Group Conversational Agents

A Review of Designs that Support and Shape Group Interaction

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Abstract

Conversational agents that participate in or mediate group interaction introduce challenges that extend beyond supporting individual users, raising new questions about how agents participate in and influence groups. To characterise this emerging design space, we present a systematic review of 53 peer-reviewed studies on group conversational agents (GCAs). We analyse how GCAs intervene in group-level processes, including participation regulation, conflict mediation, task alignment, and execution support. Using concepts from group research as an analytic lens, we organise prior GCA work around recurring group interactional challenges (orientation, conflict, alignment, and execution), and examine the roles agents are designed to play in addressing these challenges. We find that GCAs are predominantly designed as short-term, role-bounded interventions targeting isolated challenges in bounded interactional contexts. We further identify recurring structural tensions in GCA design, including tradeoffs between visibility and discretion, proactivity and group autonomy, and agent authority and group ownership. Together, these findings clarify how current GCAs are positioned within group interaction, surface the implicit assumptions embedded in their designs, and outline open questions for future research on conversational agents as group-level interventions.

CCS Concepts

• **Human-centered computing** → **Collaborative and social computing**.

Keywords

multi-party, groups, teams, group conversational agents, multi-party interaction, group research, group dynamics, multi-party chatbot, human-agent interaction, human-AI interaction, review

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1 Introduction

Conversational agents have become a familiar interface for interacting with computational systems, from smart speakers to large language model–based assistants. Most of these agents, however, are designed around a single-user interaction model, responding to individual queries, commands, or prompts (e.g. [2]). When deployed in group settings, these agents often struggle [64]. Prior work has documented both technical breakdowns (turn-taking, addressee identification) and social breakdowns (users have different goals) when multiple people attempt to interact with a conversational agent in the same context [22, 64, 70]. These failures point to a

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deeper issue: supporting group interaction requires different designs assumptions than supporting individuals. CSCW and groupware research emerged in part from the recognition that group work posed fundamentally different design challenges than individual interaction [7]. Group conversational agents surface a similar distinction today, motivating the need for new mechanisms for intervening directly in group interaction.

In response, a growing body of work has begun to explore what we refer to as *group conversational agents*. Rather than answering questions posed by individuals, these agents are designed to participate in, moderate, or shape group interaction itself. Examples include agents that encourage quieter members to speak, mediate disagreements, structure discussions, or help groups maintain shared understanding during collaborative tasks [8, 27, 41, 78]. Despite this growing interest, research on group conversational agents remains fragmented. Systems are described using different terms, motivated by different goals, and evaluated using disparate criteria, making it difficult to reason across designs or to articulate what distinguishes a conversational agent *for groups* from one merely used *by* groups.

In this paper, we adopt an operational definition that reflects how these systems are currently designed and studied. We define **group conversational agents (GCAs)** as conversational systems designed to *sense and intervene on group-level interactions* in multiparty settings. These interventions are directed at properties of the group's interaction (e.g., participation balance, conflict expression, or shared understanding), rather than at optimising responses for any single user. This distinguishes GCAs from multi-user chatbots that answer individual queries in a shared channel (e.g. [76]), as well as from coordination tools that support groups without engaging conversationally. Under this definition, GCAs can be understood as *designed interventions on group interactions*, rather than as general-purpose conversational interfaces.

The goal of this work is to provide a design-oriented synthesis of the emerging research on GCAs. We ask: (1) *What kinds of group challenges are GCAs designed to address?* (2) *What roles are agents framed to play within group interaction?* And (3) *What assumptions about groups are embedded in these designs?* To answer these questions, we conducted a systematic, design-oriented review of 53 peer-reviewed papers on conversational agents for group contexts, drawing on concepts from CSCW and group interaction research to guide our analysis. Using concepts from CSCW and group interaction research as an analytic lens, we organize prior work around four recurring challenges that GCAs target: *orientation* (supporting engagement and participation), *conflict* (mediating disagreement and breakdowns), *alignment* (structuring communication, coordination, and shared understanding), and *execution* (supporting ongoing task performance). Across these challenges, we examine how agents are framed in different roles—such as facilitators, mediators, peers, or background assistants—and how the framing of roles shape the kinds of interventions that agents are designed to perform.

Our analysis shows that current GCAs are predominantly designed as short-term, role-bounded interventions that address specific challenges in well-defined group interactions. We interpret this narrow scope as a design consequence of making the agent's interactions legible and evaluable. Further, we identify structural design tensions that cut across systems, including tradeoffs between visibility and discretion, proactivity and group autonomy, and agent authority and group ownership. These tensions reflect fundamental design choices about when and how agents should intervene in group interaction.

By synthesizing prior work through this lens, this paper makes three contributions.

- First, we provide a structured overview of the design space of group conversational agents grounded in an operational definition of GCAs as group-level interventions.
- Second, we articulate how GCAs are designed to address recurring group challenges through specific roles and strategies.
- Third, we surface common design tensions that shape GCA behaviour, offering a vocabulary for reasoning about assumptions that are often left implicit.

Together, these contributions position GCAs as a distinct and consequential design space for interaction design research, and outline directions for future work on conversational agents that support and shape group interaction.

2 Background

Designing systems that support and shape group interaction has long been a focus of CSCW and groupware research. Early work in this area recognised that supporting groups involves different challenges than supporting individuals, requiring attention to coordination, communication, and evolving interactional dynamics rather than isolated user actions [7, 68]. Conversational agents introduce new mechanisms for intervening in group interaction, and inherit the same core challenges: these agents operate within social systems.

2.1 Groups as Interactional Systems

A central insight from group research is that groups are not simply collections of individuals, but interactional systems characterised by interdependence and shared activity. McGrath describes groups as dynamic processes in which outcomes emerge through patterns of interaction shaped by task demands, member relationships, and situational constraints [52]. From this perspective, group behaviour cannot be fully understood by examining individual actions in isolation; instead, it arises from how contributions accumulate, respond to one another, and evolve over time.

This view has two implications that are particularly relevant for conversational agents. First, group interaction is inherently temporal: early patterns of participation, coordination, and role-taking influence subsequent group dynamics. Second, while task characteristics shape interaction, they do not deterministically prescribe it: groups may approach the same task in different ways depending on norms, relationships, and situational context. In thinking about GCAs then, we should treat group processes themselves as a primary object of design and analysis, rather than as a backdrop for individual interaction.

2.2 Group Development as an Analytic Lens

To reason about how group needs change over time, we draw on Tuckman's developmental model of groups [91]. Tuckman characterises group development as progressing through stages of Forming, Storming, Norming, and Performing, reflecting shifts in social structure, conflict, and task coordination. While the model has been critiqued for its linearity, it remains widely used as a descriptive lens for understanding how group challenges evolve [12].

In this work, we use Tuckman's model analytically rather than prescriptively. We reinterpret each stage in terms of a dominant group-level challenge: orientation (Forming), conflict (Storming), alignment (Norming), and execution (Performing). This framing allows us to organise prior work on group conversational agents around the kinds of group processes agents are designed to support, without assuming that groups follow a fixed progression. Importantly, this lens foregrounds the temporal and interactional nature of group challenges.

2.3 Prior Reviews of Conversational Agents in Group Contexts

A growing number of review papers have examined conversational agents, but most focus on dyadic interaction. Early surveys classified agent architectures (e.g., reactive vs. deliberative) primarily at the level of individual behaviour [55]. Reviews of embodied conversational agents emphasize how nonverbal cues such as gaze and gesture influence user perceptions in one-on-one settings [50]. Similarly, systematic reviews of conversational content have shown that even dyadic agents struggle to capture emotional nuance and interactional context [40].

Research in human–robot interaction (HRI) has engaged more directly with group settings, examining how agents influence participation, norms, and collaboration [36, 75] . A foundational contribution in this space is the literature review by Sebo et al. [75], which synthesizes over a hundred studies of robots interacting with groups and teams. Their review characterizes how robots shape group dynamics through verbal and nonverbal behaviour, identifies recurring robot roles (e.g., leader, peer, follower), and situates these interventions within an Input–Process–Output (IPO) framework that treats robot behaviour as an input shaping group interaction processes and outcomes. Weisswange et al. [96] extend this model with the Mediation IPO model, which focuses specifically on robots as mediators in group interaction, articulating mediation strategies such as participation regulation, conflict management, and coordination support. Together, these reviews provide a valuable vocabulary for describing how agents can influence group processes and outcomes.

At the same time, these reviews are largely situated within HRI and often assume physical embodiment as a default design condition. IPO-style frameworks also tend to emphasize relationships between inputs, processes, and outcomes, offering comparatively less structure for reasoning about how agent roles, intervention timing, and group-level challenges evolve over the course of interaction. As a result, while prior reviews provide important insights into how agents can affect group behaviour, they offer limited support for comparing conversational agents across modalities or for surfacing the interactional and normative assumptions embedded in different designs.

Outside of HRI, Petousi et al. [60, 61] reviewed multiparty chatbots as dialogue facilitators, identifying common facilitation strategies but focusing primarily on bot performance rather than broader group dynamics. Taken together, these reviews offer valuable perspectives on agent-supported group interaction, yet they stop short of providing an integrative framework for reasoning across agent roles, intervention designs, and the assumptions different systems make about how groups function.

2.4 Positioning This Review

Our work builds on these foundations by focusing on group conversational agents that are realized primarily as language mediated interventions on group activities. Thus, we consider a perspective span text-, voice-, avatar-, and robot-based systems that primarily use language to intervene in groups. This focus is deliberate: rather than focusing on agent capabilities or technical architectures, we foreground group-level challenges and interactional processes.

We use group theory selectively as an analytic lens (not as a design prescription) to organize how group conversational agents are currently designed and studied. In particular, McGrath's interactional view of groups and Tuckman's developmental framing allow us to synthesize prior work around recurring challenges, agent roles, and intervention strategies. This approach enables us to surface common patterns, implicit assumptions, and structural tensions in current GCA designs, setting the stage for the findings and discussion that follow. Our goal is not to propose a new prescriptive model for GCA design, but to synthesize how GCAs are currently conceptualized, studied, and evaluated.

3 Review Methodology and Corpus

In this section, we describe how we constructed our literature corpus, including our search strategy, and inclusion and exclusion criteria.

3.1 Corpus Construction

We conducted a structured literature review of studies drawn primarily from the HCI community, focusing on conversational agents that engage with groups rather than individual users. Our goal was to capture work on group conversational agents (GCAs): conversational systems designed to sense and intervene in group-level interactional processes.

The review followed an adapted PRISMA framework [53], proceeding through three stages: identification, screening, and inclusion (see Figure 1). An initial keyword-driven search was conducted across major digital libraries (described below), followed by iterative refinement through screening and snowballing.

3.1.1 Eligibility and Inclusion Criteria. In this review, we define group conversational agents (GCAs) as conversational systems designed to sense and intervene in group-level interactional processes in multi-party settings, where the agent's logic targets properties of group interaction rather than optimizing responses for any single user. This definition distinguishes GCAs from conversational agents that are merely used in group contexts or from coordination tools that do not engage conversationally (e.g. [76, 77]).

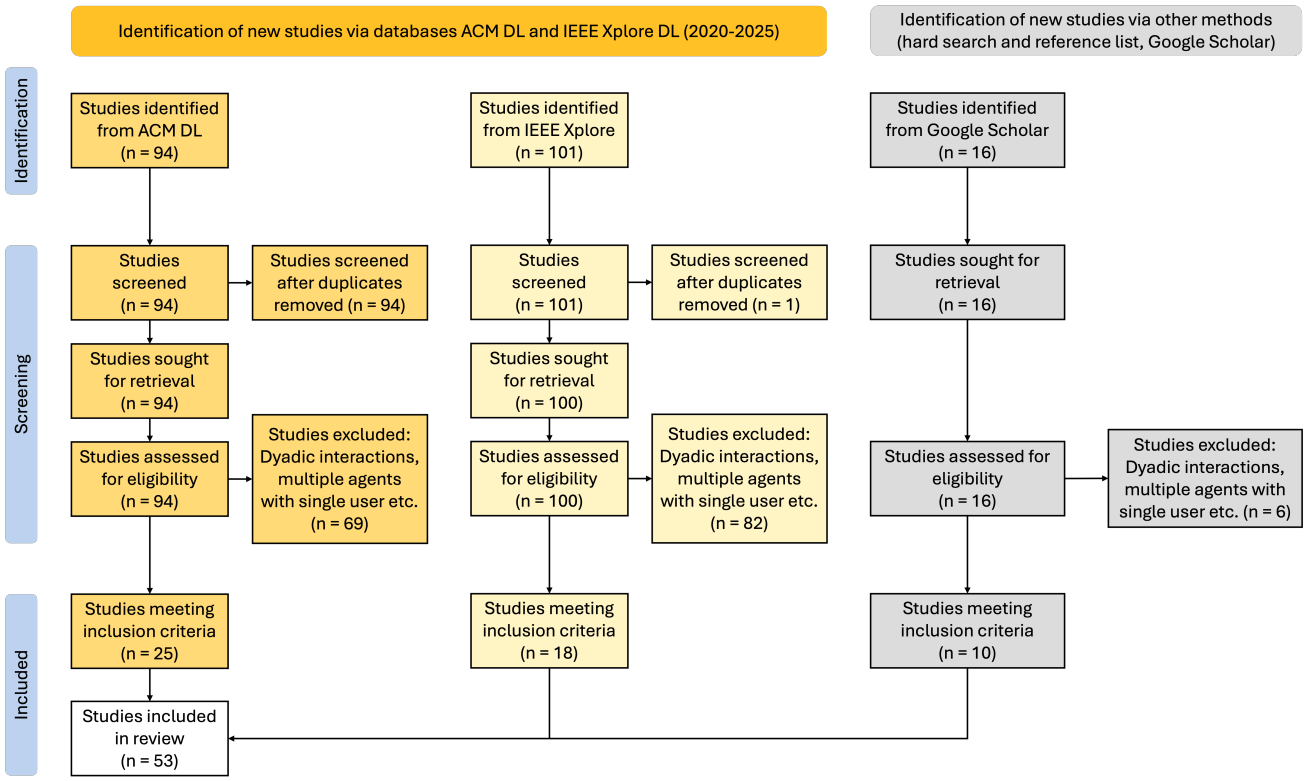


Figure 1: Adapted PRISMA flowchart of the study selection process.

We focus specifically on language-mediated interaction, as natural language remains the dominant interface for contemporary conversational agents. This focus enables systematic comparison of intervention strategies across systems, particularly those that operate through explicit, discursive contributions to group interaction. We acknowledge adjacent work in social robotics (e.g. [62, 63]), which demonstrates how agents can influence group dynamics through nonverbal and embodied cues such as gaze and gesture. However, in such systems, a substantial portion of the agent's interactional effect is mediated through embodiment rather than language. By focusing on language-mediated interaction, we center our analysis on interventions that are explicit, content-oriented, and directly interpretable by participants.

Studies were included if they met all the following criteria:

(1) *Natural language interaction:* the agent communicated using spoken or written natural language.
(2) *Multi-user engagement:* at least two human participants could independently interact with the agent.
(3) *Group-level intervention:* the agent's contributions were intended to influence human-human interaction (e.g., facilitation, mediation, prompting, regulation).
(4) *Group awareness:* the agent differentiated between participants in the group, or adapted to group composition, behaviour, or dynamics.
(5) *Synchronous interaction:* interaction occurred in real time rather than asynchronously.
(6) *Empirical grounding:* the study reported how the agent was used in a group setting, or evaluated its effects on group interaction.

We excluded studies that did not meaningfully engage with group-level interactional processes. These included: dyadic human-agent interactions [10, 13, 28]; systems where the agent interacted with only a single user despite being deployed in a group context (e.g., forum onboarding or moderation bots) [34, 77]; agent-to-agent or multi-agent coordination systems where humans played a peripheral role [1]; and system-centric evaluations focused exclusively on algorithmic or NLP performance without analysis of group interaction [92].

3.1.2 Search Strategy and Selection. We focused on peer-reviewed studies published in English between 2020 and 2025, prioritizing recent work to reflect contemporary GCA designs and evaluation practices. The primary search was conducted using the ACM Digital Library and IEEE Xplore, which together cover a broad range of HCI and intelligent systems venues.

To expand coverage, we conducted backward and forward snowballing using Google Scholar, following established guidelines for systematic reviews [97]. This process surfaced studies published prior to 2020 that met our inclusion criteria.

ACM Digital Library was selected for its strong representation of HCI venues, including CHI, CSCW, GROUP, HRI, ICMI, CUI, and IUI [82], and has been used as a primary source in prior review

work [65, 94]. IEEE Xplore was included to capture adjacent research on interactive systems and intelligent agents. We focused on fully peer-reviewed publications.

Search keywords were iteratively refined based on prior reviews of group interaction and agent-based systems [19, 66, 72, 75, 100], and included combinations such as:

- "multi-party", "multi-user intelligent agent", "multiparty chatbot", "multiparty robot"
- "human–agent interaction", "human–human–agent interaction"
- (agent OR robot OR embodiment) AND human AND (group OR team)
- (agent OR robot) AND (interpersonal OR "group dynamics" OR "human–human interaction")

Using this process, we identified a final corpus of 53 peer-reviewed studies. A complete list of included papers, along with publication venues and years, is provided in Table 2.

Scope and limitations. As with any review, our corpus reflects the boundaries imposed by our definition of GCAs, our focus on synchronous interaction, and our emphasis on group-level intervention. While this necessarily excludes some relevant adjacent work (e.g., asynchronous collaboration tools or moderation bots), these boundaries allow for a more focused synthesis of how conversational agents are currently designed and studied as group-level interventions.

3.2 Codebook and Data Analysis

Following the eligibility assessment, we developed an initial set of codes using a mixed approach. We drew from the frameworks described earlier to consider group tasks, group challenges, agent characteristics, and group relationships. Some codes began as phrases borrowed from the corpus papers, and were refined into keywords (to cover similar concepts in different papers), including agent role, agent intervention, and so forth. Finally, we catalogued and documented how agents had been constructed, characteristics of their behaviours, how the researchers had conducted empirical studies of the agents, and so forth. The codebook was iteratively refined through repeated analysis of the corpus, resulting in the final coding schema (see Table 1), which was then applied to the entire corpus.

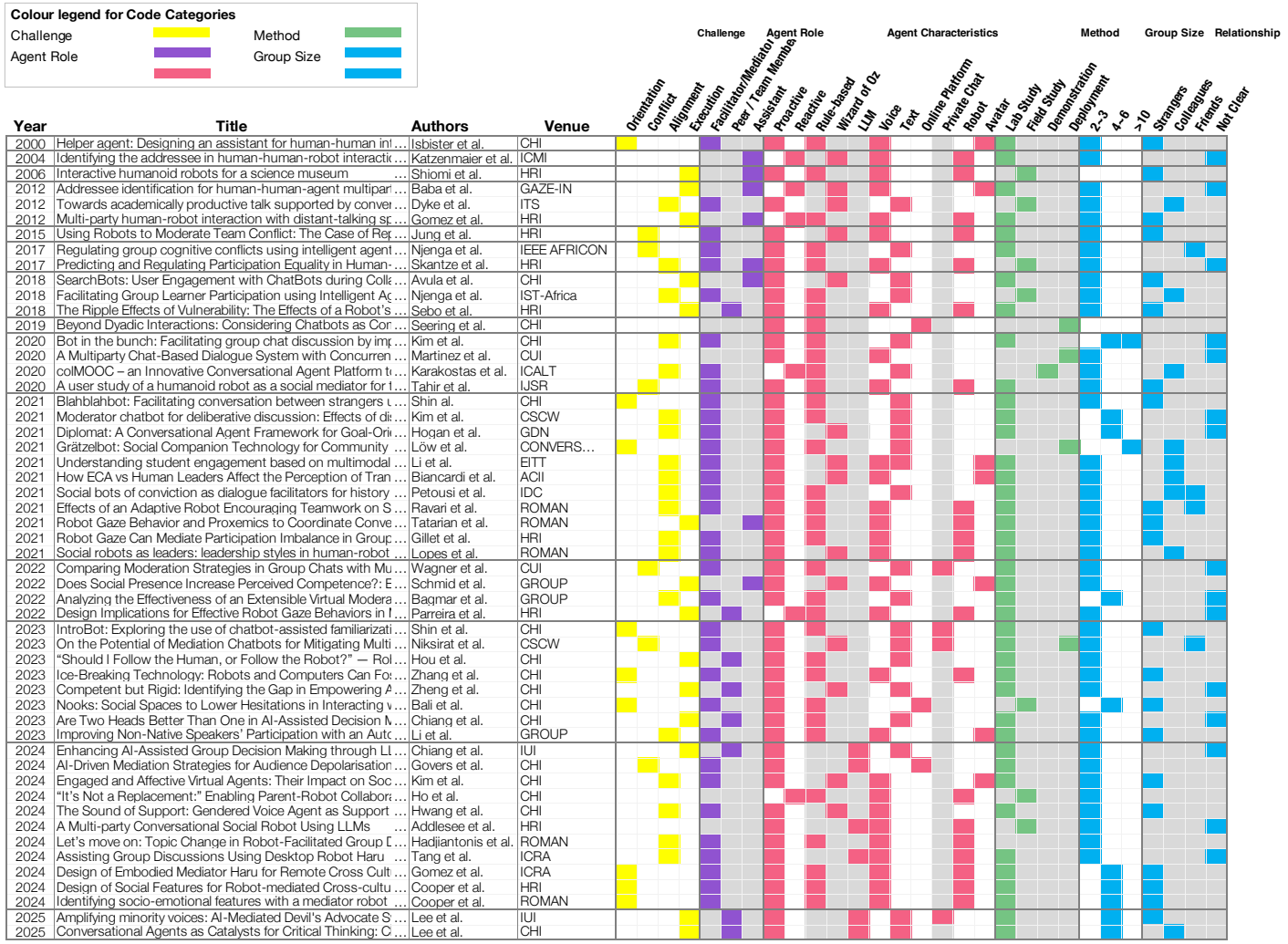
Coding was primarily conducted by the two lead authors through iterative reading and discussion of the corpus. Initial codes were applied independently to a subset of papers, followed by joint discussion with the remaining author team to resolve ambiguities and refine code definitions. The finalized codebook was then applied consistently across the full corpus.

Our coding was descriptive rather than evaluative, focusing on how GCAs are framed, implemented, and studied, rather than assessing the effectiveness or quality of individual designs.

Table 1: Code categories and descriptions used to systematically analyze the corpus of 53 studies. Codes were developed through a mixed deductive–inductive approach, grounded in theoretical frameworks and refined through insights from the screening process.

Code	Code Description
Challenge	The core group challenge addressed by the agent (i.e., orientation, conflict, alignment, execution) in the group interaction.
Agent Role	Building on the framework by Sebo et al. [75], this code captures the type of role the agent plays in response to the group challenge. The role is indicative both of the kind of intervention that agent enacted, and *how* the agent enacted its intervention.
Agent Characteristics	Attributes and interactional features of the agent. These codes capture implementation and design choices. We identified five dimensions: • Proactivity and Reactivity: Based on the model of mixed-initiative interaction [3], this code captures whether the agent autonomously initiates actions or solely responds to user input, reflecting varying levels of initiative and control. Proactive agents sustain momentum and prevent stagnation, while reactive agents preserve user autonomy. • Implementation Type: Identifies the underlying implementation (i.e., rule-based: deterministic logic, Wizard-of-Oz: human-operated, or LLM-based: machine-learned language generation). This code captures the technical realization of agent behaviours, including how responses and behaviours are generated. • Modality: This codes classifies modality through which the agent interacts (i.e., voice, text, or online platform/visual interface). • Conversation Dynamics: This code differentiates whether the agent engages in private (1:1) or group (1:N) interactions, reflecting different modes of communication within the system. • Embodiment: Captures whether the agent is physically embodied (robot) or virtually represented (avatar), or not at all. It emphasizes designing agents that feel socially embedded, enhancing group dynamics by acting as members rather than mere tools.
Method	The research methods employed in the empirical study (i.e., lab study, field study, demonstration, deployment) to examine interactions with GCAs. It captures the context and setting in which these interactions are explored.
Group Size	The number of unique humans interacting with the agent, ranging from small groups (2–3 members) to large groups (> 10 members). It provides insights into the expected complexity of the interactions.
Relationship	The nature of relationship between group participants as described by the authors' recruitment.

Table 2: Corpus of 53 studies categorized according to the coding framework outlined in Table 1. Studies were sorted according to their publication year.



Year	Title	Authors	Venue
2000	Helper agent: Designing an assistant for human-human in…	Isbister et al.	CHI
2004	Identifying the addressee in human-human-robot interacti…	Katzenmaier et al.	ICMI
2006	Interactive humanoid robots for a science museum …	Shiomi et al.	HRI
2012	Addressee identification for human-human-agent multipar…	Baba et al.	GAZE-IN
2012	Towards academically productive talk supported by conve…	Dyke et al.	ITS
2012	Multi-party human-robot interaction with distant-talking sp…	Gomez et al.	HRI
2015	Using Robots to Moderate Team Conflict: The Case of Rep…	Jung et al.	HRI
2017	Regulating group cognitive conflicts using intelligent agent…	Njenga et al.	IEEE AFRICON
2017	Predicting and Regulating Participation Equality in Human-…	Skantze et al.	HRI
2018	SearchBots: User Engagement with ChatBots during Colla…	Avula et al.	CHI
2018	Facilitating Group Learner Participation using Intelligent Ag…	Njenga et al.	IST-Africa
2018	The Ripple Effects of Vulnerability: The Effects of a Robot's …	Sebo et al.	HRI
2019	Beyond Dyadic Interactions: Considering Chatbots as Cor…	Seering et al.	CHI
2020	Bot in the bunch: Facilitating group chat discussion by imp…	Kim et al.	CHI
2020	A Multiparty Chat-Based Dialogue System with Concurren…	Martinez et al.	CUI
2020	colMOOC – an Innovative Conversational Agent Platform t…	Karakostas et al.	ICALT
2020	A user study of a humanoid robot as a social mediator for t…	Tahir et al.	IJSR
2021	Blahblahbot: Facilitating conversation between strangers u…	Shin al.	CHI
2021	Moderator chatbot for deliberative discussion: Effects of di…	Kim et al.	CSCW
2021	Diplomat: A Conversational Agent Framework for Goal-Ori…	Hogan et al.	GDN
2021	Grätzelbot: Social Companion Technology for Community …	Löw et al.	CONVERS…
2021	Understanding student engagement based on multimodal …	Li et al.	EITT
2021	How ECA vs Human Leaders Affect the Perception of Tran…	Biancardi et al.	ACII
2021	Social bots of conviction as dialogue facilitators for history …	Petousi et al.	IDC
2021	Effects of an Adaptive Robot Encouraging Teamwork on S…	Ravari et al.	ROMAN
2021	Robot Gaze Behavior and Proxemics to Coordinate Conve…	Tatarian et al.	ROMAN
2021	Robot Gaze Can Mediate Participation Imbalance in Group…	Gillet et al.	HRI
2021	Social robots as leaders: leadership styles in human-robot …	Lopes et al.	ROMAN
2022	Comparing Moderation Strategies in Group Chats with Mu…	Wagner et al.	CUI
2022	Does Social Presence Increase Perceived Competence?: E…	Schmid et al.	GROUP
2022	Analyzing the Effectiveness of an Extensible Virtual Modera…	Bagmar et al.	GROUP
2022	Design Implications for Effective Robot Gaze Behaviors in I…	Parreira et al.	HRI
2023	IntroBot: Exploring the use of chatbot-assisted familiarizati…	Shin et al.	CHI
2023	On the Potential of Mediation Chatbots for Mitigating Multi…	Niksirat et al.	CSCW
2023	"Should I Follow the Human, or Follow the Robot?" — Rol…	Hou et al.	CHI
2023	Ice-Breaking Technology: Robots and Computers Can Fo…	Zhang et al.	CHI
2023	Competent but Rigid: Identifying the Gap in Empowering A…	Zheng et al.	CHI
2023	Nooks: Social Spaces to Lower Hesitations in Interacting v…	Bali et al.	CHI
2023	Are Two Heads Better Than One in AI-Assisted Decision M…	Chiang et al.	CHI
2023	Improving Non-Native Speakers' Participation with an Auto…	Li et al.	GROUP
2024	Enhancing AI-Assisted Group Decision Making through LL…	Chiang et al.	IUI
2024	AI-Driven Mediation Strategies for Audience Depolarisation …	Govers et al.	CHI
2024	Engaged and Affective Virtual Agents: Their Impact on Soc…	Kim et al.	CHI
2024	"It's Not a Replacement:" Enabling Parent-Robot Collabora…	Ho et al.	CHI
2024	The Sound of Support: Gendered Voice Agent as Support …	Hwang et al.	CHI
2024	A Multi-party Conversational Social Robot Using LLMs …	Addlesee et al.	HRI
2024	Let's move on: Topic Change in Robot-Facilitated Group D…	Hadjiantonis et al.	ROMAN
2024	Assisting Group Discussions Using Desktop Robot Haru …	Tang et al.	ICRA
2024	Design of Embodied Mediator Haru for Remote Cross Cult…	Gomez et al.	ICRA
2024	Design of Social Features for Robot-mediated Cross-cultu…	Cooper et al.	HRI
2024	Identifying socio-emotional features with a mediator robot …	Cooper et al.	ROMAN
2025	Amplifying minority voices: AI-Mediated Devil's Advocate S…	Lee et al.	IUI
2025	Conversational Agents as Catalysts for Critical Thinking: C…	Lee et al.	CHI

4 Findings

In this section, we report findings from our literature review in three parts: (1) group-level interventions; (2) targeted group challenges; and (3) role framing in groups.

4.1 Group-Level Interventions

Across the reviewed systems, GCAs intervene on collective interactional processes—such as participation balance, turn-taking, conflict mediation, and shared understanding—rather than primarily supporting individual users. This positions GCAs as mechanisms for shaping group interaction, distinguishing them from individual conversational agents. For example, several systems in the corpus focus on participation regulation, including encouraging quieter participants to contribute [17, 33, 78], intervening when individuals dominate or behave abusively [37, 88], or explicitly structuring turn-taking within the group [8, 30, 41]. These designs act on relationships among participants and reflect implicit assumptions about equitable or balanced contribution in collaborative interaction. Other systems intervene on group-level phenomena such as conflict and disagreement, treating divergent perspectives as a shared problem to be managed rather than an individual failure. For instance, some agents attempt to surface compromises by integrating ideas across perspectives [27], while others adopt mediating strategies such as soliciting input privately versus publicly to reduce tension [69, 93]. We also observe agents that shape how groups engage with the collaborative task itself. In some cases, agents monitor conversational topics and introduce alternative perspectives to guard against premature consensus or groupthink [16, 44, 46], thereby influencing collective reasoning rather than individual decision-making. To enable such interventions, many GCAs implicitly model aspects of group state, such as participation patterns [41, 42, 67], conversational topics [33, 79, 98], or divergence in perspectives [16, 44, 46], rather than tracking individual user goals alone.

While many GCAs deliver interventions publicly to the group, including shared prompts [29, 41, 49], turn-taking cues [17, 18], or collective feedback [8, 41], some systems explore private or asymmetric interventions targeted at individual members [78, 93]. These private interventions remain relatively less common in the corpus, but illustrate an alternative design approach for shaping group processes without directly exposing individual behaviour to the group.

Taken together, these examples illustrate that GCAs are designed to operate on group-level processes, embedding particular operationalizations of effective collaboration into their intervention strategies. While these assumptions are often implicit, they shape how agents steer group interaction toward specific interactional outcomes.

As summarized in Table 2, systems in the corpus typically target one dominant interactional challenge—orientation, conflict, alignment, or execution—through a bounded set of intervention strategies and role framings. Rather than attempting to support group interaction holistically, GCAs are most often designed to intervene at particular moments where breakdowns are anticipated or experimentally instantiated. Examining the corpus through this lens reveals recurring correspondences between group challenges and the kinds of actions agents are designed to take. We use these correspondences to organize the analysis that follows, and summarize representative intervention strategies for each challenge in Table 3, before examining how they are instantiated across concrete systems.

Table 3: Examples of group-level interventions that agents took to address group challenges in group work (orientation, conflict, alignment, and execution). Each intervention is described as a type of action that the agent would take.

Group Challenge	Group-Level Interventions
Orientation	• Suggest casual conversation topics as ice-breakers for fostering social connections [17, 18, 33, 78, 79, 98]. This helps individuals that do not know each other well. • Establish conversational norms and provide structure to the interaction (e.g., give turn-taking cues) [17, 18, 25, 78]. This provides structure to the interaction in case participants are unsure how to participate. • Encourage quieter members to contribute by providing nudges or explicit requests for them to participate [17, 18, 25, 33, 78]. This counters low engagement, and encourages inclusive participation. • Assign sub-tasks to each member so they can build a shared identity and understand their roles on the team [51]. This clarifies role expectations.
Conflict	• As a mediator, identify competing proposals to make differences explicit [27]. Can also propose compromise suggestions or integrative options. This surfaces disagreements, and helps groups in reaching consensus. • As a mediator, reframe disagreements constructively and enforce standards of interaction behaviour [37, 88]. This keeps conflict productive. • As a mediator, assist negotiation by mediating interpersonal tensions during the discussion [57, 69, 93].
Alignment	• Structure task-related discussion to make information exchanges between participants efficient [8, 11, 29, 30, 38, 41, 42, 47, 49, 67]. This establishes and coordinates communication processes within the group. • As a facilitator, organize and scaffold participation around tasks to support workflow and coordination [8, 20, 23, 30, 32, 41, 42, 56, 67, 89]. This improves coordination. • Summarize and synthesize different perspectives to help integrate contributions and adjust plans [8, 41].
Execution	• As an assistant, provide relevant information and resources [5, 6, 24, 39, 60, 71, 80, 90]. This fills knowledge or skill gaps. • As a peer/team member, contribute opinions to broaden the option space and help groups move forward [15, 31, 59, 71, 86, 99]. • As a peer/team member, play devil's advocate to prompt consideration of alternatives [16, 44, 46].

4.2 Targeted Group Challenges

In our corpus, GCAs are generally designed to address a specific group-level challenge, such as encouraging participation [42, 56, 89], mediating disagreement [27, 37], or supporting coordination [20, 32], rather than adapting across multiple aspects of group interaction. These systems are typically evaluated in controlled or bounded settings, a pattern that reflects both prevailing technical constraints and research norms that favor isolating discrete interactional problems. To characterize the types of group-level challenges that GCAs are designed to address, we draw on Tuckman's group development framework as an analytic lens. We use the categories of orientation, conflict, alignment, and execution not as a model of how groups necessarily progress, but as a way to label recurring interactional challenges that GCAs target in experimental and applied settings.

4.2.1 Orientation-focused GCAs. Orientation-related challenges arise when group members lack familiarity with one another's working styles, expectations, or social norms, creating uncertainty about how to interact and contribute effectively [54]. Many GCAs in the corpus are explicitly designed to target these challenges by structuring early interaction, encouraging participation, or clarifying how group members should engage with one another. In these systems, agents are commonly framed as social facilitators, focusing on easing initial interaction rather than supporting downstream collaboration.

One set of systems addresses orientation by mitigating a lack of social familiarity among group members [26]. For example, BlablaBot [79] analyzes participants' social media content to identify shared interests and suggests conversation topics to initiate interaction. Such designs operationalize orientation as a problem of initiating social exchange, with agents intervening to lower barriers to early conversation among unfamiliar participants.

Other systems conceptualize orientation as a lack of interaction structure, where uncertainty about when or how to contribute leads to confusion or disengagement [95]. IntroBot [78], for instance, scaffolds early group interaction through explicit prompts that mark phases of conversation, such as self-introductions, topic discussion, and closure. By providing temporal structure, these agents reduce ambiguity around how participation should be taking place within a bound interaction context.

Several GCAs also focus on encouraging engagement during early interaction, particularly when anxiety or uncertainty leads to silence or uneven participation [35]. In such systems, agents monitor conversational activity and prompt less active members to contribute, as in IntroBot's detection of prolonged inactivity followed by targeted encouragement. In contrast, Gomez et al. [25] adopt a robot-mediated approach that emphasizes equitable turn-taking at the group level, using an embodied agent to manage speaker transitions rather than prompting individuals directly.

A smaller number of systems frame orientation as a lack of role clarity within newly formed groups. For example, Grätzelbot [51] assigns collaborative scavenger-hunt tasks to university freshmen to encourage interaction and clarify expectations around participation. In these designs, orientation is addressed through structured group activities that implicitly define how individuals are expected to contribute.

These GCAs focus on structuring early interaction rather than supporting ongoing collaboration.

4.2.2 Conflict-focused GCAs. Conflict-focused GCAs are designed to address situations in which divergent opinions, approaches, or interactional norms disrupt group interaction. In the corpus, conflict is typically operationalized as a localized interactional challenge, such as disagreements, negative communication, or negotiation impasses; this is in contrast to conflicts that are emergent over longer-term group dynamics. Agents in these systems are commonly framed as mediators, intervening to structure dialogue or facilitate resolution within constrained task contexts.

One class of systems targets conflicts arising from a lack of consensus in opinions or approaches [87]. For example, Govers et al. [27] explore how conversational agents can mediate online debates to reduce polarization. In their system, the agent identifies opposing viewpoints, prompts participants with probing questions to surface underlying reasoning, and proposes compromise solutions based on conflict resolution strategies. Here, conflict is framed as a problem of balancing competing perspectives within a structured deliberative exchange.

Other systems conceptualize conflict as a breakdown in interactional norms, such when someone uses negative or abusive language. Jung et al. [37], for instance, examine agent-mediated repair strategies in real-time collaborative tasks. In their study, an agent intervenes following negative comments by either delivering repair-oriented messages that enforce norms of respectful communication or offering neutral statements that deflect tension. These designs treat conflict as an interactional disruption that can be addressed through immediate, localized social intervention.

A separate set of systems focuses on conflict as a lack of negotiation support, particularly in situations where direct negotiation may be socially uncomfortable. Wagner et al. [93] investigate agent-assisted scheduling, comparing public coordination strategies with a "private negotiation" approach in which the agent contacts individuals privately to explore flexibility in availability. This design operationalizes conflict as a coordination impasse and explores private, asymmetric communication to facilitate compromise without public confrontation.

Private messaging is also employed in systems addressing multi-party privacy conflicts. For example, MediationBot [69] privately contacts content uploaders to initiate consent checks before publicly negotiating acceptable sharing practices. Across these systems, private intervention emerges as an alternative design strategy for managing conflict, though we only observed this in a very limited subset of the corpus.

Here, conflict is treated as a localized interactional breakdown rather than a long-term group dynamic.

4.2.3 Alignment-focused GCAs. Alignment-focused GCAs are designed to address challenges related to how group members communicate, coordinate, and collaborate around a shared task. In the corpus, alignment is typically operationalized as a challenge of maintaining coherent task-focused interaction, where breakdowns in information exchange, coordination of contributions, or integration of task-relevant viewpoints hinder collective progress. These systems commonly frame agents as task facilitators, intervening to

structure interaction and maintain coherence during collaborative work.

One subset of systems addresses alignment by framing alignment challenges as breakdowns in established communication processes. In these designs, communication breakdowns are framed as disorganized or inefficient information exchange between members of the group, where unclear turn-taking or unfocused discussion impedes task progress [4]. For example, DebateBot [42] structures conversation flow in a debate by issuing explicit prompts that guide participants to share reasoning in turns. In comparison to free flowing conversation, the study reports that structured prompting influenced discussion dynamics, including how reasoning was shared and how opinions were surfaced. While superficially similar to prompted engagement in orientation-focused GCAs, this intervention is functionally distinct: they are focused on task process rather than social familiarization.

Other systems operationalize alignment as a coordination challenge, particularly in managing interdependent contributions among group members [85]. In the absence of coordination norms, groups risk duplicated effort or uneven participation. To address this, GCAs such as GroupfeedBot [41] monitor participation patterns and prompt input from less active members to sustain task momentum. Similarly, Li et al. [48] design an agent that rebalances participation in multilingual groups by redirecting attention to non-native speakers (to give them opportunities to participate) when native-speaking members dominate the conversation. In these systems, coordination is treated as a matter of regulating participation to optimize task flow.

A smaller number of systems frame alignment as a lack of established collaboration procedures, focusing on how groups integrate and build upon individual contributions [58]. These agents employ strategies such as real-time summarization to consolidate viewpoints and surface overlooked topics. For instance, ArbiterBot [8] summarizes discussion content and highlights gaps in coverage, while GroupfeedBot [41] provides summaries of both individual opinions and collective positions. These approaches treat alignment as a problem of maintaining shared awareness during collaborative decision-making.

Alignment is operationalized through task-focused structuring within bounded collaborative settings.

4.2.4 Execution-focused GCAs. Execution-focused GCAs are designed to support groups during ongoing task work, particularly once a group is already engaged in collective activity. Drawing on McGrath's task circumplex [52], these systems predominantly target execution-oriented group tasks, where progress depends on access to task-relevant information, contributions from multiple members, and opportunities to introduce counter-perspectives during task performance. In the corpus, execution is typically operationalized as a task-centric challenge, where gaps in knowledge, limited expertise, or pressures toward premature consensus hinder task progress as framed within the study context. These systems often frame agents as contributors to the task, either by supplying information or by participating directly in group interaction.

One class of systems addresses execution challenges arising from a lack of necessary knowledge or skills. In these designs, agents provide task-relevant information within a collaborative setting to support group work. For example, Avula et al. [5] examine a SearchBot in a collaborative search task, comparing approaches in which the agent either explicitly elicits information through questions or passively monitors conversation to infer informational needs. In both cases, execution is framed as surfacing relevant information within the group's collaborative context rather than restructuring group interaction.

Other systems operationalize execution by positioning the agent as a peer contributor within the group. In these designs, the agent participates directly in discussion or decision-making alongside human members. For instance, Zheng et al. [99] introduce an agent that takes part in group discussion and voting when ranking student essays, with decision-making influence comparable to that of human participants. Here, execution is framed as adding an additional task-oriented contributor to the group rather than explicitly mediating group processes.

A smaller subset of systems targets execution challenges related to diminished critical thinking, particularly in contexts where group cohesion leads to conformity or groupthink [73]. These designs adopt strategies such as the Devil's Advocate approach, in which the agent introduces opposing viewpoints to challenge emerging consensus. For example, Chiang et al. [16] design an agent that generates critique questions and counterarguments to prompt reconsideration of dominant positions. In these systems, execution is treated as introducing critique or dissent during task performance rather than managing broader group dynamics.

Execution is framed as task contribution during ongoing work rather than sustained group adaptation.

Summary. We find that current group conversational agents are predominantly designed as short-term interventions targeting specific group challenges within bounded interactional contexts, rather than as processes that unfold over longer periods of group collaboration. This short-term framing reflects the experimental and exploratory nature of much of the existing work, and leaves open questions about how group-level challenges evolve over time, as well as how—and indeed whether—group conversational agents might support longer-term group processes.

4.3 Role Framing in Groups

Within these existing short-term, challenge-specific designs, researchers make different choices about how conversational agents are positioned relative to the group. Across the corpus, GCAs are commonly framed in three recurring ways, as shown in Table 4: as facilitators or mediators that intervene in group interaction, as peers or team members that participate alongside humans, or as assistants that support group work from the background. Each framing situates the agent differently within the group's interactional structure—for example, as an external moderator, a participating member, or an infrastructural resource. In turn, this positioning makes certain agent actions intelligible and socially acceptable, while making others inappropriate or out of scope. These role framings therefore do not only describe agent behaviour, but also embed normative assumptions about how group interaction is expected to function (and therefore what constitute breakdowns), and how such breakdowns should be addressed.

4.3.1 Facilitator and Mediator Roles. In facilitator and mediator roles, the agent is positioned as an entity responsible for shaping the quality of group interaction rather than contributing task content directly. In orientation-focused systems, agents are commonly framed as social facilitators that help groups initiate interaction, establish participation norms, and reduce ambiguity around early engagement (e.g., topic suggestions and conversational scaffolding in IntroBot and BlablaBot [78, 79]). In alignment-focused tasks, agents are conceptualized as task facilitators that help structure task-related discussions and coordinate group activity (e.g., reminding participants of time constraints or redirecting discussion to pending topics in ArbiterBot [8] and GroupfeedBot [41]). In conflict-focused systems, agents are framed as mediators that surface divergent viewpoints, reframe disagreement, or guide groups through negotiation processes (e.g., identifying competing proposals and suggesting compromise in debate mediation [27], or repairing norm violations in real-time collaboration [37]).

Interventions associated with this role. This role framing uses interventions that regulate how group members interact with one another. Common strategies include structuring turn-taking, prompting quieter members to participate, moderating conversational tone, reframing disagreements, and orchestrating negotiation steps. Most of these interventions are delivered publicly to the group, positioning the agent as a facilitator, mediator or moderator—a neutral party with some authority. A smaller number of systems demonstrate more selective or discreet enactments of this role, such as privately contacting individuals during negotiation or before sharing potentially sensitive content [78, 93]. These approaches allow the agent to manage social friction while limiting public exposure.

Underlying assumptions. These roles assume the interaction problems can be addressed through localized conversational prompts or procedural scaffolding. The designed interventions assume that they can influence group processes such as participation balance, conflict expression, or negotiation outcomes. They also implicitly treat such intervention as acceptable within the group interaction, without explicitly addressing actual questions of whether the agent could be perceived as being legitimately able to intervene, and have the authority to do so—particularly in longer-term deployments.

4.3.2 Peer and Team Member Roles. In peer and team member roles, the agent is positioned as a participant that engages alongside humans in task-related discussion or decision-making. This framing appears most prominently in execution-focused systems, where the agent contributes information or judgments as part of the group's ongoing work. For example, some systems position the agent as an equal participant in discussion and voting (e.g., an agent AESER was designed to act as an equal member in a review panel alongside two English teachers, jointly evaluating and ranking three student essays. The agent actively participated in the group by sharing scores, asking and answering questions during discussions, expressing uncertainty, and voting on final decisions on par with human members [99]). Relatedly, some systems adopt a devil's advocate role in AI-assisted group decision making, in which a dedicated conversational agent explicitly challenges either the recommendations produced by another AI system or the group's emerging majority opinion. Such interventions foster richer, more critical group discussions [16].

Interventions associated with this role. This framing uses interventions that operate through "normal" contributions to the group. Specifically, agents may express opinions, or generate critiques in the same interaction space as human team members. In such cases, their visible contributions are not labeled nor treated as being special, and are treated as part of the group's processes.

Underlying assumptions. These roles assume that group work can be supported by adding an additional contributor. They implicitly treat the agent as an equal and legitimate source of information or judgement within the group. Participation is typically treated as symmetric, even when real-world groups typically have more complex social structures (e.g. hierarchies, and differentiated knowledge/skills).

4.3.3 Assistant and Background Support Roles. In these roles, the conversational agent is framed as a supportive resource that assists group work without acting as a central conversational participant. This positioning is particularly common in execution-focused systems, where agents provide on-demand informational support while users are engaged in task execution. Rather than shaping interaction dynamics, such agents primarily contribute instrumental resources that facilitate task completion. For example, Schmid et al. [71] designed three conversational agents with varying levels of social presence to support financial advisory interactions between consultants and clients. In their system, the agents assisted information seeking and sensemaking by retrieving and visualizing task-relevant data, such as stock trends and asset allocation charts, enabling users to make informed decisions while conducting the consultation. By manipulating the agent's social presence, the study examined how different degrees of anthropomorphic framing influenced the advisory process. Here, the agent is more of a background tool that augments human performance.

Interventions associated with this role. In this framing, agent interventions prioritize informational support over direct participation in group dialogue. Such interventions may be deployed either reactively, in response to explicit user queries, or proactively, by anticipating informational needs during ongoing group activity. By supplying information that is otherwise unavailable or unevenly distributed among group members, these agents aim to indirectly shape group interaction without explicitly asserting a conversational or social role.

Underlying assumptions. These roles are grounded in the assumption that a substantial portion of group difficulties arises from insufficient or unevenly distributed knowledge among group members. These designs position the agent as a resource that improves the informational environment while leaving decisions about how to act or decide to human members.

Summary. Across the corpus, role framing provides a lens for understanding how GCAs are positioned relative to group interaction. As we can see, each role is embedded with assumptions about both how group challenges/processes function and how problems can be resolved. Implicitly, they all assume that GCAs can be understood as legitimate actors, and in some cases treated as having a degree of authority, within the group's interaction space.

Table 4: Researchers position conversational agents in different roles relative to the group: facilitators or mediators, peers, or assistants. These role framings reflect underlying normative assumptions about how group interaction is expected to function.

Agent Role	Underlying Assumption	Group Challenge	Intervention
Facilitator	The interaction problems can be addressed through localized conversational prompts or procedural scaffolding.	Orientation	• Help groups initiate interaction. • Establish participation norms. • Reduce ambiguity around early engagement.
		Alignment	• Structure task-related discussions. • Coordinate group activity.
Mediator		Conflict	• Surface divergent viewpoints. • Reframe disagreement constructively. • Guide groups through negotiation processes.
Peer/Team Member	Group work can be supported by adding an additional contributor.	Execution	• Contribute information or judgments. • Adopt a devil's advocate role.
Assistant	A substantial portion of group difficulties arises from insufficient or unevenly distributed knowledge among group members.		• Provide on-demand informational support.

5 Discussion

Drawing on the findings from the literature review, we summarize how conversational agents have evolved from individual assistants to those that support group interventions. We also reflect on the current status of GCA design research, and structural design tensions in GCAs. Finally, we discuss implications for future GCA research.

5.1 From Individual Assistants to Group Interventions

Early work in CSCW and groupware explored how interactive systems could be designed to actively shape group work, rather than merely connecting participants [68]. Beyond serving as communication media, these systems embedded mechanisms to structure and mediate collaboration. For example, Colab introduced shared workspaces that allowed participants to externalise and manipulate ideas collectively [83, 84], while systems such as Cognoter explicitly mediated brainstorming, decision-making, and debate through computer-supported processes [21]. These systems treated *group interaction* itself as a design target, asking what kinds of tools could be built to support effective collaboration given the technical infrastructures of their time.

Similarly, GCAs are designed to sense and intervene in group interaction processes. Across the corpus, GCAs have been shown to regulate participation balance in group discussions [41, 48, 78], mediate conflicts or structured debates [27, 37], and support the development of shared understanding through summarisation or topic management[8, 41]. To do so, GCAs operationalise aspects of group structure, such as tracking who has spoken and how often [41, 42], identifying divergent viewpoints within a discussion [27, 69], or monitoring topical coverage across contributions [8]. On the basis of these representations, GCAs determine whether an intervention is warranted, what form it should take, and how it should be delivered. These interventions may be delivered publicly to the group [25, 42], privately to individual members [78, 93], or through a combination of both.

GCAs, in how they operate within group settings, are distinct from multi-user uses of conversational systems that primarily respond to individual queries (e.g. [9, 14]), generate post-hoc summaries of discussion [8], or relay procedural information such as group rules or agendas [30]. Rather than treating the group as a collection of independent users, GCAs intervene on relationships and interactional processes among participants.

As a result, the success criteria for GCAs shift away from producing "correct" or optimal responses, which are common benchmarks for individual conversational agents [9, 14, 43, 74], and instead shift toward collective notions of effectiveness, usefulness, and non-disruption. In practice, GCAs have been evaluated not primarily on what they say, but rather how their interventions have shaped group dynamics: whether participation becomes more balanced, whether disagreements are handled productively, whether groups maintain momentum, and whether interventions are perceived as appropriate within the ongoing interaction. Thus, GCAs are assessed through their effects on group processes rather than through the correctness of individual responses. This paves the way for new kinds of metrics—such as group harmony (distinct from consensus or cohesion), or interactional friction (awkward pauses or misalignment of intent), or alignment without agreement (e.g. "I can explain others' perspectives, even if I do not agree with it").

5.2 Current GCA Design Research: Narrow by Design

Across the corpus, GCAs are predominantly designed as short-term, localised interventions that address specific group challenges

in bounded interactional contexts. This narrowness does not appear incidental. Rather, it can be interpreted as emerging from a convergence of design legibility concerns, technical constraints, and prevailing evaluation norms. In practice, such narrow framing makes GCAs investigable: it renders interventions designable, interpretable, and evaluable within controlled research settings.

From a design perspective, narrow framing reduces ambiguity about what the agent is responsible for within an interaction. Most systems constrain the agent's temporal scope, interactional scope, and degree of authority, clarifying what the agent is accountable for in a given moment. As a result, design problems are commonly formulated around short-term challenges that can be isolated and addressed through targeted interventions, often within the context of lab-based studies. Agents are typically role-bounded, with clearly specified functions (e.g., facilitator, mediator, contributor), which simplifies conceptualisation, supports interpretation of agent behaviour by users, and functionally limits unintended overreach or authority.

Technical constraints further reinforce this narrowing. Many GCAs operationalise group behaviour using observable and comparatively low-level interactional features, such as turn counts [41, 42] or participation frequency [48]. These signals are relatively straightforward to compute and reason about, whereas deeper semantic interpretation of group members' contributions introduces additional ambiguity, uncertainty, and design risk [27]. Similarly, interventions are often implemented through lightweight mechanisms such as awareness cues [41], rule-based prompts [78], or, in more recent systems, LLM-generated text that lowers authoring effort while preserving bounded intervention logic [16].

Evaluation norms further sustain this pattern. Most studies in the corpus rely on short, bounded evaluations, which are well-suited to investigating isolated challenges and discrete interventions. Short study durations favour narrow intervention scopes, and narrowly scoped interventions, in turn, lend themselves to short-term evaluation. Together, these mutually reinforcing dynamics favour role-bounded, intervention-specific designs that favour clarity and measurability over long-term adaptation or evolving group dynamics.

Finally, in many systems, design rationales are embedded in implementation choices rather than articulated as explicit claims. For example, decisions about what constitutes "balanced participation" or an "appropriate intervention" are often encoded as thresholds [41] or prompts [78], without being discussed as normative assumptions about group interaction. This makes it difficult to compare systems, generalise findings across contexts, or reason about what success means at the group level. As a result, theoretical commitments about group interaction often remain implicit, limiting cumulative understanding across GCA research.

5.3 Structural Design Tensions in GCAs

In the corpus, we observe several recurring structural design tensions across GCAs. We interpret these tensions as a consequence of needing to position an agent within a group's social and interactional structure. We identify several here, while leaving open the possibility that other tensions may emerge as GCA design space expands.

Visibility - Discretion. Interventions by the agent on the group's activity may be highly visible (i.e. public contributions visible to the group, as in [29, 41, 49]), or they may be handled discretely (i.e. via private messages to an individual, as in [78, 93]). More visible interventions may promote accountability, though at the risk of embarrassing group members (e.g. consider an agent that tells the group that Bob is speaking too much, versus an agent that lets Bob know this in private). Designers here need to consider two questions: (1) who witnesses the intervention? and (2) who bears the social cost of the intervention? Ultimately, visibility choices encode assumptions about how groups tolerate correction, disagreement, and regulation.

Proactivity - Group Autonomy. To what extent, and when should an agent intervene? Without adequate framing and context, some GCAs provide what may seem like unsolicited interventions based on group behaviours [16, 79, 93]. On the other hand, some GCAs are explicitly triggered by group members (e.g. the group can choose to request assistance explicitly [24, 38]), which leans heavily on group autonomy. Designers here consider three questions: (1) who notices breakdowns, (2) who decides that interventions are needed, and (3) who initiates repair? Proactivity encodes assumptions about what counts as appropriate intervention timing and how much control groups should retain.

Authority - Group Ownership. To what extent is the GCA shaping outcomes versus supporting a group's process? And, for a group, who is ultimately responsible for decisions? This tension directly connects to the role that the agent has in the group, how the group is to perceive the agent's legitimacy in that role, and how much they trust the agent to fulfill the role. Given the lab studies reported in the corpus, participants are implicitly assumed to trust and assume the GCA's legitimacy in the group; however, it is harder to know how these may play out practically in real life situations.

We describe these tensions as spectra rather than binaries; systems necessarily position themselves along these dimensions rather than resolving them. Naming these tradeoffs helps designers reason about the assumptions they are making about groups, rather than implicitly encoding them into systems and evaluations.

5.4 Implications for Future GCA Research

Our analysis highlights several implications for future research on group conversational agents. Advancing GCA research will involve greater attention to group-level evaluation, longer-term interactional dynamics, and the explicit articulation of assumptions about how groups should function.

Group-level evaluation. If GCAs are designed to intervene on group processes, then evaluating them primarily through individual-level measures (e.g., satisfaction, perceived usefulness) may be misaligned with the goal of understanding group outcomes. Instead, we need to develop and validate metrics that consider group function (e.g. Was the group efficient? Was the group effective? Did the group get along with itself? Did the group enjoy its work?). Many metrics that we observed are logical, though may be the product of what can be easily quantified and measured (e.g. balanced participation = contribution counts or word counts) rather than focusing on constructs that may be harder to operationalise (e.g. harmony). Future work should more clearly identify, operationalise metrics

of group phenomena that an agent is intended to influence, even when these outcomes are harder to define or measure, as articulated in Lee et al.'s notion of Group UX [45].

Temporal dynamics as an open question. Across the corpus, GCAs were primarily evaluated in short-term, bounded interactions, leaving open the question of how such interventions might play out over time. Group norms, trust, and expectations evolve, and interventions that are helpful early in an interaction may become redundant, intrusive, or counterproductive as collaboration progresses. Rather than assuming temporal generality, future research should explicitly examine how GCAs operate across longer timescales: when interventions remain appropriate, how groups adapt to an agent's presence, and how agents might adjust their behaviour as group dynamics change.

Making assumptions about group interaction explicit. Our findings suggest a need for even more thoughtful engagement with the assumptions that GCA designs encode. Design choices implicitly define what counts as "balanced participation" [48, 81] or "appropriate participation" within a group. When these assumptions remain implicit—embedded in thresholds, prompts, or triggering conditions—they are difficult to interrogate, compare, or challenge. Future research should continue to surface these assumptions as part of system design and reporting, enabling clearer interpretation of results and more cumulative progress across studies.

These implications point toward refining how GCAs are framed and studied: not merely as conversational interfaces deployed in group settings, but as interventions that enact particular values and theories of group interaction. Making these commitments explicit is a necessary step toward more robust, comparable, and reflective GCA research.

6 Conclusion

In this paper, we reviewed 53 peer-reviewed studies on group conversational agents (GCAs) to understand how conversational systems are designed to sense, intervene in, and shape group interaction. Rather than treating groups as collections of individual users, this work foregrounds GCAs as group-level interventions that operate on participation, coordination, conflict, and shared understanding.

Using group research as an analytic lens, we organized prior work around recurring group challenges (orientation, conflict, alignment, and execution) and examined the roles agents are framed to play in addressing them. Our analysis shows that current GCA designs are predominantly short-term and role-bounded, reflecting design, technical, and evaluative constraints, and that they encode implicit assumptions about appropriate intervention, authority, and group functioning.

By surfacing these patterns and structural design tensions, this review provides a shared vocabulary for reasoning about GCAs as group-oriented systems. We hope this synthesis helps researchers more deliberately articulate design assumptions, evaluate agents at the group level, and advance the study of conversational agents as participants in collaborative social systems.

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