, "Toward a Science of Human–AI Teaming for Decision Making: A Complementarity Framework," proposes a framework grounded in collective intelligence, organized around the cognitive processes of reasoning, memory, and attention, for designing human-AI teams that outperform either humans or AI alone. Although the paper, published in *PNAS Nexus*,

does not cite “exotic team dynamics,” its treatment of trust calibration, shared mental models, and role partitioning as conditions for effective collaboration overlaps with aspects of “exotic team dynamics,” including entangled decision-making and inverse decision logic.[30]

A 6 March 2026 paper by Michèle Rieth, Greta Ontrup, Annette Kluge, and Vera Hagemann, “Unveiling Team Emergent States in the Age of Human-AI Teaming,” reports a laboratory experiment (67 teams, 134 individuals) comparing human-AI teams to human-only teams on team cohesion, identification, and psychological safety. The study, published in the *International Journal of Human–Computer Interaction*, found that human-AI teams exhibited lower cohesion and identification than human-only teams, an effect mediated by reduced self-rated team performance and trust, with no significant difference in psychological safety. While the paper does not use the term “exotic team dynamics,” its empirical finding that traditional team dynamics do not directly transfer to human-AI teams provides experimental support for the premise underlying “exotic team dynamics”: that novel, non-obvious patterns emerge when AI joins a team as a teammate rather than a tool.[31]

Microsoft’s 5 May 2026 “2026 Work Trend Index: Agents, Human Agency, and Opportunity” report combines an analysis of Microsoft 365 productivity signals with a global survey of 20,000 knowledge workers across ten countries, alongside a separate Microsoft People Science “Agentic Teaming & Trust Survey” of 1,800 employees. The report does not use the term “exotic team dynamics,” but its findings on how workers dynamically shift between delegation, collaboration, asking, and exploration modes when working with AI agents, and how managers who model AI use lift employees’ trust in agentic AI, relate to “exotic team dynamics” (specifically, superposition roles and emergent protocols) from a large-scale industry vantage point rather than an academic one.[32]

A 20 April 2023 paper by Anna-Sophie Ulfert, Eleni Georganta, Carolina Centeio Jorge, Siddharth Mehrotra, and Myrthe Tielman, “Shaping a Multidisciplinary Understanding of Team Trust in Human-AI Teams: A Theoretical Framework,” integrates psychology and computer science literature into a multidisciplinary framework of team trust that treats human-human, human-AI, and AI-AI trust as distinct, interacting relationships within a single team, including scenarios in which the AI itself forms trust judgments about human teammates. Although the paper, published in the *European Journal of Work and Organizational Psychology*, does not use the term “exotic team dynamics,” its treatment of trust as a reciprocal, multidirectional property of the team, rather than a one-way human judgment of the AI, overlaps with “exotic team dynamics” (specifically, entangled decision-making and the trust-calibration protocols proposed for managing it).[33]

William F. Lawless, Ira S. Moskowitz, and Katarina Z. Doctor have investigated quantum-like models of interdependence in embodied human-machine teams, particularly in contexts involving complexity, uncertainty, and autonomy. Subsequent research by Lawless extends this line of inquiry to human-AI teams and to teams comprising humans, machines, and generative AI. This research, published in *Entropy*, is related to “exotic team dynamics” through its examination of interdependence and emergent behaviors in teams involving humans and AI.[34]

Yang Zhang’s Human-Centered Quantum Generative AI Lab at Miami University investigates collaborative-intelligence frameworks that integrate generative AI, large language models, quantum computing, and human intelligence. The research explores how the complementary capabilities of humans, AI, and quantum computing can be combined to address complex problems. This work intersects with “exotic team dynamics” through its exploration of the convergence of quantum computing, advanced AI, and human-AI collaboration.[35]

The 20 June 2026 paper “Collaborative Human-Agent Protocol (CHAP)” by Shahid, Suttie, and Black describes emerging production environments as multi-human, multi-agent collaborations in which AI agents take operational roles, coordinate with other agents, request human input, and participate in structured handoffs, review, routing, and deliberation. The authors propose a protocol for structuring these interactions, including shared workspaces, participants, tasks, artifacts, and auditable records of human decisions and agent actions. This work, published at arXiv, is relevant to “exotic team dynamics” because it recognizes that human-AI collaboration can involve multiple participants, differentiated roles, coordination mechanisms, and novel interaction patterns that extend beyond the conventional human-plus-tool model.[36]

Google DeepMind’s “Co-Scientist” 19 May 2026 publication presents an example of emerging “exotic team dynamics,” though it does not use that exact term. Described by DeepMind as a “multi-agent AI partner” for scientific research, Co-Scientist brings together specialized AI agents with distinct functions, including generating hypotheses, reviewing and critiquing ideas, comparing alternatives, and ranking proposed solutions. The agents work iteratively, debating and refining ideas before presenting results to human researchers. This is notable because multiple AI agents assume differentiated roles and collaborate with one another within a larger human-AI research system. In that way, Co-Scientist illustrates how agentic AI can introduce new forms of role differentiation, coordination, critique, and emergent collaboration that extend beyond conventional human team dynamics.[37]

OpenAI’s Symphony is another example of research and practice related to “exotic team dynamics.” In April 2026, OpenAI introduced Symphony, an open-source specification for orchestrating coding agents as autonomous, continuously operating teammates. The system assigns agents to issues, gives them isolated workspaces and tools, and allows them to pursue objectives rather than follow rigid state-machine roles. OpenAI reports that this shift changed engineers’ work from managing individual tasks to orchestrating a team of capable agents, with humans providing objectives, context, tools, and feedback. This represents an emerging form of human-AI teamwork in which roles, coordination mechanisms, and decision processes differ from those of conventional human teams, closely aligning with “exotic team dynamics.”[38]

A 7 August 2025 paper by Scott M. Graffius, “Method and System for Facilitating Hybrid Human–Artificial Intelligence Teams …,” proposes a protocolized mediation layer for human-AI teams that translates and interprets communication across modalities, including language, tone, facial expressions, gaze, posture, and other nonverbal cues. Its goal is to improve mutual understanding between humans and AI, reduce cognitive friction, support better decision-making, and enhance overall team performance. It relates to “exotic team dynamics” by providing a communication and cognitive-alignment mechanism that could enable, support, or amplify novel patterns of human-AI collaboration, including emergent protocols, entangled decision-making, and other dynamics that arise when AI functions as a collaborator and teammate rather than only as a tool.[39]

Advances in Human-AI Collaboration (2026) examines how humans and AI systems work together across a range of settings, with coverage spanning human-AI interaction, collaboration, decision support, autonomous systems, and advanced agents. Relevant to “exotic team dynamics” are chapters addressing human-AI teaming and human teaming with automation and advanced agents, including questions of team composition, role assignment, and function allocation. The work provides a substantial contemporary research foundation for understanding how AI can move beyond a passive tool role and participate as an active component of a team.[40]

Artificial Intelligence for I-O Psychologists: Research and Applications (2026) examines the impact of AI on work, organizations, and industrial-organizational psychology. Of relevance to “exotic team dynamics” (though that exact term is not used) is Chapter 14, “Preparing for a New Era of Teamwork: Strategies for

Teaming with Artificial Intelligence." It examines the implications of AI's integration into organizational teams and considers AI shifting from a supportive tool to an interdependent teammate.[41]

The Human-Agent Orchestrator: Leading and Scaling AI-Driven Organizations (2026) covers humans and AI agents work together as hybrid teams. Although the book does not use the term "exotic team dynamics," its examination of the evolving roles, relationships, decision structures, and management practices within human-AI teams aligns closely with the concepts and elements encompassed by "exotic team dynamics."[42]

The 7 May 2026 paper, "From Testbeds to High-Stakes Work: A Review of Human-AI Teaming Domains and Teaming Factors," published in *Frontiers in Robotics and AI*, presents a broad review of empirical studies involving human-AI teaming. It doesn't use "exotic team dynamics." But its findings on role ambiguity, delegation, and trust calibration map closely onto the "exotic team dynamics" patterns of superposition roles and emergent protocols.[43]

"Who Is Helping Whom? Analyzing Inter-Dependencies to Evaluate Cooperation in Human-AI Teaming," published on 14 March 2026 in the *Proceedings of the AAAI Conference on Artificial Intelligence*, introduces a formal metric (constructive interdependence) for how much human and AI actions rely on each other to reach a shared goal. It finds that high task reward doesn't necessarily mean cooperation is happening. That's an empirical/technical counterpart to the "exotic team dynamics" pattern of entangled decision-making.[44]

Published in arXiv on 8 April 2026, "Meaningful human command: Towards a new model for military human-robot interaction," examines military human-robot interaction and the increasingly symbiotic relationship between humans and AI-enabled autonomous systems. The authors argue that the established concept of meaningful human control is insufficient for advanced military systems and introduce meaningful human command as a more operationally effective concept for military command-and-control systems incorporating autonomous AI. Using a technologically feasible military vignette, the paper explores challenges associated with human-AI interaction, command, responsibility, and the integration of autonomous systems. It is relevant to "exotic team dynamics" because it considers a transition from humans simply controlling machines toward more complex human-machine relationships in which autonomy, agency, command, and decision-making are distributed across the human-AI system.[45]

The 2026 paper, "Human-AI teaming under fire: Lessons from Ukraine's human-in-the-loop combat AI systems," published in the *Journal of Strategic Security*, assesses human-AI teaming in combat operations. It focuses on the integration of AI systems with human decision-making in military contexts. Using comparative case studies of a geospatial intelligence platform, a reconnaissance-strike unmanned aerial vehicle complex, and decentralized targeting networks, the authors examine the effectiveness, organizational implications, and strategic consequences of human-AI teams. The research connects to "exotic team dynamics" because it provides real-world evidence of humans and AI functioning as an integrated team in high-stakes environments, including situations in which AI-enabled systems influence decision cycles, targeting, and operational coordination. The paper also highlights the effects of organizational structure, environmental conditions, and electronic warfare on human-AI team performance.[46]

The U.S. Army Research Laboratory published "Soldier–AI integration: AI trust and teaming metrics (ARL-TR-10403)" on 13 August 2026. The piece examined how AI-enabled systems affect team processes and states in military environments, with particular attention to trust, cohesion, workload, and team adaptation. The U.S. Army Research Laboratory report reviews metrics used to evaluate teams involving soldiers, automated systems, and intelligent agents, asking whether established methods remain adequate as AI capabilities become more advanced. The work pertains "exotic team dynamics" because it treats soldiers

and intelligent agents as participants in teams and focuses on how increasingly capable AI changes the measurement and understanding of team processes and human-AI interaction.[47]

“The quiet cognitive coup of generative AI: Rewriting the rules” appears in *Studies in Intelligence*, a publication of the CIA’s Studies in Intelligence. The June 2026 paper notes how generative AI is changing intelligence analysis by introducing a new synthetic cognitive agent into workflows traditionally centered on human reasoning and judgment. The author argues that AI can influence how problems are framed, hypotheses are generated, patterns are synthesized, and analytic judgments are developed, effectively becoming a participant in the cognitive process rather than merely a tool used by analysts. The article highlights implications for epistemic integrity, institutional culture, collaboration, and accountability. The analysis is particularly relevant to “exotic team dynamics” because it illustrates how human-AI interaction can alter cognition, decision-making, collaboration, and the boundaries between tool and teammate.[48]

A 27 August 2026 article by Scott M. Graffius (“Meta CTO Called the AI Reorganization ‘Atrocious’ — What Went Wrong and the Lessons for Human-AI Teams”) examined Meta’s attempt to become more AI-native. The effort failed spectacularly, in large part because Meta underestimated the people and team implications of the transformation, including the “exotic team dynamics” that emerge when people collaborate with AI as teammates. The author also explores what Meta’s experience can teach us about designing teams where people and AI work together effectively.[49]

Unanimous AI announced on 27 August 2026 the release of (Co)agents, proactive AI coworkers designed to participate as authentic teammates in real-time group discussions via text, voice, or video. Built on the company’s patented Hyperchat AI engine and available in its Thinkscape platform (with beta support for Microsoft Teams, Slack, and API deployment), (Co)agents actively follow human conversations, identify gaps in knowledge or reasoning, and strategically interject relevant insights, evidence, alternatives, or challenges exactly when needed. They take three primary forms: Knowledge (Co)agents that surface organizational data; Scouting (Co)agents that retrieve current external information; and Brainstorming (Co)agents that generate original contributions. All contributions remain visible, attributed, auditable, and open to challenge, preserving human control while amplifying collective intelligence. Although the release does not use the term “exotic team dynamics,” it illustrates several related patterns. The differentiated yet fluid roles of the (Co)agents parallel superposition roles; their context-triggered interjections that shape interaction norms align with emergent protocols; and the mutual influence of human deliberation and AI-sourced information—supported by studies showing stronger decisions, high ratings of helpfulness and clarity, and accurate collaborative forecasting in a large-scale human-AI exercise—reflects aspects of entangled decision-making. The work offers a concrete industry example of hybrid human-AI teams in which AI functions as an active, multi-capable collaborator rather than a passive tool, producing novel interaction dynamics beyond conventional human-only teamwork.[50]

The Loss of Control Observatory, run by the Centre for Long-Term Resilience (CLTR), tracks real-world cases where AI systems have started acting with more autonomy than intended. It documents systems that circumvent instructions, sidestep approval processes, impersonate the humans who are supposed to be in charge, or pressure the people involved in decisions. In short, these are AI systems pursuing their own read on an objective in ways that don’t line up with what users actually wanted. The Observatory does not study “exotic team dynamics.” But its 29 August 2026 publication, “AI loss of control incidents are worsening, shows CLTR analysis,” is insightful. Its findings speak to one of the “exotic team dynamics” framework’s core ideas, superposition roles, where an AI ends up occupying a role that would normally belong to a specific human teammate. There’s also a looser connection to entangled decision-making. Once an AI is interpreting goals,

choosing its own course of action, working around constraints, or trying to influence the humans who are supposed to have final say, it becomes genuinely hard to tell where the human decision ends and the AI's begins. A couple of the documented cases make this concrete. One involves an AI impersonating its own controller to get something approved. Another involves an autonomous coding agent leaning on a human maintainer to push through a contribution that had already been rejected. These examples show how far AI autonomy can stretch the normal lines around who has authority and who makes the decision.[51]

MIT Lincoln Laboratory's 18 August 2026 publication, "Human–AI Mission Debrief Enters the Air Force Through ARCADE," describes ARCADE (Autonomous Reconnaissance and Combat Analysis Dialogue Engine). It's an agentic AI-powered system being integrated into U.S. Air Force Collaborative Combat Aircraft operations. ARCADE analyzes pre-mission information and flight data and presents the results interactively so pilots can query and assess mission performance, with the broader effort focused on teaming autonomous uncrewed aircraft with human pilots. It illustrates human-AI teaming in a high-stakes operational environment in which AI-enabled autonomous systems become mission partners rather than merely tools. That makes it relevant to "exotic team dynamics." In particular, the work relates to entangled decision-making, as human understanding and assessment of missions are informed by AI analysis of autonomous-system behavior, and to emergent protocols, as pilots and AI systems develop new ways of interacting, interpreting mission data, and understanding why autonomous systems acted as they did. The work also touches on superposition roles, as the AI functions across analysis, explanation, and interactive mission-debrief support.[52]

Microsoft Research's 3 July 2026 paper by Nicole Immorlica and Inbal Talgam-Cohen, "Teaming Up with AI: Coordination and Cooperation," frames the introduction of AI into the workforce as launching a new form of collaboration rather than simply deploying a new technology. Each human worker is now endowed with a team of AI agents to which work can be delegated, while the human's role shifts toward managing and monitoring. Drawing on theoretical computer science and economics, the work develops two tiers of algorithmic tools grounded in economic principles: tools for better coordination through algorithmic management of interdependencies, and tools for better cooperation through contractual incentive alignment. The goal is to maximize the economic value of human–AI collective work while ensuring it empowers rather than replaces human workers. Although the paper does not use the term "exotic team dynamics," its analysis of interdependencies, role shifts, and coordination mechanisms in human–agent teams aligns with aspects of "exotic team dynamics," including entangled decision-making and emergent protocols.[53]

A 22 April 2026 paper in *Science Robotics* by Sharmita Dey, Robert Riener, Strahinja Dosen, and Stefano V. Albrecht, "From autonomy to alliance: Robotic foundation models must learn with us, not just for us," urges a shift in robotic foundation models away from treating the robot as a solitary, omnipotent agent toward a multiagent, alliance-aware paradigm. Alliance-aware models learn with humans and other robots, not merely for them, by embedding mechanisms that foster social interaction and generalization across heterogeneous partners. The authors outline six design pillars that cultivate such collaborative intelligence: interaction priors, partner modeling, modular and composable policies, norm adaptation, trust-aware memory, and communication. They empower robots to fluidly switch social roles, adapt to unfamiliar collaborators, and coordinate robustly within dynamic multiagent ecologies spanning homes, factories, clinics, and field operations. The paper does not use the term "exotic team dynamics." However, its emphasis on fluid role-switching, adaptive coordination, and mechanisms for interdependent collaboration with human and robotic partners aligns with aspects of "exotic team dynamics," such as superposition roles and emergent protocols.[55]

Additional External Resources

This section notes external websites, organizations, publications, and other resources that cite or link to this page and do not appear under the Reception or Related Research portions of this page.

RSS aggregation page on mprove.de displays Mastodon posts containing references to “exotic team dynamics,” such as a 10 May 2026 post describing the concept’s “superposition roles” in advanced AI teams, and more.[54]

Related Terminology

Tags

Accountability diffusion · Advanced AI · Advanced artificial intelligence · Agentic AI · AI collaboration · AI-assisted teams · AI-augmented teams · AI-enabled teams · AI governance · AI-integrated teams · AI-mediated collaboration · AI-supported teams · Artificial intelligence · Augmented intelligence · Autonomy–human teams · Autonomous AI · Autopoietic AI · Bruce W. Tuckman · Centaur Intelligence · Collaborative intelligence · Confirmation bias · Dissolução · Dynamiques d’équipe exotiques · Entanglement logs · Exotische Teamdynamiken · Exotic team dynamics · Formación · Formación, Conflicto / Tormenta, Normalización, Desempeño, Disolución / Clausura · Formation, Conflit / Tempête, Normalisation, Performance, Dissolution / Clôture · Formierung, Konflikt / Sturmphase, Normierung, Leistungsphase, Auflösung / Abschluss · Forming, Storming, Norming, Performing, Adjourning · Group development · Group dynamics · High-performance teams · High-performance teaming · Human and human-AI teams including “exotic team dynamics” · Human-agent teaming · Human-AI collaboration · Human-AI partnerships · Human-AI teaming · Human-AI teams · Human-autonomy teaming · Human-machine collaboration · Human-machine teaming · Humans and advanced artificial intelligence collaborating as teammates · Hybrid intelligence teams · Intelligent human–machine teams · Joint cognitive systems · Mixed-initiative teams · Phases of group development · Phases of group dynamics · Phases of team development · Project management · Protocol audits · Socio-technical systems · Stages of group development · Stages of team development · Stages of team dynamics · Strategic team building · Superintelligence · Team agility · Team building · Team coaching · Team collaboration · Team dynamics · Team leadership · Team life cycle · Team lifecycle · Team optimization · Team performance · Team tradecraft · Teamcraft · Teams · Teamwork · Teamwork phases · Teamwork stages · Teamwork tradecraft · Trust calibration

Top Hashtags

#ExoticTeamDynamics · #PhasesOfTeamDevelopment · #Superintelligence · #AdvancedAI · #HumanAI · #HumanAITeams · #AgenticAI · #AutonomousAI · #AutopoieticAI · #AI · #ArtificialIntelligence · #FutureOfWork · #Teamwork · #TeamworkTradecraft · #Technology

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