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Time and timing matter:
The role of temporal leadership in the emergence and effectiveness of team voice

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Time and timing matter:

The role of temporal leadership in the emergence and effectiveness of team voice

Abstract: Drawing on the paradox perspective of creativity and functional leadership theory, our research investigates how formal (temporal leadership) and informal leadership (shared leadership) jointly shape the emergence and effectiveness of team voice. Specifically, we explore the dual moderating role of temporal leadership, examining its negative impact on the relationship between shared leadership and team voice, and its positive influence on the curvilinear relationship between team voice and team creativity. Analyzing data from a simulation study involving 78 teams (495 participants) and a field study of 77 software development teams (572 participants), we find that shared leadership positively predicts team voice; meanwhile, temporal leadership attenuates this effect. Additionally, team voice and team creativity exhibit an inverted U-shaped relationship, with high temporal leadership attenuating the curvilinear pattern and shifting the optimal level of voice upward. Finally, we discuss the theoretical contributions and practical implications of these findings.

Keywords: shared leadership; team voice; temporal leadership; team creativity

Highlights

- Shared leadership promotes team voice by enabling autonomy and mutual influence
- High temporal leadership weakens the benefits of shared leadership on team voice
- Team voice boosts team creativity, but only up to an optimal point
- Temporal leadership helps channel team voice into team creativity
- Leadership needs vary across stages of team creative work

1. Introduction

In contemporary organizations, for teams to excel, members must feel free to share constructive feedback, opinions, and ideas (i.e., engaging in team voice; Morrison, 2011). Yet, they must also stay synchronized so that the feedback and ideas translate into tangible outcomes. One such critical outcome is team creativity, defined as a team's collective ability to generate both novel (i.e., original and nonobvious) and useful (i.e., practical and valuable) ideas, as reflected in products, services, processes, and procedures (Shin & Zhou, 2007). In promoting team voice and, consequently, team creativity, leaders face tensions between autonomy and control, a core paradox inherent to their behaviors (Waldman & Bowen, 2016). The paradox perspective of creativity suggests that to foster creativity, organizations need leadership behaviors that enable autonomy and maintain control (Lewis & Smith, 2014; Miron-Spektor & Erez, 2017; Miron-Spektor & Paletz, 2020). Leadership behaviors that grant members abundant autonomy may foster high team voice but risk directionless exploration that fails to translate into creative outcomes. Conversely, leadership behaviors that exert excessive control can stifle the autonomy needed for members to engage in team voice. Thus, successful leadership behaviors in the context of fostering team voice and team creativity involve a dynamic approach that shifts between providing freedom for team voice and implementing structure for team creativity. This is consistent with functional leadership theory's core tenets (Morgeson et al., 2009), which suggests that the effectiveness of specific leader behaviors hinges on which functional need is most salient at a given stage of a team's workflow (Farh & Chen, 2018).

Drawing on the paradox perspective of creativity and functional leadership theory (Lewis & Smith, 2014; McGrath, 1962; Morgeson et al., 2009), we propose that shared leadership, wherein leadership influence is spread across multiple team members rather than concentrated in a single formal leader, addresses teams' functional need for autonomy and is particularly effective in promoting team voice. Thus, our first goal is to examine shared leadership's role in facilitating team voice. Shared leadership has been conceptualized as "a dynamic, interactive influence process among individuals in groups aimed at leading one another to achieve group or organizational goals or both" (Pearce & Conger, 2003, p. 1). While extant research on shared leadership has primarily examined its effects on performance outcomes (see Zhu et al., 2018, for a review), how shared leadership influences team voice behaviors remains underexplored. Addressing this gap, we argue that when team members undertake functional leadership responsibilities through shared leadership, they develop a strong sense of autonomy and responsibility to influence team outcomes, thus engaging in more team voice behaviors.

Meanwhile, as enabling voice emergence and maintaining voice effectiveness create tensions between autonomy and control, formal vertical leadership behaviors emphasizing control demands are likely to have differential functional significance in the different stages of team processes. Specifically, as teams operate under clocks, calendars, and milestones that shape how members interact, one formal leadership behavior regarding how to manage time demands (i.e., temporal leadership; Mohammed & Nadkarni, 2011) is especially relevant for the evolution of team processes. Temporal leadership refers to leader actions that shape when work happens, such as setting deadlines, sequencing activities, and pacing team efforts

(Mohammed & Nadkarni, 2011). In the early stages of the team process, strong temporal leadership may constrain voice emergence by limiting the autonomy needed for members to freely express ideas. However, as teams progress toward deliverables and face increasing coordination challenges, temporal leadership becomes crucial for channeling voice behaviors toward creative outcomes and preventing the fragmentation of team efforts.

Thus, our second goal is to explore how temporal leadership, as an important contextual factor, may play a dual moderating role in the different stages of the team process. Extant research has predominantly revealed that temporal leadership has uniform positive effects across team processes (e.g., Maruping et al., 2015; Mohammed & Nadkarni, 2011). Meanwhile, we seek to expand the current understanding by demonstrating that temporal leadership has contradictory effects (i.e., simultaneously constrains and enables different team processes) depending on the team creativity stage. To integrate these arguments, Figure 1 presents a process model illustrating how temporal leadership intervenes at different stages of the team process, weakening voice emergence in earlier stages while enabling the translation of team voice into creative outcomes as coordination demands increase.

======Figure 1 ======

Specifically, we argue that temporal leadership can weaken the effects of shared leadership on team voice but facilitate the translation of team voice into team creativity. Functional leadership theory (McGrath, 1962) suggests that leader behaviors are more effective when they address salient team needs but are less effective when such needs are not salient or do not exist (Farh & Chen, 2018). In the stage from shared leadership to team voice, temporal leadership addresses a need (time management) that is less salient to a team.

Moreover, with its focus on schedules and deadlines, temporal leadership creates a more structured environment that may reduce the autonomy team members feel under shared leadership, thus making them less likely to voice opinions and ideas that may disrupt timelines.

Conversely, we suggest that the temporal structures established by temporal leadership can help team members deal better with the conflicting demands in translating team voice into team creativity. The paradox perspective of creativity posits that generating creative outcomes requires teams to balance opposing demands, such as shifting between divergent (exploring diverse ideas) and convergent thinking (identifying the best solution; Lewis & Smith, 2014; Miron-Spektor & Erez, 2017; Miron-Spektor & Paletz, 2020). When team voice becomes excessive (i.e., many ideas are proposed by many members without sufficient time or structure to integrate them), teams may struggle to manage these tensions. This can undermine creativity, engendering an inverted U-shaped relationship between team voice and team creativity. Addressing the coordination needs in translating team voice into team creativity, leaders with high temporal leadership can schedule specific periods for the conflicting processes of divergent and convergent thinking. This can allow team members to fully focus on each mode without worrying about transitions and reduce the coordination losses (Mohammed & Nadkarni, 2011). Thus, we argue that temporal leadership can widen the range of team voice levels that result in high creativity and increase the overall level of creativity achievable at the peak of the inverted U-curve.

Together, our research makes three contributions to the literature. First, we advance research on team voice by examining how shared leadership, as an informal leadership

structure, facilitates the emergence of team voice. Studies have primarily focused on the role of formal leadership in shaping voice behaviors (Morrison, 2023). Meanwhile, we highlight the unique advantages of shared leadership rooted in horizontal, lateral influence among peers (Morgeson et al., 2009; Pearce & Conger, 2003). Responding to calls to jointly examine shared and vertical leadership (Zhu et al., 2018), we further show that these leadership forms may operate in tension rather than harmony, extending extant work emphasizing only their additive or complementary effects (e.g., He et al., 2019). Second, we extend research on the team voice–team creativity relationship, which has largely assumed a positive linear association (e.g., Li et al., 2017). Drawing on the paradox perspective of creativity, we demonstrate that team voice exhibits a curvilinear relationship with team creativity, thereby clarifying when voice enhances creative outcomes and when it becomes counterproductive. Third, we contribute to the temporal leadership literature by challenging the prevailing view that temporal leadership is uniformly beneficial across team processes (Maruping et al., 2015; Mohammed & Nadkarni, 2011). By integrating the paradox perspective of creativity with functional leadership theory, we theorize and show that temporal leadership exerts paradoxical moderating effects across team creativity stages. Specifically, it may inhibit the emergence of team voice, where flexibility and autonomy are critical, while facilitating the translation of voice into creative performance in later stages characterized by heightened coordination demands. This process-sensitive perspective advances a more contingent understanding of leadership effectiveness (Chen & Liu, 2020; Maruping et al., 2015). Figure 2 illustrates our theoretical model.

====== Figure 2 ======

2. Literature review and hypothesis development

2.1 Shared leadership and team voice

Shared leadership emerges when leadership responsibilities are distributed among team members rather than concentrated in a single individual (Carson et al., 2007). Unlike conventional hierarchical leadership with formal authority resting with a single manager, in shared leadership, team members alternate between leading and following based on situational demands. This creates a dynamic process of mutual influence (Carson et al., 2007; Pearce & Conger, 2003). We argue that this interpersonal and horizontal nature of shared leadership can engender more team voice behaviors.

First, shared leadership increases team members' awareness of problems and opportunities, which is a prerequisite for voice behaviors (Pinder & Harlos, 2001). By engaging team members in strategic thinking and team activities (Zhu et al., 2018), shared leadership enhances their awareness and understanding of team and organizational needs, problems, and missions, creating both the knowledge basis and felt obligation for voice (Morrison, 2011). Second, shared leadership cultivates prosocial motivation by orienting team members toward collective rather than individual goals (Carson et al., 2007; Zhu et al., 2018). This directly aligns with the prosocial nature of voice behaviors, which aim to initiate positive organizational changes (Van Dyne et al., 2003; Grant & Ashford, 2008; Morrison, 2014). Third, shared leadership fosters high-quality interpersonal relationships through reciprocal influence processes (Carson et al., 2007). These encourage information exchange and sharing, which are the fundamental components of team voice (Morrison, 2011). When

open exchanges become normalized through shared leadership practices, team voice naturally emerges from these collaborative interactions. Accordingly, we hypothesize:

Hypothesis 1. Shared leadership is positively related to team voice.

2.2 The moderating role of temporal leadership in the relationship between shared leadership and team voice

Mohammed and Nadkarni (2011) first introduced the concept of team temporal leadership. It focuses on how leaders manage team timing through three main activities: scheduling (setting specific milestones to monitor team task progress), synchronizing (coordinating team members' activities through structured timelines), and allocating temporal resources (establishing priorities and time buffers). Temporal leadership affects team performance (Mohammed & Nadkarni, 2011), team creativity (Duan et al., 2023), and handling of time pressures (Maruping et al., 2015). Drawing on functional leadership theory, which suggests that leadership is most effective when addressing critical team needs (Farh & Chen, 2018; McGrath, 1962), we propose that control-focused temporal leadership may weaken the positive relationship between shared leadership and team voice.

Specifically, while shared leadership enhances team voice through problem awareness, collective motivation, and information sharing, temporal leadership may counteract these benefits in several ways. First, the rigid time schedules in temporal leadership may limit team members' ability to develop in shared leadership to deeply reflect on team problems and develop an awareness of team issues beyond immediate deadline concerns (Duan et al., 2023; Sinha et al., 2021). Second, temporal leaders' focus on temporal milestones may direct attention away from the strategic considerations fostered in shared

leadership (Duan et al., 2023). Further, their emphasis on temporal efficiency may create pressure that discourages voice behaviors as potentially disruptive to established timelines (Detert & Burris, 2007; Bachrach et al., 2023). Third, the structured interactions around scheduling in high-temporal leadership may inhibit the natural communication flow that characterizes shared leadership, limiting opportunities for spontaneous idea-sharing and deep informational exchanges among team members (Duan et al., 2023). In summary, temporal leadership's hierarchical nature, where one individual controls time-related decisions, may undermine shared leadership's egalitarian premise, causing team members to prioritize schedule adherence over speaking up about potential issues or innovative ideas. Accordingly, we hypothesize:

Hypothesis 2. Temporal leadership moderates the relationship between shared leadership and team voice such that the relationship is stronger when temporal leadership is lower.

2.3 Team voice and team creativity

Drawing on the paradox perspective of creativity, we posit that moderate team voice provides the optimal conditions for creativity. The paradox perspective challenges the notion that creativity is a linear process and frames it as a dynamic interplay of contrasting elements, which teams need to carefully balance to be creative (Miron-Spektor & Erez, 2017; Miron-Spektor & Paletz, 2020). Specifically, it proposes that creativity emerges from the tensions between seemingly opposing processes: generative and evaluative thinking, divergent and convergent thinking, and attention to novelty and usefulness. In generative thinking, team members try to produce diverse and alternative options, while in evaluative thinking, team

members evaluate different alternatives and try to reach the single best solution (Goldschmidt, 2016). Creativity also requires divergent thinking that challenges current patterns and produces novelty, and convergent thinking that adheres to established boundaries and ensures usefulness (Goldschmidt, 2016).

We propose that team voice has an inverted-U-shaped relationship with team creativity. Under low team voice, as often seen in highly hierarchical R&D teams where junior scientists hesitate to challenge senior researchers' perspectives, the limited generation of diverse ideas and perspectives can hinder creativity (Guo et al., 2018). As team voice increases to moderate levels, exemplified in cross-functional workshops where structured brainstorming techniques ensure balanced participation, members challenge assumptions, share diverse ideas, and explore alternative viewpoints, enabling the generative and divergent thinking necessary for creativity (Hundschell et al., 2021). The moderate flow of voice also allows teams the time and effort to effectively process, evaluate, and integrate ideas through evaluative and convergent thinking (Harvey & Kou, 2013).

However, when team voice becomes excessive along multiple dimensions, creativity may start declining. As operationalized in our research, team voice captures the prevalence of speaking-up behaviors in teams, such as frequently expressing opinions and recommending changes, rather than the quality or specific content of the voiced ideas themselves. Accordingly, higher team voice reflects greater volume of expressed viewpoints and not necessarily higher-quality input. From this perspective, excessive voice may manifest as (1) an overwhelming frequency of input whereby members contribute ideas faster than the team can meaningfully process them, (2) an excessive diversity of perspectives without effective

ways to integrate them, and (3) prolonged divergent discussions that prevent convergence toward viable solutions. As often observed in open discussion meetings where everyone speaks at length without agenda constraints or time limits, such excessive voice creates cognitive overload that impedes the convergent thinking necessary for idea refinement and evaluation (Harvey & Kou, 2013; Hundschell et al., 2021). Excessive voice may also increase interpersonal conflicts and disagreements, reducing members' willingness to integrate each other's ideas (Harvey & Kou, 2013). Thus, excessive team voice may disrupt the delicate balance needed for optimal creativity. Accordingly, we hypothesize:

Hypothesis 3: Team voice has an inverted-U-shaped relationship with team creativity.

2.4 The moderating role of temporal leadership in the relationship between team voice and team creativity

The paradoxical perspective of creativity suggests that leadership plays an important role in helping members navigate contradictory demands in the creative process (Miron-Spektor & Erez, 2017; Miron-Spektor & Paletz, 2020). We argue that temporal leadership, involving setting deadlines, coordinating actions, and allocating temporal resources (Mohammed & Nadkarni, 2011), can help translate team voice into creativity by aiding members in navigating tensions between the different creative processes.

First, temporal leadership can schedule dedicated time blocks for divergent and convergent thinking processes, allowing members to fully engage in each thinking mode and reducing the cognitive burden they experience when attempting to simultaneously generate and evaluate ideas (Maruping et al., 2015; Mohammed & Alipour, 2015). Second, by synchronizing the timing of members' actions, temporal leaders can help members develop a

collective understanding about when to generate versus integrate ideas. This can help mitigate the chaos that often emerges when multiple members attempt to simultaneously suggest ideas and provide feedback (Gevers et al., 2006). Third, temporal leaders can allocate temporal resources to help teams avoid becoming paralyzed by excessive divergence or premature convergence (Mohammed & Nadkarni, 2011) and be better prepared to resolve possible conflicts produced by excessive team voice (Gevers et al., 2001). For example, in a product development team tasked with creating a new mobile application, when team members begin voicing diverse ideas about features and functionality, a temporal leader can allot a two-week period dedicated to idea generation where all members contribute suggestions without any evaluation. This can be followed by a one-week evaluation period where ideas are assessed for feasibility and usefulness. Then, the temporal leader can establish specific daily meetings during the generation phase where each member shares new concepts, followed by structured integration sessions during the evaluation phase where members combine promising elements from different proposals. Finally, the temporal leader can establish priorities and time buffers for managing the inherent tensions in the creative process. For example, the leader may allocate 60% of the project timeline to idea exploration, 25% to integration and synthesis, and 15% as buffer time for resolving conflicts that arise when different voices advocate for competing approaches.

Conversely, low temporal leadership leaves teams without essential tools to manage the voice-to-creativity process (Mohammed & Nadkarni, 2011). Without a temporal structure, teams with high voice may become stuck in excessive divergent thinking without adequate refinement and evaluation (Harvey & Kou, 2013). Additionally, the absence of

temporal structure may intensify cognitive load as team members attempt to simultaneously process new ideas while refining existing ones (Chong et al., 2011). Thus, temporal leadership serves as a critical moderator that amplifies the positive relation between team voice and team creativity at low to medium levels of team voice, puts off the point at which team voice gradually starts inhibiting team creativity, and ultimately, shifts the optimal point of voice behaviors upward. Accordingly, we hypothesize:

Hypothesis 4: Temporal leadership moderates the curvilinear relationship between team voice and team creativity, such that team voice promotes more team creativity when temporal leadership is higher rather than lower, and the inflection point of the inverted-U curve moves to the upper right corner when temporal leadership is higher.

3. Overview of studies

We conducted two multisource, time-lagged studies to test our hypotheses. Study 1 used a business simulation to observe initial patterns (Dierdorff et al., 2011), while Study 2 employed a field study to replicate and validate these findings. This approach enabled constructive replication across varied designs and enhanced the robustness and generalizability of our results.

4. Study 1: Business simulation survey

4.1 The business simulation

The business simulation approach is an established method for examining organizational behaviors and testing theoretical frameworks (e.g., Dierdorff et al., 2011; Fisher et al., 2012). Our study leverages this approach, whereby teams role-play as companies competing in a market by developing comprehensive business strategies. The

simulation replicates a real-world organizational environment where each team is responsible for a comprehensive array of business operations, including research and development, design, production, and sales. Within these simulated companies, team members assume roles reflective of a corporate hierarchy, with a CEO-equivalent leading the strategy and team coordination. Team members are responsible for various business functions and collaboratively creating product strategies and financial plans. In the simulation, teams face two fiscal cycles, wherein they make strategic decisions on production, marketing, and pricing at specific times, reacting to their competitors' actions.

4.2 Sample and procedure

The participants included 495 managers from 78 teams enrolled in a series of 8 business simulation courses conducted from January 2022 to January 2023 as part of non-degree executive training programs. Each team had 3 to 9 members (Mean = 6). The sample was 54.7% male, with 95.6% holding bachelor's degrees or higher, and a mean age of 34.79 years (*SD* = 5.36).

The simulation comprised two one-day stages, with each day serving as both an accounting period and a reporting cycle. All participants provided informed consent before participating in the study. Before the business simulation, the lecturer provided a guide for the simulation process, and demographic information was collected. At the end of day one, team members reported on shared leadership using the network measure method and rated their leaders' temporal behaviors; meanwhile, team leaders reported on team voice. At the end of day two, team leaders rated team creativity.

4.3 Measures

We adhered to Brislin's (1986) recommended back-translation method for translating our questionnaires from English into Chinese. Except for shared leadership, all other key constructs were rated on a seven-point Likert scale.

Shared leadership. Following extant research (Carson et al., 2007; Sinha et al., 2021), we measured shared leadership using a social network approach where team members rated each peer's leadership behaviors. Members used a three-point scale (1 = rarely, 2 = sometimes, 3 = most of the time) to rate the following question: "Could you rate the degree to which this individual established objectives for the project, assigned duties, and distributed resources, offered constructive criticism, delivered task-oriented guidance, implemented structure, directed the team, and monitored performance?" We operationalized shared leadership at the team level using network density, calculated by dividing actual perceived leadership connections by the total possible connections within each team. Following Sinha et al. (2021), we converted ratings to binary scores (rarely = 0, sometimes/most of the time = 1) before the social network analysis. High density indicated greater shared leadership, reflecting multiple members perceived as engaging in leadership behaviors.

Temporal leadership. Temporal leadership was measured using a seven-item scale developed by Mohammed and Nadkarni (2011; Cronbach's α = .93). We observed adequate levels of interrater agreement and aggregated it to the team level (median Rwg = .88, mean Rwg = .84, ICC (1) = .28, and ICC (2) = .71).

Team voice. In Study 1, team voice was reported by the team leader for two primary reasons. First, this approach acknowledges the interactive nature of voice as a co-constructed process (Zhang et al., 2022). This aligns with research indicating that voice involves both the

act of speaking up and how it is received and interpreted by leaders (Morrison, 2014). This perspective captures not just individual expression but also leadership's crucial role in recognizing and shaping these contributions. Team leader-rated voice has demonstrated high reliability and validity in extant studies (Ye et al., 2019; Zheng et al., 2022). Second, our business simulation course has a specific segment titled *Reflection and Summary*, led by each team's leader. During this segment, team leaders present a summary of their team's performance, including aspects related to each team member's contributions and suggestions. This setup naturally positions team leaders as the focal point for reporting team voice, as they are responsible for summarizing and reflecting upon the inputs and ideas from their team members. Therefore, team leaders were tasked with gauging the collective engagement of their team in voice behavior, drawing upon a specialized six-item scale originally devised by Van Dyne and LePine (1998; Cronbach's α = .91).

Team creativity. Following Li et al. (2018), team creativity was assessed using a three-item scale adapted from Farh and Chen (2018). Team leaders rated the extent to which their team's output was (1) "creative," (2) "original and practical," and (3) "demonstrative of the team's ability to use existing information or resources creatively" (Cronbach's α = .75). As the assessment was conducted after the business simulation, team leaders had access to comprehensive performance data. This enabled them to provide an informed evaluation of their team's creativity across the two simulated stages.

Control variables. To account for potential confounding factors, we included team size as a control variable, given its effects on team outcomes (e.g., Amason & Sapienza,

2016). Additionally, we controlled for team-level diversity in gender, age, and educational background, as these factors may affect our model's results.

4.4 Analysis strategy

We used hierarchical ordinary least squares regression to test our hypotheses. To examine the shared leadership–team voice relationship, we first included shared leadership and its squared term and then added temporal leadership and the interaction term to test the moderation effect. For the team voice−team creativity relationship, we included team voice and its squared term, and then temporal leadership, and the interaction terms involving team voice and temporal leadership to examine the moderation effects. All predictor variables (shared leadership, team voice, temporal leadership, and controls) and interaction terms were mean-centered before analysis to reduce multicollinearity and improve interpretability (Aiken et al., 1991).

4.5 Results

4.5.1 Descriptive statistics and preliminary analysis

Table 1 displays the descriptive statistics and correlations of the variables. We found a positive relationship between shared leadership and team voice ($r = .43$, $p < .01$), and between team voice and team creativity ($r = .33$, $p < .01$).

======Table 1======

We conducted a two-level confirmatory factor analysis. Using item parceling to reduce random errors and improve stability (Little et al., 2002), we randomly assigned three parcels for team voice and four for temporal leadership (Landis et al., 2016). The measurement model showed acceptable fit ($\chi^2 = 65.15$, $df = 14$; RMSEA = .09, $SRMR_{within}$

= .02, $SRMR_{between}$ = .05; CFI = .97, TLI = .94) and a better fit than other alternative measurement models, supporting the distinctive factor structure of our variables.

4.5.2 Hypothesis testing results

As shown in Table 2, shared leadership had a significant positive linear effect on team voice (β = .43, p < .01, Model 3b). Meanwhile, its curvilinear effect was not significant (β = –.06, *n.s.*, Model 3b). Thus, Hypothesis 1 was supported. The interaction between shared and temporal leadership was negative but not statistically significant (β = –.16, p = .14, Model 3a). Thus, Hypothesis 2 was not supported. To further assess the magnitude of this non-significant moderation effect, we compared nested regression models. Adding the interaction terms in Model 3 explained an additional 2.3% of the variance in team voice (ΔR^2 = .02). However, this increment was not statistically significant (ΔF (2, 70) = 1.16, p = .32). Thus, the moderation terms did not substantially improve model fit beyond the main effects. Consistent with this result, the unstandardized interaction estimate was negative, as theorized, but modest in magnitude (b = –2.22, SE = 1.46). Further, its 95% confidence interval [–5.121, .684] included zero, indicating considerable estimation uncertainty. Thus, the hypothesized moderation effect in Study 1 was directionally consistent with our theorizing but weakly estimated and not statistically supported in this sample.

Hypothesis 3 proposed an inverted-U-shaped relationship between team voice and team creativity. Results in Table 2 showed a positive linear effect (β = .34, p < .01, M10) and a negative quadratic effect (β = –.48, p < .01, M10) of team voice on creativity, indicating a curvilinear relationship. To validate the inverted U shape beyond the significant quadratic effect (Haans et al., 2015), we conducted a two-line test using the Robin Hood procedure

(Simonsohn, 2018). As shown in Figure 3, at low-to-moderate levels, each unit increase in team voice enhanced creativity (b = .88, p < .01). Meanwhile, at moderate-to-high levels, each unit increase reduced creativity (b = –.49, p < .05), supporting Hypothesis 3. The vertex of the inverted U-shaped relationship was .36 (95% CI [.042, .814]), while the curvilinear effect was −.48 (95% CI [−.534, −.242]).

Hypothesis 4 proposed that temporal leadership moderates the curvilinear relationship between team voice and team creativity. Results in Table 2 (Model 12) showed a significant quadratic-by-linear interaction on creativity (β = .20, p < .05), supporting Hypothesis 4. As shown in Figure 4, when temporal leadership was low (−1 *SD*), the vertex was .06 (95% CI [−.180, .634]) and the curvilinear effect was −.59 (95% CI [−.933, −.272]). Conversely, when temporal leadership was high (+1 *SD*), the vertex shifted to 1.02 (95% CI [.483, 4.190]) and the curvilinear effect was −.23 (95% CI [−.420, −.073]), which was statistically significant. Thus, under low temporal leadership, the curvilinear relationship was strongly negative (b = –.59, p < .01). Under high temporal leadership, the negative slope was weaker (b = –.23, p < .05), with the inflection point shifting to the upper right corner. A *Johnson–Neyman* analysis further showed that, within the observed range of temporal leadership, team voice's quadratic effect on team creativity was statistically significant only at lower to moderate levels of temporal leadership (below approximately 6.19; see Online Supplemental Figure S1). At higher levels of temporal leadership, the quadratic effect became nonsignificant. Thus, temporal leadership attenuated the inverted U-shaped relationship by buffering the downturn associated with high levels of team voice.

======Table 2 and Figures 3 and 4 ======

4.6 Supplementary analyses[1]

In Study 1, we additionally employed an independent, output-based measure of team creativity as a robustness check. Specifically, team creativity was evaluated by the course instructor, who was not involved in the survey data collection and was blind to the study hypotheses. The instructor did not have access to teams' survey responses for the current study; instead, creativity ratings were based on teams' observable simulation outputs generated throughout the exercise. The evaluation was criterion-based rather than a comparative ranking across teams and focused on the extent to which each team generated and implemented novel ideas across several predefined domains, including new design solutions, new construction processes, new business models, and other innovations such as new rules and cost-saving practices. The results remained substantively unchanged: Team voice exhibited a significant inverted U-shaped relationship with team creativity ($\beta = -.38$, $p < .01$; Model 10, Online Supplemental Table S2), while the quadratic-by-linear interaction with temporal leadership was also significant ($\beta = .23$, $p < .05$; Model 12, Table S2). Thus, the analyses using both density- and centralization-based shared leadership measures produced consistent patterns. The detailed findings are reported in Online Supplemental Tables S2 and S3.

4.7 Brief discussion

Our simulation study provided initial support for most hypotheses, showing that shared leadership promotes team voice, team voice exhibits an inverted U-shaped relationship

[1] As a robustness check, we also replicated the analyses using a leadership centralization index, which captures the extent to which leadership influence is concentrated in a small number of team members. As reported in Online Supplemental Table S1, the results were consistent with the primary analyses.

with team creativity, and temporal leadership moderates the voice–creativity relationship. Although temporal leadership's moderating effect on the shared leadership–team voice relationship was in the predicted negative direction, it did not reach statistical significance and was only modest in magnitude. Thus, temporal leadership's inhibiting effect on voice emergence may be weaker or less stable in the simulation setting, where team interactions are relatively bounded and ongoing coordination pressures may be less salient than in natural organizational contexts. Additionally, having leaders rate both team voice and creativity raises potential concerns about common method bias. To address these limitations, we conducted Study 2 in natural organizational settings with intact teams. Specifically, we used team member-rated voice to reduce method bias and examine whether the hypothesized relationships would hold under real work conditions. Together, this complementary design helps balance internal validity and external relevance, while offering a more cautious basis for interpreting the cross-study pattern of results.

5. Study 2: Field survey

5.1 Sample and procedure

For Study 2, we recruited 523 subordinates from 82 software development teams and their leaders at two Beijing technology companies. These teams operate within structured frameworks while addressing urgent client demands, like system upgrades. In collaboration with the human resource managers, we conducted data collection in three phases spaced two weeks apart. At Time 1, team members provided demographics and rated shared leadership (using the social network approach from Study 1) and leaders' temporal leadership behaviors. At Time 2, subordinates evaluated the team voice. At Time 3, leaders rated team creativity.

Participation was voluntary and confidential, with separate paper-and-pencil surveys directly submitted to the research team after informed consent.

At Time 1, we received complete responses from all 82 team leaders and 523 subordinates. At Time 2, we had responses from 513 subordinates across 80 teams (a 98.09% response rate). At Time 3, we received valid responses from 495 subordinates in 77 teams (a response rate of 96.49%). The final sample included 77 teams with 572 respondents. Team sizes ranged from 5 to 10 members, with an average size of 7. Participants were 57.2% male with a mean age of 33.20 years (*SD* = 5.25), and all held bachelor's degrees or higher.

5.2 Measures

Study 2 employed the same measurements for shared leadership, team voice, temporal leadership, and team creativity as in Study 1. However, as an extension and to complement the initial study, we gathered reports on team voice directly from subordinates (Zhang et al., 2022). The reliability of the team voice measure was robust (Cronbach's α = .90). Further, interrater agreement was strong for team-level analysis (mean Rwg = .94, ICC (1) = .68). For temporal leadership, the measure also demonstrated high reliability (Cronbach's α = .94) and adequate interrater agreement for team-level aggregation (mean Rwg = .63, ICC (1) = .32). For team creativity, the reliability was similarly high (Cronbach's α = .94). We controlled the same variables as Study 1 to ensure comparability.

5.3 Analysis strategy

The analysis strategy in Study 2 was the same as we used in Study 1.

5.4 Results[1]

[1] As a robustness check, we replicated the analyses using a leadership centralization index as an alternative operationalization of shared leadership (Online Supplemental Table S4). The results were consistent with the primary

Table 3 reports the descriptive statistics. The results demonstrated a positive relationship between shared leadership and team voice (r = .40, p < .01).

======Table 3======

We mean-centered predictor variables before regression analysis. As shown in Table 4, shared leadership positively predicted team voice (β = .33, p < .01; M3b), supporting Hypothesis 1. The interaction term significantly and negatively affected team voice (β = –.23, p < .05; M3a), supporting Hypothesis 2. Simple slope tests (Figure 5) revealed a stronger positive relationship between shared leadership and team voice under low (b = 2.75, p < .01) versus high temporal leadership (b = .82, *n.s.*; *diff* = 1.93, p < .01).

======Table 4 and Figure 5======

Supporting Hypothesis 3, team voice had a significant negative quadratic effect on team creativity (β = –.69, p < .01; Table 4, M10). As shown in Figure 6, the two-line tests showed team voice positively affected creativity at low-to-moderate levels (b = 1.2, p < .05) but negatively at moderate-to-high levels (b = –.82, p < .01). The vertex of the inverted U-shaped relationship was −.27 (95% CI [−.559, −.045]), while the curvilinear effect was −.69 (95% CI [−.855, −.418]). Supporting Hypothesis 4, the quadratic-by-linear interaction of team voice and temporal leadership significantly predicted team creativity (β = .49, p < .01; Table 4, M11). As shown in Figure 7, under low temporal leadership, the vertex of the inverted U-shaped relationship was −.39 (95% CI [−1.443, −.266]) and the curvilinear effect was −.59 (95% CI [−.862, −.055]). When temporal leadership was high (+1 *SD*), the vertex was −.25 (95% CI [−3.168, 1.788]); further, the curvilinear effect was −.21 (95% CI

analyses.

[−.691, .090]), which was not statistically significant. A comparable *Johnson–Neyman* analysis in Study 2 showed that, within the observed range of temporal leadership, the quadratic effect of team voice on team creativity was statistically significant only at lower to moderate levels of temporal leadership (below approximately 5.56; see Online Supplemental Figure S2). As temporal leadership increased, the quadratic effect became nonsignificant. Thus, temporal leadership attenuated the inverted U-shaped relationship and extended the range over which team voice remained beneficial for creativity.

======Figures 6 and 7======

5.5 Brief discussion

Study 2 replicated Study 1's findings in a field setting using employee-rated voice. This can mitigate potential bias from leaders rating both team voice and creativity while allowing us to examine whether the measurement source affects model validation. The moderating effect of temporal leadership on the shared leadership–team voice relationship was also supported. The convergent results across simulation and field environments further increased confidence in our hypotheses' generalizability.

6. General discussion

6.1 Theoretical implications

First, we highlight the critical role of informal leadership, particularly shared leadership, in fostering team voice. Studies have predominantly focused on how formal leadership behaviors influence team voice (for a review, see Morrison, 2023). Our findings extend this understanding by revealing how the horizontal, lateral influence within shared leadership can facilitate team voice's emergence by providing members with the autonomy to

actively engage in team activities and strategic thinking. Importantly, while the literature primarily considers team voice as a precursor to shared leadership (Carson et al., 2007), we demonstrate that shared leadership also serves as an antecedent of team voice. This underscores the bidirectional and mutually reinforcing nature of the relationship between shared leadership and team voice. Furthermore, we identify the counteracting effect of temporal leadership in weakening the positive relationship between shared leadership and team voice. Thus, shared leadership, as a form of informal leadership, does not operate in isolation. Its effectiveness depends on the broader vertical leadership context within the team, which can impact or even undermine its benefits. This insight advances our understanding of shared leadership by moving beyond its simple main effects to explore when and why it works.

Second, our research uncovers the curvilinear nature of the relationship between team voice and creativity. Extant research typically emphasizes the positive, linear effects of voice on creativity (Li et al., 2017; Ye et al., 2019; Zheng et al., 2022). Meanwhile, we draw on the paradox perspective of creativity and demonstrate that moderate team voice yields optimal creative outcomes by facilitating a balance between divergent and convergent thinking. Conceptually, this "optimal zone" of team voice emerges from the inherent tension between the benefits and costs of voice behaviors in creative contexts. Low team voice limits the diversity of ideas and perspectives needed for creative breakthroughs. Meanwhile, excessive voice can become counterproductive by creating information and cognitive overload that harms creativity. The optimal zone represents a theoretical sweet spot where voice behaviors provide sufficient cognitive diversity and constructive challenge while maintaining team

focus. These conditions are essential for both generating creative ideas (divergent thinking) and refining them into viable solutions (convergent thinking). Additionally, we identify temporal leadership as a critical moderator that attenuates the inverted U-shaped relationship between team voice and team creativity by buffering the decline at high levels of team voice, flattening the curve, and shifting the optimal level of voice upward. Through temporal structuring, activity coordination, and resource management, temporal leadership helps teams more productively harness extensive voice input, thereby extending the range over which voice remains beneficial for creativity. This finding also offers new insights into the interplay of voice behaviors and leadership dynamics in creative processes (Ali et al., 2020).

Finally, we unravel temporal leadership's paradoxical moderating role across different stages of team processes. Specifically, temporal leadership operates as a double-edged sword, simultaneously constraining and enabling team dynamics depending on the process stage. During the voice generation phase, temporal leadership's emphasis on time management can stifle the organic, emergent interactions that fuel shared leadership's influence on team voice. However, these same structural properties also help teams better channel diverse voices into creative outputs. Extant research has primarily emphasized temporal leadership's positive effects on coordination and alignment (e.g., Lyu et al., 2022; Mohammed & Alipour, 2015; Mohammed & Nadkarni, 2011), and only recently begun exploring its potential constraints on creativity (e.g., Duan et al., 2016). Meanwhile, we advance a paradoxical perspective that positions these seemingly contradictory effects as two sides of the same coin. This paradox suggests that effective temporal leaders must navigate the tension between providing sufficient structure to enable coordination while maintaining enough flexibility to allow for

emergent processes. Crucially, temporal leadership's effectiveness lies in managing the inherent tensions across different phases of team functioning.

6.2 Practical implications

Our research offers several actionable insights for team leaders and organizational practitioners seeking to enhance team voice and creativity. First, leaders should adopt temporal separation by carefully calibrating the timing and intensity of temporal structuring across different phases of teamwork. Temporal separation allows teams to focus on distinct activities in discrete time windows, clarifying what should be done when, and reducing role and process ambiguity (Shi & Prescott, 2012). Our findings suggest that during early phases, when voice emergence is critical, excessive temporal structuring may inadvertently undermine the benefits of shared leadership by constraining perceived autonomy and dampening speaking up (Morrison, 2011). Accordingly, leaders should preserve temporal flexibility early on by allowing open discussion periods or loosely structured exchanges. This approach is particularly relevant for agile teams or early-stage product development groups, where maintaining flexibility in initial sprint planning or backlog exploration enables teams to surface diverse perspectives and build shared understanding before moving into tightly scheduled iterations.

Second, once team voice becomes extensive, leaders should progressively introduce temporal structure to translate diverse input into creative outcomes. Temporal leadership provides pacing, coordination, and clarity, facilitating the shift from idea generation to integration and implementation (Rosso, 2014). For example, in product design or development teams, alternating open brainstorming sessions with time-bounded decision

checkpoints can help channel divergent input into actionable concepts. Structuring dedicated time blocks for divergent and convergent thinking reduces cognitive overload. Meanwhile, synchronizing team activities fosters shared expectations about when to generate ideas versus when to evaluate and integrate them. Practices such as milestone planning, time-bounded decision making, and structured integration sessions help manage competing inputs, prevent idea overload, and sustain creative momentum (Mohammed & Nadkarni, 2011).

Third, organizations operating in creative or fast-paced environments may benefit from adopting hybrid leadership systems combining shared leadership with carefully staged temporal leadership. Dynamically balancing flexibility and temporal control is especially critical under conditions of high velocity, tight deadlines, or shifting priorities (Knight, 2015). Rather than relying on constant temporal control, effective leaders can adjust the level of structuring in response to evolving team conditions, enabling voice when exploration is needed and imposing structure when coordination becomes critical.

In summary, leadership responses should vary with the team's phase and coordination needs rather than follow a uniform pattern. The practical challenge is to preserve the autonomy that helps voice emerge early while introducing greater temporal structure as coordination and integration demands increase. When tasks are exploratory and ideas are still emerging, delaying strong temporal structuring may help sustain broad participation and support divergent thinking. As team voice becomes more extensive or diffuse, moderate temporal structure can help separate ideation from evaluation and integration, thereby reducing overload from excessive input. As teams approach key milestones or deadlines, milestone pacing and time-bounded decision points may help shift attention from exploration

toward convergence. Similarly, when ideas proliferate but integration lags, structured integration sessions can help teams synthesize, prioritize, and align diverse contributions. In teams with limited experience or weaker coordination capacity, such structuring interventions may need to be introduced earlier because the coordination burdens of broad participation may likely emerge sooner. A concise phase-based leadership framework is provided in Online Supplemental Table S5.

6.3 Limitations and future research directions

First, the causal relationship between shared leadership and team voice remains to be further substantiated. Longitudinal or experimental research designs can enable more rigorous causal assessment by capturing how shared leadership and team voice co-evolve temporally. Such approaches can offer deeper insight into the dynamic mechanisms through which leadership configurations shape team functioning and outcomes across diverse organizational contexts.

Second, how team voice is conceptualized and measured in this research needs to be clarified, particularly given that different reporting sources were used across the two studies. In Study 1, team voice was rated by team leaders; meanwhile, in Study 2, it was assessed by team members and aggregated to the team level. Despite this difference in source, both operationalizations were intended to capture the team-level prevalence of speaking up rather than the quality or content of voiced ideas, which helps preserve comparability at the construct level. Simultaneously, the two approaches may introduce different source-related biases: Leader ratings may be shaped by leader impressions or halo effects, whereas member ratings may be more susceptible to shared perceptual bias.

However, the overall pattern of findings involving team voice was broadly consistent across the two studies. The only notable difference concerned the moderating effect of temporal leadership on the shared leadership and voice relationship, which reached statistical significance in Study 2 but not in Study 1. Still, even this effect was directionally consistent across studies, with both coefficients being negative. All other focal results were substantively replicated across both studies. This convergence across different reporting sources provides a useful form of methodological triangulation and reduces the likelihood of the core findings being attributable to a single-source artifact. Nevertheless, our study design does not permit a definitive test of source effects, which requires collecting both leader- and member-rated team voice within the same study. Future research can address this limitation by adopting multi-source voice assessments and testing measurement invariance across raters.

Additionally, our measurement approach does not distinguish between different types of voice, such as promotive versus prohibitive voice, which may follow distinct dynamics and interact differently with temporal leadership. Promotive voice, which emphasizes new possibilities and opportunities for improvement, may benefit from looser temporal pacing that allows for the extended exploration of novel ideas. Meanwhile, a prohibitive voice, which highlights risks, problems, or concerns requiring attention, may require tighter temporal structuring to support timely integration and corrective action. Consequently, different voice types may load differently onto the curvilinear relationship observed here; some forms may reach the point of diminishing returns sooner than others, depending on their coordination requirements. Therefore, disentangling voice types is an important future research avenue

aimed at refining the functional form of the voice creativity relationship and specifying how temporal leadership differentially moderates each form.

Moreover, although our current design does not incorporate network-based measures of voice, a social network perspective offers a promising direction for future research. Our voice measure is perceptual and captures aggregate levels of voice activity within teams. However, it does not directly assess the structural distribution, concentration, or interaction patterns of voice across team members. Examining how the concentration versus dispersion of voiced input shapes coordination demands and creative outcomes can meaningfully extend understanding of how leadership and voice jointly influence team processes over time. For instance, a highly dispersed voice where many members contribute relatively equally may require stronger temporal structuring to achieve integration across many contributors. Meanwhile, a concentrated voice where a few members dominate the conversation may benefit from temporal pacing that ensures broader participation before convergence. Additionally, the temporal sequencing of voice, including when different members speak up relative to project phases, may interact with temporal leadership in shaping whether diverse input translates into creative outcomes or becomes fragmented and unintegrated. To explore these possibilities, future studies can employ network-based voice measures and capture the relational and temporal structure of voice behaviors within teams.

Third, we sought to examine how team voice emerges and is translated into team creativity. While our findings shed light on this process, they also leave open important questions regarding the broader mechanisms through which informal leadership shapes team voice and creative outcomes. Our current focus on shared leadership captures only one form

of informal leadership, potentially overlooking other influential mechanisms. For instance, emergent leadership behaviors, peer coaching, and informal mentoring may each exert distinct effects on how team voice unfolds and contributes to creativity, meriting further investigation. Additionally, future research should adopt more comprehensive measures of team creativity that reflect its multifaceted nature, including stages such as idea generation, evaluation, and selection (Emich & Vincent, 2020; Zhang et al., 2019).

Fourth, we primarily relied on subjective evaluations of team creativity. In both studies, creativity was assessed by team leaders using established scales. This practice is common in simulation and field research but may raise concerns about perceptual biases, such as halo effects and shared evaluation contexts. To mitigate these concerns, we employed a time-lagged design and assessed leadership behaviors using team member reports rather than leader ratings. Still, we acknowledge that collecting measures of leader liking of the team or leader efficacy may have allowed direct statistical control for potential confounds caused by leader evaluative biases.

Importantly, the direction and form of potential rating bias warrant careful consideration. General evaluative or halo-based biases would be expected to inflate creativity ratings in a relatively uniform and monotonic manner, thereby strengthening linear associations. Meanwhile, our results reveal a systematic inverted U-shaped relationship between team voice and creativity. Creativity declines at higher levels of voice, and the turning point shifts as a function of temporal leadership. Such a curvilinear and conditional pattern is difficult to attribute to simple evaluative bias. Additionally, in Study 1, we replicated the focal findings using an independent, third-party assessment of team creativity

provided by the business simulation's course instructor. The results based on this alternative outcome measure were substantively identical, further supporting the robustness of the observed relationships. Nevertheless, both measures in Study 1 rely on subjective evaluation, which remains an inherent limitation. In Study 2, objective performance milestones or external assessments of team creative outputs were not collected, limiting our ability to triangulate findings in the field context. Future research can benefit from incorporating fully independent, artifact-based measures of creativity, such as external expert ratings or objective evaluations of creative outputs, to further strengthen causal inference and triangulate creativity assessment.

Fifth, we emphasize that the relationship between shared and temporal leadership is not inherently conflictual but context dependent. Both studies were conducted in project teams with clear deliverables and strict timelines (Ishak & Ballard, 2011). These conditions heighten time pressure and coordination demands, and thus, shape how temporal leadership regulates the autonomy–control tension at the core of our model. One boundary condition is task structure. In innovation-driven or design-oriented work, where broad participation and idea exploration remain valuable, strong temporal structuring introduced too early may constrain voice and narrow the pool of emerging ideas (Baer & Oldham, 2006). Meanwhile, in routine, operational, or safety-critical work, where reliability and synchronization are paramount, temporal leadership may become enabling earlier because the costs of fragmentation are more salient (Weick & Sutcliffe, 2007).

A second boundary condition is the coordination load. As team size, task complexity, and interdependence increase, distributed voice is more likely to become fragmented rather

than generative. Hence, temporal leadership can be more functional at earlier stages. More mature teams may sustain higher levels of voice without losing coherence, reducing the need for early structuring (Farh & Chen, 2018). Conversely, less mature teams may require earlier structuring because coordination burdens emerge sooner.

A third boundary condition is the normative context. In high psychological safety environments, temporal structuring may facilitate convergence without suppressing voice. Meanwhile, in low-safety contexts, early structuring may amplify silence by signaling premature closure (Edmondson, 1999). In higher power distance contexts, teams may experience temporal structuring as legitimate coordination, whereas in lower power distance contexts, teams may perceive it as a restriction on autonomy. Overall, these conditions do not introduce separate mechanisms. Rather, they shift the point at which temporal leadership moves from constraining to enabling by recalibrating the balance between autonomy and control.

7. Conclusions

Drawing on the paradox perspective of creativity and functional leadership theory, we examine how shared leadership, as a form of informal leadership, promotes the emergence of team voice and the paradoxical moderating effects of temporal leadership in the different team processes of team voice emergence and effectiveness. We find that moderate team voice provides the optimal conditions for creativity. Moreover, temporal leadership weakens the positive relationship between shared leadership and team voice while simultaneously enhancing the transition from team voice to team creativity. By examining these intricate

dynamics, our research enriches the literature on leadership, including formal and informal leadership, team voice, and creativity.

References

Aiken, L. S., West, S. G., & Reno, R. R. (1991). *Multiple regression: Testing and interpreting interactions*. Sage Publications.

Ali, A., Wang, H., & Johnson, R. E. (2020). Empirical analysis of shared leadership promotion and team creativity: An adaptive leadership perspective. *Journal of Organizational Behavior*, *41*(5), 405-423. https://doi.org/10.1002/job.2437

Amason, A. C., & Sapienza, H. J. (2016). The effects of top management team size and interaction norms on cognitive and affective conflict. *Journal of Management*, *23*(4), 495-516. https://doi.org/10.1177/014920639702300401

Bachrach, D. G., Rapp, T. L., Ogilvie, J., & Rapp, A. A. (2024). It's about time (management)!: role overload as a bridge explaining relationships between helping, voice, and objective sales performance. *Journal of Business Research, 172*(1):114295. https://doi.org/10.1016/j.jbusres.2023.114295

Baer, M., & Oldham, G. R. (2006). The curvilinear relation between experienced creative time pressure and creativity: Moderating effects of openness to experience and support for creativity. *Journal of Applied Psychology, 91*(4), 963-970. https://doi.org/10.1037/0021-9010.91.4.963

Brislin, R. W. (1986). The wording and translation of research instruments. In W. J. Lonner & J. W. Berry (Eds.), *Cross-cultural research and methodology series (Vol. 8). Field methods in cross-cultural research* (pp. 137–164). Sage Publications.

Carson, J. B., Tesluk, P. E., & Marrone, J. A. (2007). Shared leadership in teams: An investigation of antecedent conditions and performance. *Academy of Management Journal*, *50*(5), 1217-1234. https://doi.org/10.5465/amj.2007.20159921

Chen, J., & Liu, L. (2020). Reconciling temporal conflicts in innovation ambidexterity: The role of TMT temporal leadership. *Journal of Knowledge Management*, *24*(8), 1899-1920. https://doi.org/10.1108/jkm-10-2019-0555

Chong, D. S. F., Eerde, W. V., Chai, K. H., & Rutte, C. G. (2011). A double-edged sword: The effects of challenge and hindrance time pressure on new product development teams. *IEEE Transactions on Engineering Management*, *58*(1), 71-86. https://doi.org/10.1109/tem.2010.2048914

Detert, J. R., & Burris, E. R. (2007). Leadership behavior and employee voice: Is the door really open? *Academy of Management Journal*, *50*(4), 869-884. https://doi.org/10.5465/amj.2007.26279183

Dierdorff, E. C., Bell, S. T., & Belohlav, J. A. (2011). The power of "we": Effects of psychological collectivism on team performance over time. *Journal of Applied Psychology*, *96*(2), 247-262. https://doi.org/10.1037/a0020929

Duan, C., Zhang, M. J., Liu, X., Ling, C. D., & Xie, X. Y. (2023). Investigating the curvilinear relationship between temporal leadership and team creativity: The moderation of knowledge complexity and the mediation of team creative process engagement. *Journal of Organizational Behavior*, *44*(4), 717-738. https://doi.org/10.1002/job.2698

Duan, J., Li, C., Xu, Y., & Wu, C. h. (2016). Transformational leadership and employee voice behavior: A Pygmalion mechanism. *Journal of Organizational Behavior*, *38*(5), 650-670. https://doi.org/10.1002/job.2157

Edmondson, A. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly*, *44*(2), 350-383. https://doi.org/10.2307/2666999

Emich, K. J., & Vincent, L. C. (2020). Shifting focus: The influence of affective diversity on team creativity. *Organizational Behavior and Human Decision Processes*, *156*, 24-37. https://doi.org/10.1016/j.obhdp.2019.10.002

Farh, C. I. C., & Chen, G. (2018). Leadership and member voice in action teams: Test of a dynamic phase model. *Journal of Applied Psychology*, *103*(1), 97-110. https://doi.org/10.1037/apl0000256

Fisher, D. M., Bell, S. T., Dierdorff, E. C., & Belohlav, J. A. (2012). Facet personality and surface-level diversity as team mental model antecedents: Implications for implicit coordination. *Journal of Applied Psychology*, *97*(4), 825-841. https://doi.org/10.1037/a0027851

Gevers, J. M. P., Rutte, C. G., & Van Eerde, W. (2006). Meeting deadlines in work groups: Implicit and explicit mechanisms. *Applied Psychology*, *55*(1), 52-72. https://doi.org/10.1111/j.1464-0597.2006.00228.x

Gevers, J. M. P., van Eerde, W., & Rutte, C. G. (2001). Time pressure, potency, and progress in project groups. *European Journal of Work and Organizational Psychology*, *10*(2), 205-221. https://doi.org/10.1080/13594320143000636

Goldschmidt, G. (2016). Linkographic evidence for concurrent divergent and convergent thinking in creative design. *Creativity Research Journal*, *28*(2), 115-122. https://doi.org/10.1080/10400419.2016.1162497

Grant, A. M., & Ashford, S. J. (2008). The dynamics of proactivity at work. *Research in Organizational Behavior*, *28*, 3-34. https://doi.org/10.1016/j.riob.2008.04.002

Guo, L., Decoster, S., Babalola, M. T., De Schutter, L., Garba, O. A., & Riisla, K. (2018). Authoritarian leadership and employee creativity: The moderating role of psychological capital and the mediating role of fear and defensive silence. *Journal of Business Research*, *92*, 219-230. https://doi.org/10.1016/j.jbusres.2018.07.034

Haans, R. F. J., Pieters, C., & He, Z. L. (2015). Thinking about U: Theorizing and testing U- and inverted U-shaped relationships in strategy research. *Strategic Management Journal*, *37*(7), 1177-1195. https://doi.org/10.1002/smj.2399

Harvey, S., & Kou, C.-Y. (2013). Collective engagement in creative tasks. *Administrative Science Quarterly*, *58*(3), 346-386. https://doi.org/10.1177/0001839213498591

He, W., Hao, P., Huang, X., Long, L. R., Hiller, N. J., & Li, S. L. (2019). Different roles of shared and vertical leadership in promoting team creativity: Cultivating and synthesizing team members' individual creativity. *Personnel Psychology*, *73*(1), 199-225. https://doi.org/10.1111/peps.12321

Hundschell, A., Razinskas, S., Backmann, J., & Hoegl, M. (2021). The effects of diversity on creativity: A literature review and synthesis. *Applied Psychology*, *71*(4), 1598-1634. https://doi.org/10.1111/apps.12365

Ishak, A. W., & Ballard, D. I. (2011). Time to re-group. *Small Group Research*, *43*(1), 3-29. https://doi.org/10.1177/1046496411425250

Knight, A. P. (2015). Mood at the midpoint: Affect and change in exploratory search over time in teams that face a deadline. *Organization Science*, *26*(1), 99-118. https://doi.org/10.1287/orsc.2013.0866

Landis, R. S., Beal, D. J., & Tesluk, P. E. (2016). A Comparison of approaches to forming composite measures in structural equation models. *Organizational Research Methods*, *3*(2), 186-207. https://doi.org/10.1177/109442810032003

Lewis, M. W., & Smith, W. K. (2014). Paradox as a metatheoretical perspective. *The Journal of Applied Behavioral Science*, *50*(2), 127-149. https://doi.org/10.1177/0021886314522322

Li, A. N., Liao, H., Tangirala, S., & Firth, B. M. (2017). The content of the message matters: The differential effects of promotive and prohibitive team voice on team productivity and safety performance gains. *Journal of Applied Psychology*, *102*(8), 1259-1270. https://doi.org/10.1037/apl0000215

Li, G., Liu, H., & Luo, Y. (2018). Directive versus participative leadership: Dispositional antecedents and team consequences. *Journal of Occupational and Organizational Psychology*, *91*(3), 645-664. https://doi.org/10.1111/joop.12213

Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling: A Multidisciplinary Journal*, *9*(2), 151-173. https://doi.org/10.1207/s15328007sem0902_1

Lyu, B., Liao, X., & Yang, Y. (2022). Relationships between temporal leadership, transactive memory systems and team innovation performance. *Psychology Research and Behavior Management*, *15*, 2543-2559. https://doi.org/10.2147/PRBM.S380989

Maruping, L. M., Venkatesh, V., Thatcher, S. M. B., & Patel, P. C. (2015). Folding under pressure or rising to the occasion? Perceived time pressure and the moderating role of team temporal leadership. *Academy of Management Journal*, *58*(5), 1313-1333. https://doi.org/10.5465/amj.2012.0468

McGrath, J. E. (1962). *Leadership behavior: Some requirements for leadership training*. U. S. Civil Service Commission, Office of Career Development.

Miron-Spektor, E., & Erez, M. (2017). Looking at creativity through a paradox lens: Deeper understanding and new insights. In W. K. Smith, M. W. Lewis, P. Jarzabkowski, & A. Langley (Eds.), *The Oxford Handbook of Organizational Paradox*. https://doi.org/10.1093/oxfordhb/9780198754428.013.22

Miron-Spektor, E., & Paletz, S. B. (2020). Collective paradoxical frames. In L. Argote & J. M. Levine (Eds.), *The Oxford Handbook of Group and Organizational Learning* (pp. 429-446). Oxford University Press.

Mohammed, S., & Alipour, K. K. (2015). It's time for temporal leadership: Individual, dyadic, team, and organizational effects. *Industrial and Organizational Psychology*, *7*(2), 178-182. https://doi.org/10.1111/iops.12128

Mohammed, S., & Nadkarni, S. (2011). Temporal diversity and team performance: The moderating role of team temporal leadership. *Academy of Management Journal*, *54*(3), 489-508. https://doi.org/10.5465/amj.2011.61967991

Morgeson, F. P., DeRue, D. S., & Karam, E. P. (2009). Leadership in teams: A functional approach to understanding leadership structures and processes. *Journal of Management*, *36*(1), 5-39. https://doi.org/10.1177/0149206309347376

Morrison, E. W. (2011). Employee voice behavior: Integration and directions for future research. *Academy of Management Annals*, *5*(1), 373-412. https://doi.org/10.5465/19416520.2011.574506

Morrison, E. W. (2014). Employee voice and silence. *Annual review of organizational psychology and organizational behavior*, *1*(1), 173-197. https://doi.org/10.1146/annurev-orgpsych-031413-091328

Morrison, E. W. (2023). Employee voice and silence: Taking stock a decade later. *Annual review of organizational psychology and organizational behavior*, *10*(1), 79-107. https://doi.org/10.1146/annurev-orgpsych-120920-054654

Pearce, C. L., & Conger, J. A. (2003). All those years ago. In J. A. C. C. L. Pearce (Ed.), *Shared leadership: Reframing the hows and whys of leadership* (pp. 1–18). Sage.

Pinder, C. C., & Harlos, K. P. (2001). Employee silence: Quiescence and acquiescence as responses to perceived injustice. *Research in Personnel and Human Resources Management*, *20*, 331-369. https://doi.org/10.1016/S0742-7301(01)20007-3

Rosso, B. D. (2014). Creativity and constraints: Exploring the role of constraints in the creative processes of research and development teams. *Organization Studies*, *35*(4), 551-585. https://doi.org/10.1177/0170840613517600

Shi, W., & Prescott, J. E. (2012). Rhythm and entrainment of acquisition and alliance initiatives and firm performance: A temporal perspective. *Organization Studies*, *33*(10), 1281-1310. https://doi.org/10.1177/0170840612453530

Shin, S. J., & Zhou, J. (2007). When is educational specialization heterogeneity related to creativity in research and development teams? Transformational leadership as a moderator. *Journal of Applied Psychology*, *92*(6), 1709-1721. https://doi.org/10.1037/0021-9010.92.6.1709

Simonsohn, U. (2018). Two lines: A valid alternative to the invalid testing of U-shaped relationships with quadratic regressions. *Advances in Methods and Practices in Psychological Science*, *1*(4), 538-555. https://doi.org/10.1177/2515245918805755

Sinha, R., Chiu, C. Y., & Srinivas, S. B. (2021). Shared leadership and relationship conflict in teams: The moderating role of team power base diversity. *Journal of Organizational Behavior*, *42*(5), 649-667. https://doi.org/10.1002/job.2515

Van Dyne, L, Ang, S., & Botero, I. C. (2003). Conceptualizing employee silence and employee voice as multidimensional constructs. *Journal of Management Studies*, *40*(6), 1359-1392. https://doi.org/10.1111/1467-6486.00384

Van Dyne, L., & LePine, J. A. (1998). Helping and voice extra-role behaviors: Evidence of construct and predictive validity. *Academy of Management Journal*, *41*(1), 108-119. https://doi.org/10.2307/256902

Waldman, D. A., & Bowen, D. E. (2016). Learning to be a paradox-savvy leader. *Academy of Management Perspectives*, *30*(3), 316-327. https://doi.org/10.5465/amp.2015.0070

Weick, K. E., & Sutcliffe, K. M. (2007). *Managing the unexpected: Assuring high performance in an age of complexity*. Jossey-Bass.

Ye, Q., Wang, D., & Guo, W. (2019). Inclusive leadership and team innovation: The role of team voice and performance pressure. *European Management Journal*, *37*(4), 468-480. https://doi.org/10.1016/j.emj.2019.01.006

Zhang, L., Liang, J., & Liu, F. (2022). I spoke up, did you hear? The impact of voice (in)congruence on employee-initiated constructive changes. *Human Relations*, *76*(10), 1567-1598. https://doi.org/10.1177/00187267221110781

Zhang, W., Sun, S. L., Jiang, Y., & Zhang, W. (2019). Openness to experience and team creativity: Effects of knowledge sharing and transformational leadership. *Creativity Research Journal*, *31*(1), 62-73. https://doi.org/10.1080/10400419.2019.1577649

Zheng, X., Liu, X., Liao, H., Qin, X., & Ni, D. (2022). How and when top manager authentic leadership influences team voice: A moderated mediation model. *Journal of Business Research*, *145*, 144-155. https://doi.org/10.1016/j.jbusres.2022.02.073

Zhu, J., Liao, Z., Yam, K. C., & Johnson, R. E. (2018). Shared leadership: A state-of-the-art review and future research agenda. *Journal of Organizational Behavior*, *39*(7), 834-852. https://doi.org/10.1002/job.2296

Tables

Table 1. Means, Standard Deviation, and Correlations (Study 1)

Variable	*Mean*	*SD*	1	2	3	4	5	6	7	8
1. Team size	6.36	1.25								
2. Gender diversity [a]	.50	.10	–.08							
3. Age diversity [b]	4.00	1.47	–.03	–.08						
4. Education diversity [c]	.42	.25	.07	-.20	.08					
5. Shared leadership	.78	.12	–.17	.02	.12	.11				
6. Team voice	5.58	.86	–.03	-.17	.16	–.16	.43**	(.91)		
7. Temporal leadership	5.68	.60	.13	–.15	-.13	–.01	.05	.05	(.93)	
8. Team creativity	5.60	.70	.24*	–.04	.09	–.09	.10	.33**	.25*	(.75)

Note. $N = 78$ teams. Coefficient alpha estimates of reliability are in parentheses on the diagonal.
Correlations are significant at ** $p < .01$ and * $p < .05$.
[a] Gender diversity: *SD* of team members' gender;
[b] Age diversity: *SD* of team members' age;
[c] Education: *SD* of team members' education level.

Table 2. Hierarchical Regression Analysis Results (Study 1)

	Team voice				Team creativity								
	M1	**M2**	**M3a**	**M3b**	M4	M5	M6	M7	M8	**M9**	**M10**	**M11**	**M12**
Control variable:	–.20	–.22*	–.20	–.21*	–.04	–.05	–.02	.01	–.03	–.04	–.06	–.06	–.03
Gender diversity	(1.05)	(1.05)	(1.09)	(1.06)	(1.05)	(1.05)	(1.06)	(1.11)	(1.16)	(1.05)	(1.13)	(1.16)	(1.18)
Age diversity	.16	.11	.11	.11	.10	.09	.10	.13	.08	.10	.07	.10	.13
	(1.01)	(1.03)	(1.05)	(1.03)	(1.01)	(1.03)	(1.03)	(1.05)	(1.05)	(1.01)	(1.04)	(1.06)	(1.09)
Education diversity	–.21	–.26*	-.26*	–.26*	–.12	–.14	–.12	–.11	-.05	–.12	–.08	–.04	–.02
	(1.05)	(1.06)	(1.07)	(1.07)	(1.05)	(1.06)	(1.07)	(1.07)	(1.16)	(1.05)	(1.10)	(1.12)	(1.14)
Team size	–.03	.05	.03	.04	.25*	.27*	.19	.16	.17	.25*	.22*	.22*	.20*
	(1.01)	(1.04)	(1.08)	(1.12)	(1.01)	(1.04)	(1.12)	(1.16)	(1.12)	(1.01)	(1.02)	(1.05)	(1.06)
Independent variable: Shared leadership		.45**	.46**	.43**		.16	.01	–.06	–.20				
		(1.06)	(1.07)	(1.27)		(1.06)	(1.27)	(1.34)	(1.57)				
Shared leadership squared				–.06			–.36**	–.42**	–.10				
				(1.24)			(1.24)	(1.31)	(1.63)				
Mediator: Team voice									.41**		.34**	.31**	.31**
									(1.49)		(1.10)	(1.11)	(1.11)
Team voice squared									–.48**		–.48**	–.49**	–.51**
									(1.52)		(1.04)	(1.05)	(1.06)
Moderator: Temporal leadership			–.01					.31**				.28**	.33**
			(1.08)					(1.24)				(1.08)	(1.16)
Interaction: Temporal leadership * shared leadership			–.16					.20					
			(1.06)					(1.13)					
Temporal leadership * shared leadership squared								.05					
								(1.21)					
Temporal leadership * team voice												.29**	.25**
												(1.09)	(1.15)
Temporal leadership * team voice squared													.20*
													(1.22)
F	1.85	5.79**	4.48**	4.82**	1.59	1.66	3.04*	3.35**	6.31**	1.59	7.74**	9.65**	9.64**
ΔR^2	—	.19**	.02	.00	—	.02	.10**	.10*	.22**	—	.32**	.13**	.03*

Note. $N = 78$ teams.
Standardized regression coefficients were reported. The ΔR^2 in M3a and M3b are compared to M2, respectively.
Shared leadership operationalized as network density. Values reported in parentheses represent variance inflation factors (VIFs).
** $p < .01$ and * $p < .05$.

Table 3. Means, Standard Deviation, and Correlations (Study 2)

Variable	*Mean*	*SD*	1	2	3	4	5	6	7	8
1. Team size	7.43	1.19								
2. Gender diversity [a]	0.49	0.09	–.07							
3. Age diversity [b]	4.85	1.57	.20	–.10						
4. Education diversity [c]	0.35	0.23	.01	–.21	.01					
5. Shared leadership	0.75	0.13	–.09	.01	.02	–.04				
6. Team voice	6.05	0.71	–.08	.01	.22	–.15	.40**	(.90)		
7. Temporal leadership	5.00	0.96	.01	–.06	.14	.02	–.09	.12	(.94)	
8. Team creativity	5.74	0.76	.11	–.16	.06	.03	–.05	.06	.59**	(.94)

Note. $N = 77$ teams. Coefficient alpha estimates of reliability are in parentheses on the diagonal.
Correlations are significant at ** $p < .01$ and * $p < .05$.
[a] Gender diversity: *SD* of team members' gender;
[b] Age diversity: *SD* of team members' age;
[c] Education: *SD* of team members' education level.

Table 4. Hierarchical Regression Analysis Results (Study 2)

	Team voice				Team creativity							
	M1	**M2**	**M3a**	**M3b**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**
Control variable:	–.00	–.00	.01	.01	–.16	–.16	–.10	–.09	–.09	–.16	–.12	–.12
Gender diversity	(1.06)	(1.06)	(1.06)	(1.07)	(1.06)	(1.06)	(1.07)	(1.07)	(1.07)	(1.06)	(1.06)	(1.07)
Age diversity	.25*	.23*	.18	.22*	.03	.03	–.02	–.10	–.08	.03	–.06	–.12
	(1.05)	(1.05)	(1.10)	(1.06)	(1.05)	(1.05)	(1.06)	(1.13)	(1.14)	(1.05)	(1.13)	(1.16)
Education diversity	–.15	–.14	-.11	–.13	–.00	–.00	.02	.03	–.08	–.00	–.10	–.04
	(1.05)	(1.05)	(1.07)	(1.05)	(1.05)	(1.05)	(1.05)	(1.09)	(1.12)	(1.05)	(1.11)	(1.16)
Team size	–.12	–.09	-.08	–.09	.10	.09	.08	.10	.01	.10	.03	.08
	(1.04)	(1.05)	(1.05)	(1.05)	(1.04)	(1.05)	(1.05)	(1.06)	(1.09)	(1.04)	(1.08)	(1.09)
Independent variable:		.38**	.34**	.33**		–.04	–.20	–.13	–.31**			
Shared leadership		(1.01)	(1.08)	(1.14)		(1.01)	(1.14)	(1.25)	(1.33)			
Shared leadership squared				–.13			–.51**	–.33**	–.32**			
				(1.15)			(1.15)	(1.31)	(1.33)			
Mediator: Team voice									–.24*		–.31*	–.24*
									(1.64)		(1.57)	(1.63)
Team voice squared									–.64**		–.69**	–.43**
									(1.88)		(1.54)	(2.03)
Moderator: Temporal leadership			.17					.43**				.21
			(1.07)					(2.83)				(2.51)
Interaction: Temporal leadership * shared leadership			-.23*					–.10				
			(1.14)					(1.20)				
Temporal leadership * shared leadership squared								.11				
								(2.85)				
Temporal leadership * team voice												.25
												(3.01)
Temporal leadership* team voice squared												.49**
												(5.29)
F	1.74	4.20**	4.04**	3.76**	.71	.58	4.16**	7.06**	7.89**	.71	6.42**	10.58**
ΔR^2	—	.14**	.06+	.02	—	.00	.22**	.22**	.22**	—	.32**	.23**

Note. $N = 77$ teams.
Standardized regression coefficients were reported. The ΔR^2 in M3a and M3b are compared to M2, respectively. The ΔR^2 in M7 and M8 is compared to M6. Shared leadership operationalized as network density. Values reported in parentheses represent variance inflation factors (VIFs).
** $p < .01$ and * $p < .05$.

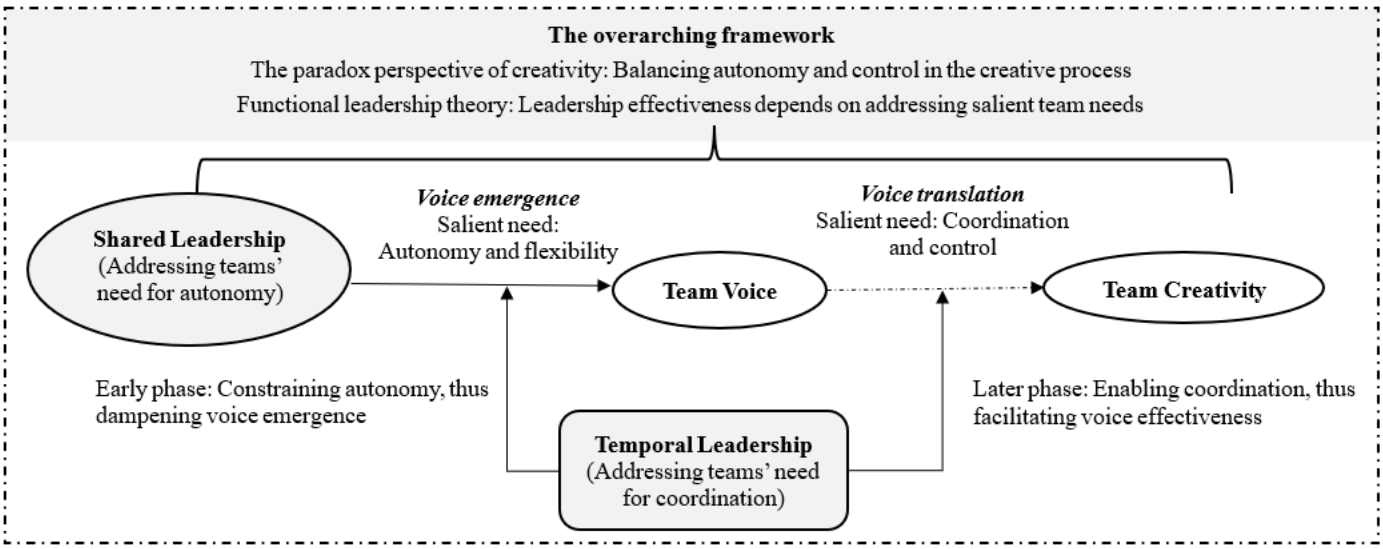

Figure 1. Process Model of Balancing Autonomy and Control over Time in the Team Creative Process

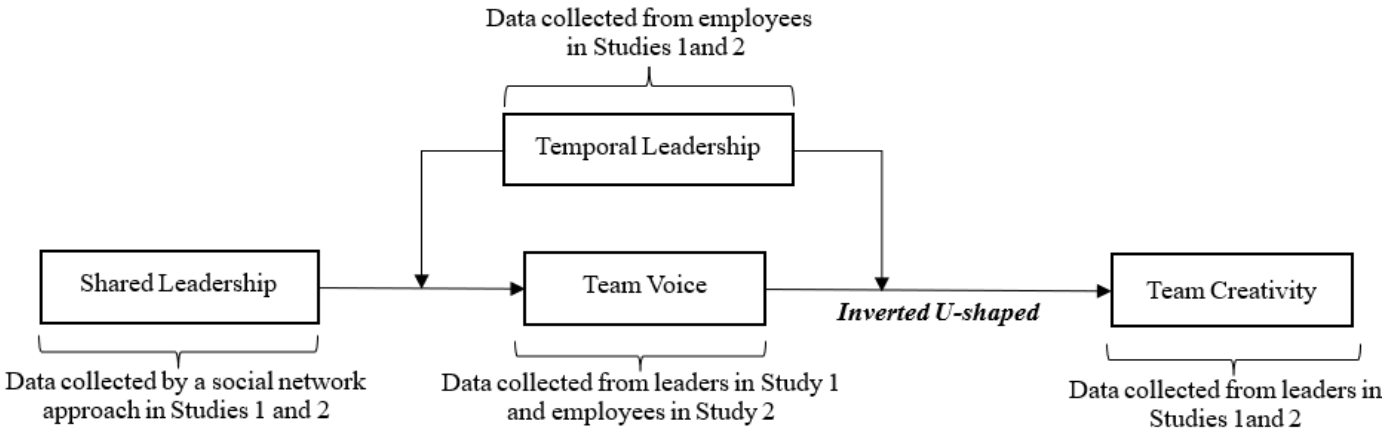

Figure 2. Hypothesized Model

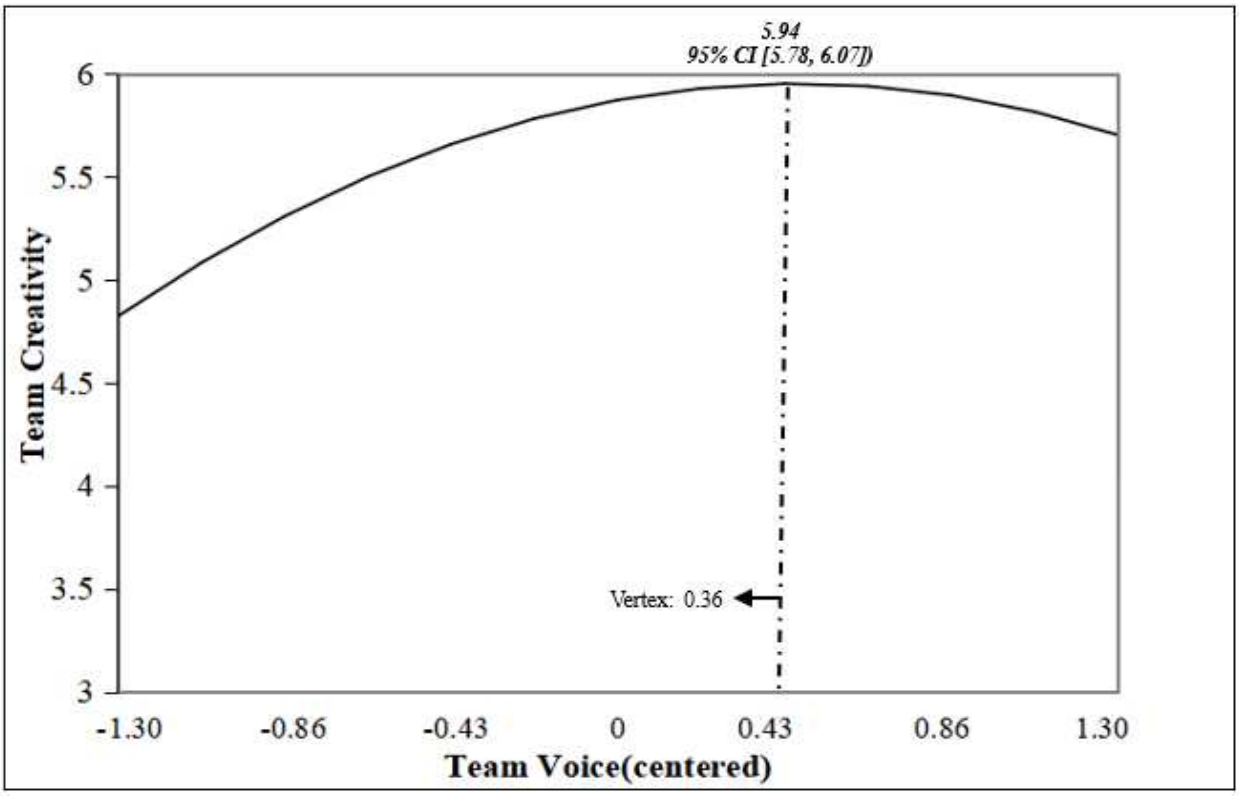

Figure 3. Curvilinear Effect between Team Voice and Team Creativity (Study 1)

Note. Model-implied predicted creativity is plotted across the observed range of team voice. Points represent predicted values at observed levels of team voice, with the 95% confidence intervals shown around each point. The vertical dashed line indicates the estimated vertex (inflection point) of the inverted-U relationship.

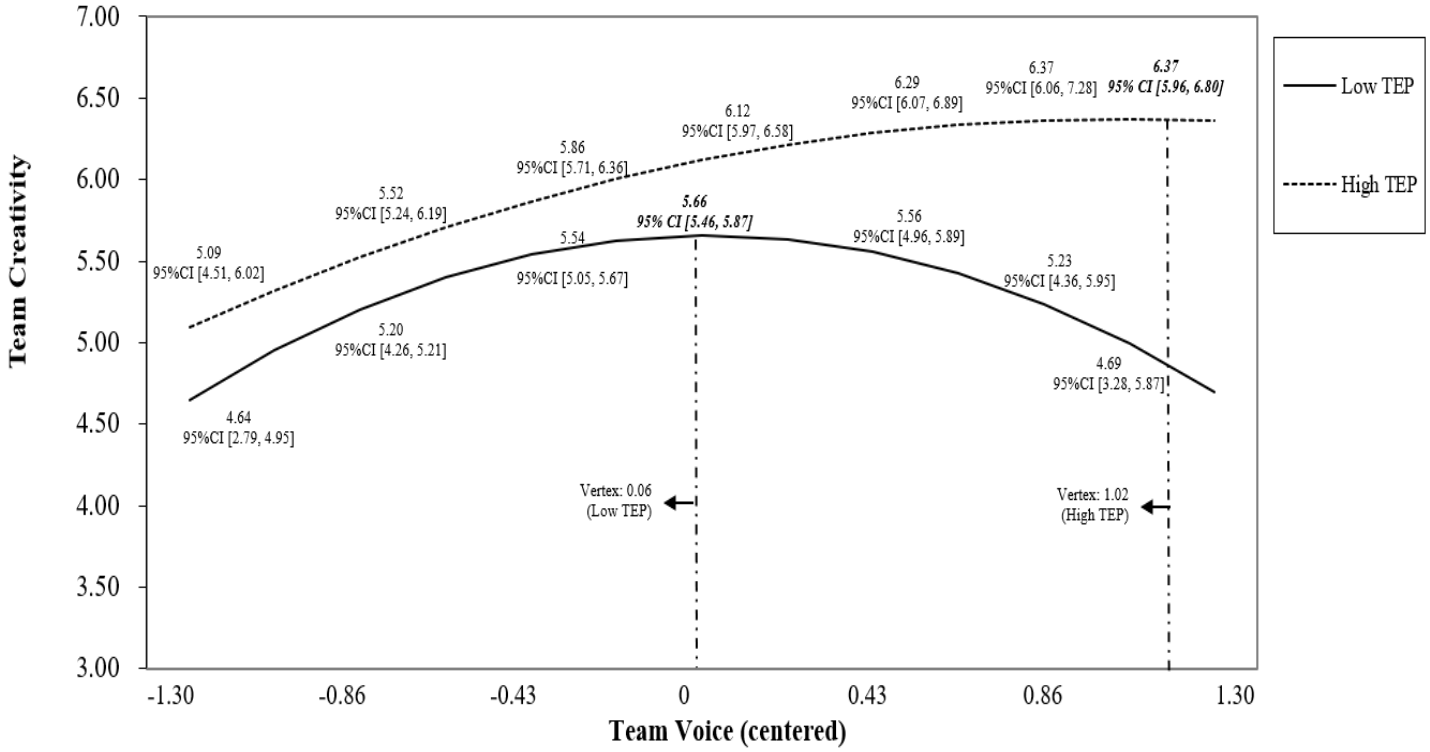

Figure 4. Moderating Effect of Temporal Leadership in the Relationship between Team Voice and Team Creativity (Study 1)

Note. Model-implied predicted creativity is plotted across the observed range of team voice (−1.5 *SD* to +1.5 *SD*) at low (−1 *SD*) and high (+1 *SD*) temporal leadership. Points represent predicted values at observed levels of team voice, with the 95% confidence intervals shown around each point. Vertical dashed lines indicate the estimated vertices (inflection points) of the inverted-U

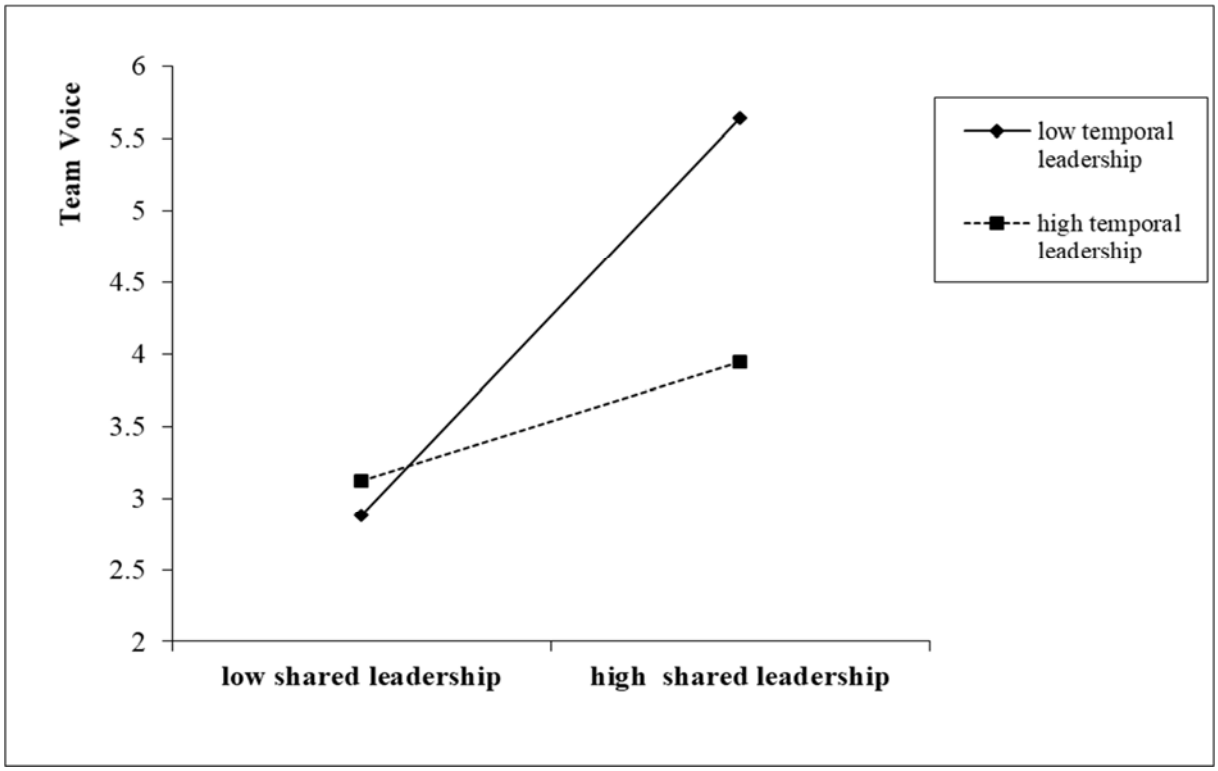

Figure 5. Moderating Effect of Temporal Leadership in the Relationship between Shared Leadership and Team Voice (Study 2)

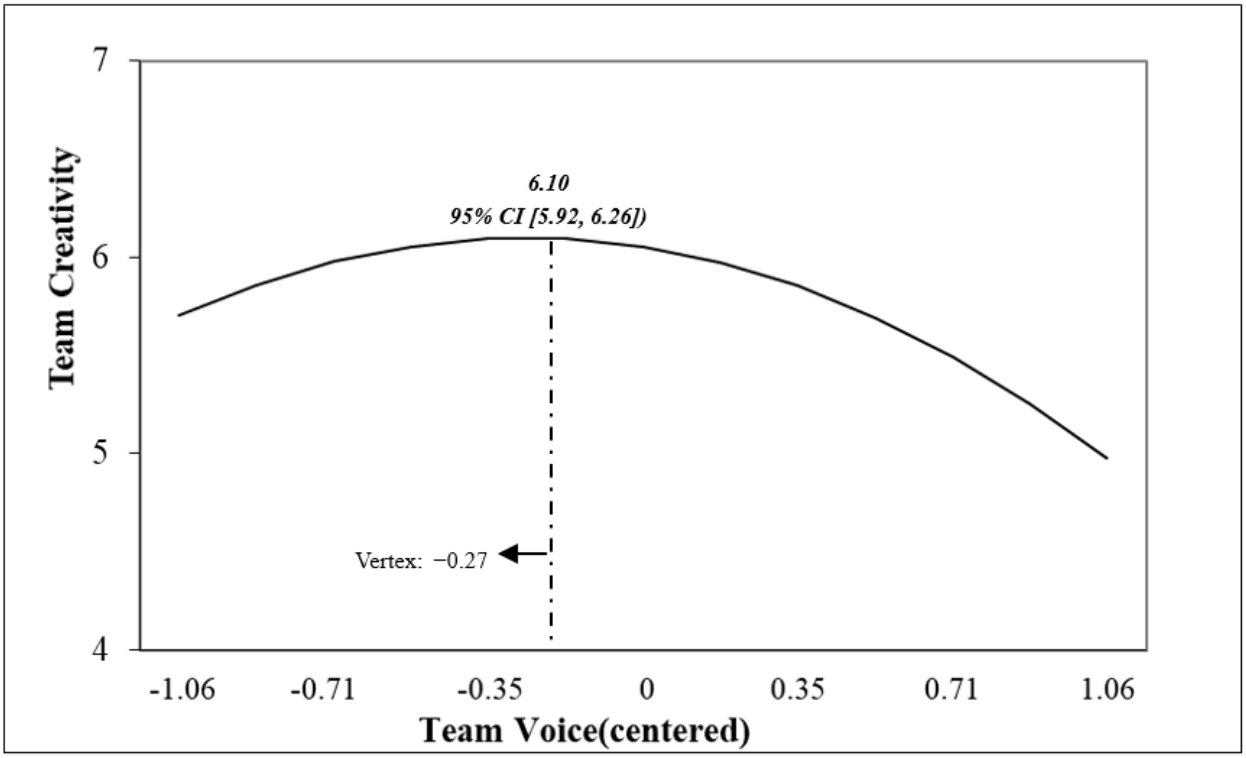

Figure 6. Curvilinear Effect between Team Voice and Team Creativity (Study 2)

Note. Model-implied predicted creativity is plotted across the observed range of team voice. Points represent predicted values at observed levels of team voice, with the 95% confidence intervals shown around each point. The vertical dashed line indicates the estimated vertex (inflection point) of the inverted-U relationship

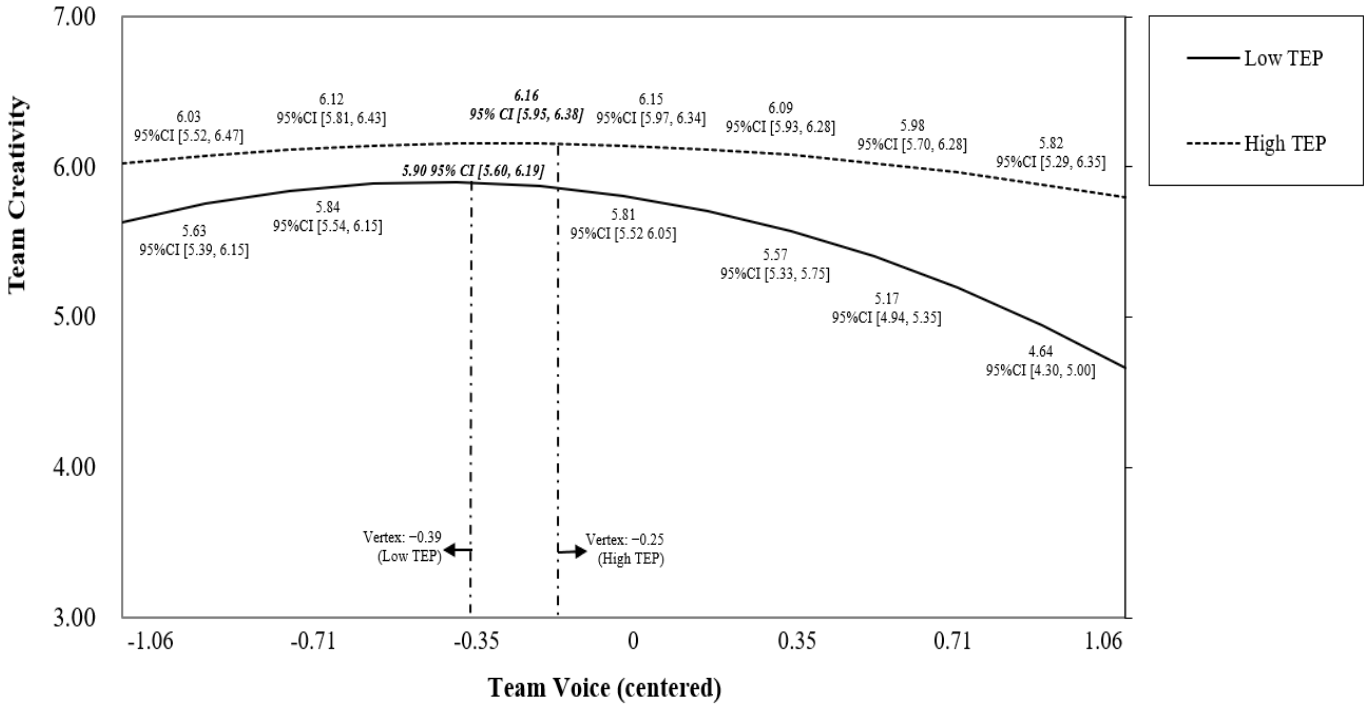

Figure 7. Moderating Effect of Temporal Leadership in the Relationship between Team Voice and Team Creativity (Study 2)

Note. Model-implied predicted creativity is plotted across the observed range of team voice (−1.5 *SD* to +1.5 *SD*) at low (−1 *SD*) and high (+1 *SD*) temporal leadership. Points represent predicted values at observed levels of team voice, with the 95% confidence intervals shown around each point. Vertical dashed lines indicate the estimated vertices (inflection points) of the inverted-U relationship under low and high temporal leadership. TEP = Temporal leadership.

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Time and timing matter:
The role of temporal leadership in the emergence and effectiveness of team voice

Online Supplemental Materials

Section A: Analyses with Shared Leadership Operationalized as the Centralization Index (Study 1)

As a robustness check, we replicated the focal analyses using a leadership centralization index as an alternative operationalization of shared leadership. The centralization index reflects the extent to which leadership influence is concentrated in a small number of team members, capturing the structural distribution of leadership influence rather than the overall volume of leadership ties. As reported in Online Supplemental Table S1, this alternative operationalization yielded substantively consistent results in Study 1: Shared leadership was positively related to team voice ($b = .33$, $p < .01$; Model 3b). Meanwhile, temporal leadership's moderating effect on this relationship was not statistically significant ($b = .02$, *n.s.*; Model 3a), mirroring the primary analyses.

Table S1. Hierarchical Regression Analysis Results (Study 1; Shared Leadership Operationalized as Centralization Index)

	Team voice				**Team creativity**								
	M1	**M2**	**M3a**	**M3b**	M4	M5	M6	M7	M8	**M9**	**M10**	**M11**	**M12**
Control variable: Gender diversity	–.20 (1.05)	–.21 (1.05)	–.20 (1.19)	–.19 (1.07)	–.04 (1.05)	–.03 (1.05)	.00 (1.07)	.07 (1.18)	–.02 (1.15)	–.04 (1.05)	–.06 (1.13)	–.06 (1.16)	–.03 (1.18)
Age diversity	.16 (1.01)	.15 (1.01)	.16 (1.03)	.16 (1.01)	.10 (1.01)	.10 (1.01)	.11 (1.01)	.15 (1.04)	.07 (1.04)	.10 (1.01)	.07 (1.04)	.10 (1.06)	.13 (1.09)
Education diversity	–.21 (1.05)	–.21 (1.05)	-.20 (1.09)	–.15 (1.13)	–.12 (1.05)	–.12 (1.05)	–.05 (1.13)	–.05 (1.15)	-.05 (1.17)	–.12 (1.05)	–.08 (1.10)	–.04 (1.12)	–.02 (1.14)
Team size	–.03 (1.01)	–.06 (1.03)	–.07 (1.07)	.00 (1.16)	.25* (1.01)	.26* (1.03)	.35** (1.16)	.31* (1.23)	.29** (1.17)	.25* (1.01)	.22* (1.02)	.22* (1.05)	.20* (1.06)
Independent variable: Shared leadership		.25* (1.02)	.26* (1.06)	.33** (1.23)		–.11 (1.02)	.00 (1.23)	.14 (1.54)	–.17 (1.38)				
Shared leadership squared				–.22 (1.46)			–.31* (1.46)	–.38** (1.68)	–.14 (1.56)				
Mediator: Team voice									.38** (1.23)		.34** (1.10)	.31** (1.11)	.31** (1.11)
Team voice squared									–.47** (1.07)		–.48** (1.04)	–.49** (1.05)	–.51** (1.06)
Moderator: Temporal leadership			.09 (1.13)					.31* (1.28)				.28** (1.08)	.33** (1.16)
Interaction: Temporal leadership * shared leadership			.02 (1.14)					–.18 (1.98)					
Temporal leadership * shared leadership squared								.26 (1.83)					
Temporal leadership * team voice												.29** (1.09)	.25** (1.15)
Temporal leadership * team voice squared													.20* (1.22)
F	1.85	2.56*	1.89	2.65*	1.59	1.47	2.20	2.42*	7.26**	1.59	7.74**	9.65**	9.64**
ΔR^2	—	.09*	.01	.03	—	.01	.06*	.09	.30**	—	.32**	.13**	.03*

Note. N = 78 teams. Standardized regression coefficients were reported. The ΔR^2 in M3a and M3b are compared to M2, respectively. Values reported in parentheses represent variance inflation factors (VIFs).

** $p < .01$ and * $p < .05$.

Section B: Analyses with an Alternative Measure of Team Creativity (Study 1)

Table S2. Hierarchical Regression Analysis Results (Study 1: Third-Party, Output-Based Team Creativity; Shared Leadership Operationalized as Network Density)

	Team voice				**Team creativity**								
	M1	**M2**	**M3a**	**M3b**	M4	M5	M6	M7	M8	**M9**	**M10**	**M11**	**M12**
Control variable: Gender diversity	–.20 (1.05)	–.21 (1.05)	–.20 (1.19)	–.19 (1.07)	–.26* (1.05)	–.27 (1.05)	–.24 (1.06)	–.20 (1.11)	–.29* (1.16)	–.26* (1.05)	–.31* (1.13)	–.28* (1.16)	–.25* (1.18)
Age diversity	.16 (1.01)	.15 (1.01)	.16 (1.03)	.16 (1.01)	–.05 (1.01)	–.07 (1.03)	–.06 (1.03)	–.02 (1.05)	–.05 (1.05)	–.05 (1.01)	–.05 (1.04)	–.02 (1.06)	.02 (1.09)
Education diversity	–.21 (1.05)	–.21 (1.05)	-.20 (1.09)	–.15 (1.13)	–.17 (1.05)	–.19 (1.06)	–.17 (1.07)	–.16 (1.07)	–.17 (1.16)	–.17 (1.05)	–.18 (1.10)	–.17 (1.12)	–.14 (1.14)
Team size	–.03 (1.01)	–.06 (1.03)	–.07 (1.07)	.00 (1.16)	–.04 (1.01)	–.02 (1.04)	–.09 (1.12)	–.14 (1.16)	–.10 (1.12)	–.04 (1.01)	–.07 (1.02)	–.10 (1.05)	–.12 (1.06)
Independent variable: Shared leadership		.25* (1.02)	.26* (1.06)	.33** (1.23)		.14 (1.06)	.02 (1.27)	–.03 (1.34)	–.05 (1.57)				
Shared leadership squared				–.22 (1.46)			–.30* (1.24)	–.34** (1.31)	–.14 (1.63)				
Mediator: Team voice									.10 (1.49)		.11 (1.10)	.10 (1.11)	.10 (1.11)
Team voice squared									–.32* (1.52)		–.38** (1.04)	–.39** (1.05)	–.41** (1.06)
Moderator: Temporal leadership			.09 (1.13)					.26* (1.24)				.23* (1.08)	.29* (1.16)
Interaction: Temporal leadership * shared leadership			.02 (1.14)					–.01 (1.13)					
Temporal leadership * shared leadership squared								.05 (1.21)					
Temporal leadership * team voice												.00 (1.09)	–.05 (1.15)
Temporal leadership * team voice squared													.23* (1.22)
F	1.85	2.56*	1.89	2.65*	1.63	1.60	2.46*	2.26*	2.72*	1.63	3.49**	3.28**	3.53**
ΔR^2	—	.09*	.01	.03	—	.02	.07*	.06	.07+	—	.15**	.05	.04*

Note. $N = 78$ teams. Standardized regression coefficients were reported. The ΔR^2 in M3a and M3b are compared to M2, respectively. Values reported in parentheses represent variance inflation factors (VIFs).
** $p < .01$ and * $p < .05$. Output-based team creativity was evaluated using criterion-based judgments of the extent to which teams generated and implemented novel ideas (e.g., new design solutions, new construction processes, new business models, and other innovations such as new rules and cost-saving practices).

Table S3. Hierarchical Regression Analysis Results (Study 1: Third-Party, Output-Based Team Creativity; Shared Leadership Operationalized as Centralization Index)

	Team voice				**Team creativity**								
	M1	**M2**	**M3a**	**M3b**	M4	M5	M6	M7	M8	**M9**	**M10**	**M11**	**M12**
Control variable: Gender diversity	–.20	–.21	–.20	–.19	–.26*	–.25*	–.22	–.13	–.26	–.26*	–.31*	–.28*	–.25*
	(1.05)	(1.05)	(1.19)	(1.07)	(1.05)	(1.05)	(1.07)	(1.18)	(1.15)	(1.05)	(1.13)	(1.16)	(1.18)
Age diversity	.16	.15	.16	.16	–.05	–.05	–.04	–.00	–.05	–.05	–.05	–.02	.02
	(1.01)	(1.01)	(1.03)	(1.01)	(1.01)	(1.01)	(1.01)	(1.04)	(1.04)	(1.01)	(1.04)	(1.06)	(1.09)
Education diversity	–.21	–.21	-.20	–.15	–.17	–.17	–.11	–.12	-.13	–.17	–.18	–.17	–.14
	(1.05)	(1.05)	(1.09)	(1.13)	(1.05)	(1.05)	(1.13)	(1.15)	(1.17)	(1.05)	(1.10)	(1.12)	(1.14)
Team size	–.03	–.06	–.07	.00	–.04	–.02	.07	.06	.02	–.04	–.07	–.10	–.12
	(1.01)	(1.03)	(1.07)	(1.16)	(1.01)	(1.03)	(1.16)	(1.23)	(1.17)	(1.01)	(1.02)	(1.05)	(1.06)
Independent variable: Shared leadership		.25*	.26*	.33**		–.17	–.06	.08	–.14				
		(1.02)	(1.06)	(1.23)		(1.02)	(1.23)	(1.54)	(1.38)				
Shared leadership squared				–.22			–.29*	–.41**	–.20				
				(1.46)			(1.46)	(1.68)	(1.56)				
Mediator: Team voice									.14		.11	.10	.10
									(1.23)		(1.10)	(1.11)	(1.11)
Team voice squared									–.36**		–.38**	–.39**	–.41**
									(1.07)		(1.04)	(1.05)	(1.06)
Moderator: Temporal leadership			.09					.30*				.23*	.29*
			(1.13)					(1.28)				(1.08)	(1.16)
Interaction: Temporal leadership * shared leadership			.02					–.32*					
			(1.14)					(1.98)					
Temporal leadership * shared leadership squared								.24					
								(1.83)					
Temporal leadership * team voice												.00	–.05
												(1.09)	(1.15)
Temporal leadership * team voice squared													.23*
													(1.22)
F	1.85	2.56*	1.89	2.65*	1.63	1.78	2.39*	2.62*	3.69**	1.63	3.49**	3.28**	3.53**
ΔR^2	—	.09*	.01	.03	—	.03	.06*	.09	.06*	—	.15**	.05	.04*

Note. $N = 78$ teams. Standardized regression coefficients were reported. The ΔR^2 in M3a and M3b are compared to M2, respectively. Values reported in parentheses represent variance inflation factors (VIFs).
** $p < .01$ and * $p < .05$. Output-based team creativity was evaluated using criterion-based judgments of the extent to which teams generated and implemented novel ideas (e.g., new design solutions, new construction processes, new business models, and other innovations such as new rules and cost-saving practices).

Section C: Analyses with Shared Leadership Operationalized as the Centralization Index (Study 2)

As a robustness check, we replicated the focal analyses using a leadership centralization index as an alternative operationalization of shared leadership. The results are reported in Online Supplemental Table S4. Using this alternative operationalization, shared leadership also positively predicted team voice ($b = .28$, $p < .05$, Model 3b), while temporal leadership significantly and negatively moderated this relationship ($b = -.29$, $p < .01$, Model 3a), consistent with our hypothesized moderation pattern.

Table S4. Hierarchical Regression Analysis Results (Study 2; Shared Leadership Operationalized as the Centralization Index)

	Team voice				Team creativity							
	M1	**M2**	**M3a**	**M3b**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**
Control variable: Gender diversity	–.00 (1.06)	–.03 (1.07)	–.04 (1.06)	–.05 (1.08)	–.16 (1.06)	–.15 (1.07)	–.18 (1.08)	–.14 (1.08)	–.14 (1.09)	–.16 (1.06)	–.12 (1.06)	–.12 (1.07)
Age diversity	.25* (1.05)	.28* (1.06)	.19 (1.10)	.27* (1.07)	.03 (1.05)	.03 (1.06)	.00 (1.07)	–.11 (1.20)	–.08 (1.18)	.03 (1.05)	–.06 (1.13)	–.12 (1.16)
Education diversity	–.15 (1.05)	–.18 (1.06)	-.16 (1.07)	–.17 (1.07)	–.00 (1.05)	.00 (1.06)	.04 (1.07)	.02 (1.08)	–.06 (1.15)	–.00 (1.05)	–.10 (1.11)	–.04 (1.16)
Team size	–.12 (1.04)	–.09 (1.05)	-.11 (1.06)	–.09 (1.05)	.10 (1.04)	.10 (1.05)	.10 (1.05)	.12 (1.06)	.03 (1.08)	.10 (1.04)	.03 (1.08)	.08 (1.09)
Independent variable: Shared leadership		.32** (1.04)	.24* (1.16)	.28* (1.11)		–.02 (1.04)	–.11 (1.11)	–.09 (1.21)	–.15 (1.22)			
Shared leadership squared				–.17 (1.09)			–.37** (1.09)	–.13 (1.37)	–.25* (1.18)			
Mediator: Team voice									–.30* (1.66)		–.31* (1.57)	–.24* (1.63)
Team voice squared									–.65** (1.63)		–.69** (1.54)	–.43** (2.03)
Moderator: Temporal leadership			.15 (1.07)					.47** (1.25)				.21 (2.51)
Interaction: Temporal leadership * shared leadership			–.29** (1.23)					.13 (1.58)				
Temporal leadership * shared leadership squared								.37** (1.63)				
Temporal leadership* team voice												.25 (3.01)
Temporal leadership * team voice squared												.49** (5.29)
F	1.74	3.27*	4.04**	3.15**	.71	.56	2.24*	7.66**	6.06**	.71	6.42**	10.58**
ΔR^2	—	.10**	.06+	.03	—	.00	.12**	.35*	.26**	—	.32**	.23**

Note. $N = 77$ teams. Standardized regression coefficients were reported. The ΔR^2 in M3a and M3b are compared to M2, respectively. The ΔR^2 in M7 and M8 is compared to M6. Values reported in parentheses represent variance inflation factors (VIFs).

** $p < .01$ and * $p < .05$.

Section D: Johnson-Neyman Regions for the Quadratic Effect of Team Voice Across Temporal Leadership (Studies 1 and 2)

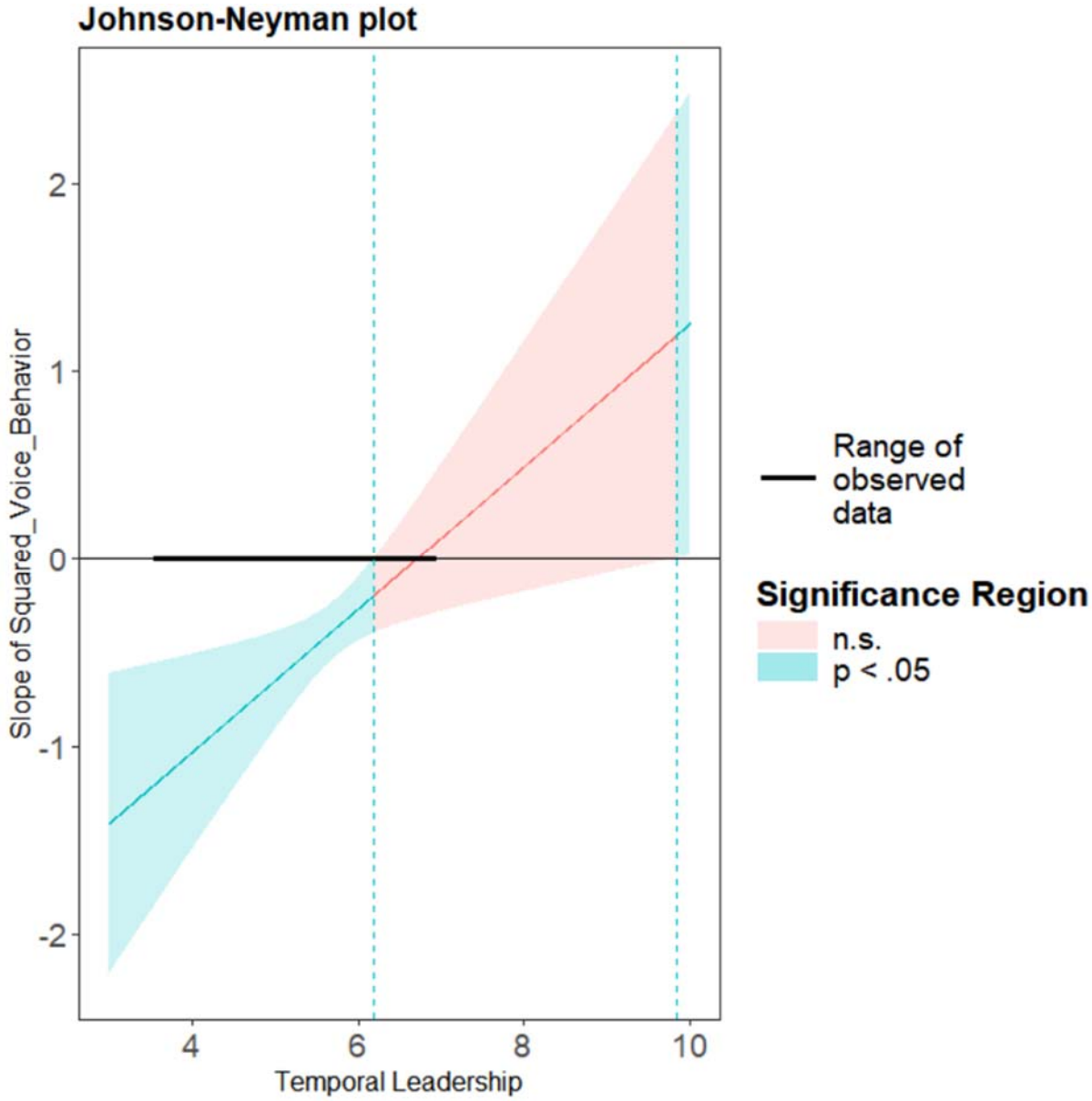

Figure S1. *Johnson-Neyman* Regions for the Quadratic Effect of Team Voice Across Temporal Leadership (Study 1)

Note. The figure displays the *Johnson-Neyman* regions for the conditional quadratic effect of team voice on team creativity as a function of temporal leadership. The vertical axis represents the estimated slope of the squared team voice term, while the horizontal axis represents temporal leadership. Shaded areas indicate regions where the conditional quadratic effect is statistically significant ($p < .05$) versus nonsignificant. The solid horizontal line indicates the observed range of temporal leadership in the sample. Within the observed range of temporal leadership [3.57, 6.90], the conditional quadratic effect is statistically significant when temporal leadership is below approximately 6.19, indicating a reliable inverted-U relationship at lower to moderate levels of temporal leadership.

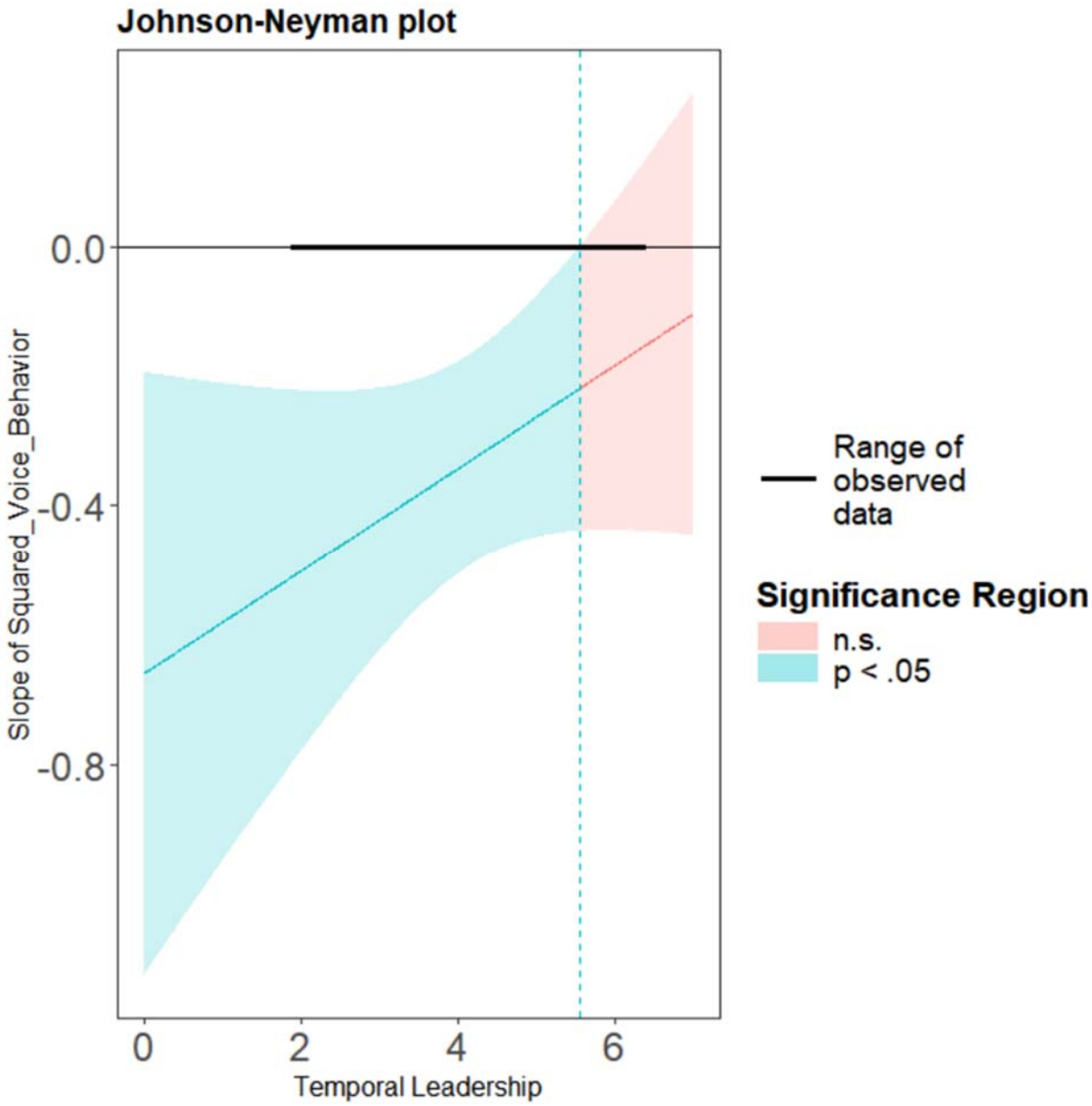

Figure S2. *Johnson-Neyman* Regions for the Quadratic Effect of Team Voice Across Temporal Leadership (Study 2)

Note. The figure presents the *Johnson-Neyman* regions for the conditional quadratic effect of team voice on team creativity as a function of temporal leadership. The vertical axis represents the estimated slope of the squared team voice term, while the horizontal axis represents temporal leadership. Shaded areas indicate regions where the conditional quadratic effect is statistically significant ($p < .05$) versus nonsignificant. The solid horizontal line indicates the observed range of temporal leadership in the sample. Within the observed range of temporal leadership [1.88, 6.36], the conditional quadratic effect is statistically significant when temporal leadership is below approximately 5.56, indicating a reliable inverted-U relationship at lower to moderate levels of temporal leadership.

Section E: Phase-based Leadership Framework for Managing Team Voice

To enhance practical usability, Table S5 summarizes the phase-based leadership guidance developed in the main text. It provides a concise framework linking team phase, key risk, and recommended temporal leadership responses.

Table S5. Phase-based Leadership Framework for Managing Team Voice

Team phase	Typical team condition	Key risks	Recommended temporal leadership response
Early exploratory phase	Ideas are still emerging, and participation is broadening	· Premature closure; and · Suppressed participation	· Keep temporal structuring light to preserve autonomy and broad voice
Intermediate phase with rising voice	Voice becomes extensive and coordination demands increase	· Input overload; and · Fragmentation	· Introduce moderate temporal structure to separate ideation from evaluation and integration
Late convergent phase	Teams face milestones, deadlines, or lagging integration	· Poor synthesis; and · Deadline slippage	· Use milestone pacing, time-bounded decision points, and structured integration sessions