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How dynamics in perceptual shared cognition and team potency predict team performance

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In a longitudinal field study of 37 professional project teams over almost 2 years, we investigated the dynamic relationship between perceptual shared cognition and team potency in predicting team performance. Our main results show that initial levels and change in perceptual shared cognition explain team performance outcomes through initial levels and change in team potency, respectively. Thereby, our findings confirmed that initial levels and change in team potency operated as an explanatory mechanism for the relationship between shared cognition and team performance. Interestingly, shared cognition change shows larger benefits on team performance outcomes than initial levels. In addition, we show differential relationships of task- and time-related shared cognition with the quality and timeliness criteria of team performance. Whereas shared task cognition predicts team performance in terms of both output quality and timeliness, shared temporal cognition predicts timeliness only. Altogether, this research suggests the unique theoretical value of change in perceptual shared cognition in explaining team performance and of affective-motivational team states as an alternative explanatory mechanism for the impact of shared cognition on team effectiveness.

Practitioner points

- Team members' perceptions of being on the same page about their collaborative task and its temporal elements boost their confidence in the team's capabilities, thereby improving team performance.
- Team members' perceived agreement about the 'what' of their collaborative task is conducive to both project quality and timeliness. Their perceived agreement on the 'when' of task accomplishment further facilitates a timely project completion.
- Team members' cognitive consensus about the task and its temporal elements are subject to change, so is their confidence in the team's capabilities. Initial disagreements do not necessarily warrant eventual detriments, but performance excellence does require that cognitive consensus is being maintained and improved throughout the project.

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Considerable research has highlighted shared cognition as an important driver of team effectiveness (Cannon-Bowers & Salas, 2001; DeChurch & Mesmer-Magnus, 2010). Team cognition research has mostly explained the impact of shared cognition by showing that members' congruent knowledge patterns (i.e., structural shared cognition) benefit team performance by ameliorating cognitive and behavioural team processes (e.g., information elaboration and coordination; DeChurch & Mesmer-Magnus, 2010; Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000). However, early team cognition literature also contends that shared cognition can transfer beyond the cognitive domain and influence affective-motivational team states by boosting members' task confidence and motivation (Klimoski & Mohammed, 1994). Initial research supports these claims by reporting positive relationships between team cognition and members' motivation and behaviour (Mathieu, Rapp, Maynard, & Mangos, 2010). Yet, there is little integrative and longitudinal research into whether and how shared cognition affects team effectiveness by influencing members' motivation. Given the general underdevelopment of the team cognition dynamics literature (Mohammed, Ferzandi, & Hamilton, 2010; Mohammed, Tesler, & Hamilton, 2012) and the vast evidence in team research underscoring the importance of motivational states for team effectiveness (Marks, Mathieu, & Zaccaro, 2001), additional longitudinal research addressing this issue is warranted.

Our research is aimed to fill this theoretical void by proposing a dynamic indirect effect model in which perceptual shared cognition affects team performance via team potency. Team potency is defined as shared confidence in a team's general capabilities (Campion, Medsker, & Higgs, 1993; Collins & Parker, 2010; Guzzo, Yost, Campbell, & Shea, 1993) and represents a *generalized* belief of collective efficacy – a team's confidence in performing *specific* tasks (Bandura, 1982). Potency beliefs are considered one of the most central constituents of team motivation and important precursors of team effectiveness (Shea & Guzzo, 1987). We use theories of motivational spirals (Bledow, 2013; Chen, Ployhart, Thomas, Anderson, & Bliese, 2011; Lindsley, Brass, & Thomas, 1995) to explain how dynamics in perceptual shared cognition feed dynamics in team potency to ultimately predict team performance. We study perceptual shared cognition rather than structural shared cognition. Whereas perceptual cognition describes team members' beliefs, attitudes, values, perceptions, and expectations without providing a deep understanding of causal, relational, or explanatory links, structured cognition attempts to capture the organization of a team's knowledge without modelling the content or amount of a given type of perception (DeChurch & Mesmer-Magnus, 2010). Although both may have a role in eliciting potency beliefs, we focus here on perceptual shared cognition given the prominent role traditionally credited to beliefs, attitudes, values, and perceptions as determinants of human motivation (Bandura, 1982). Also, we anticipate that potency beliefs will be at least partly reliant on members' realization of cognitive congruence, which is inherent to perceptual but not to structural shared cognition (Van Ginkel & Van Knippenberg, 2008). Moreover, we distinguish between task- and time-related perceptual shared cognition and between content- and time-related team performance (i.e., output quality and timeliness) to gain a more comprehensive and nuanced understanding of the impact of perceptual shared cognition on specific team performance outcomes.

Following 37 professional software development teams for almost 2 years, we conducted a four-wave longitudinal study and found general support for the proposition that increases in perceptual shared cognition over time enhance team performance through increases in team potency, independent of initial levels of shared cognition and team potency. Moreover, whereas shared task cognition predicted team performance in

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terms of both output quality and timeliness, shared temporal cognition predicted timeliness only. Thereby, this research makes three important contributions to team cognition research. First, this research is the first to evidence a convergent dynamic relationship between shared cognition and team potency over time. Second, it offers evidence from real-life work teams for the motivational explanatory mechanism through which team cognition affects team effectiveness. Third, it suggests a novel asymmetrical influence of task- and time-related shared cognition on content- and time-related team performance.

Theoretical background and hypotheses

Team cognition and team effectiveness

Team cognition concerns the manner in which knowledge that is important to team functioning is mentally organized, represented, and distributed within the team (Kozlowski & Ilgen, 2006). Over the years, the concept has gained a prominent position in major theories of team effectiveness. The underlying assumption is that team cognition serves as a cognitive framework that guides team members' behaviours and allows teams to execute tasks in an efficient and coherent manner, thereby increasing team performance (DeChurch & Mesmer-Magnus, 2010). More specifically, compatibility in team members' cognitive understanding of key elements in their performance environment enables members to anticipate the needs and actions of others and to coordinate efficiently without the need for overt communication, and hence perform tasks more effectively (Cannon-Bowers, Salas, & Converse, 1993). The abundant research in this area indeed shows strong relationships of shared cognition with behavioural processes and team states that sustain both team performance and team viability (DeChurch & Mesmer-Magnus, 2010).

Perceptual shared cognition: Task and temporal cognition

Representing one type of team cognition, perceptual shared cognition concerns team members' perceived congruence of their cognitive representations regarding key aspects of their collaborative task (DeChurch & Mesmer-Magnus, 2010; Mohammed *et al*., 2012; Rentsch, Small, & Hanges, 2008). Perceptual shared cognition differs from structural shared cognition (i.e., shared mental models) in that it does not concern *factual* knowledge of team members or its underlying structure (i.e., causal, relational, or explanatory links). Instead, it concerns members' *interpretation* of information, such as how information is being understood by the team and what opinions are held about it. Rather than raw informational content, perceptual shared cognition captures the collective beliefs, expectations, and perceptions within teams (DeChurch & Mesmer-Magnus, 2010; Mohammed *et al*., 2012; Rentsch *et al*., 2008), and reflects 'an *agreement* [among team members] as to what is being understood' (Thompson & Fine, 1999, p. 280). For example, when members of a team have common knowledge of actions, sequences, and procedures necessary to complete a task, they have structural shared cognition; when they *perceive* that they agree upon which activities are most important for goal attainment, they are said to have perceptual shared cognition. In other words, perceptual shared cognition involves evaluation of cognitive content rather than its structure, and it assesses perceived congruence of members' task understanding rather than actual sharedness.

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We examine two distinct and established forms of perceptual shared cognition that closely relate to team task performance: shared task cognition and shared temporal cognition. Shared task cognition (or shared task representations) reflects a realization of congruent mental representations among team members of their collaborative task (Tindale, Smith, Thomas, Filkins, & Sheffey, 1996; Van Ginkel & Van Knippenberg, 2008). According to Tindale *et al*. (1996), people's engagement with a task is guided by their subjective understanding of the task, or task representation. People with different task representations may perform the same task in different ways. In teams, this may elicit conflicting expectations and cause coordination failures. In contrast, having similar task representation – or shared task cognition – will promote shared expectations for task execution and allow members to coordinate individual contributions effectively. Moreover, research by Van Ginkel and Van Knippenberg (2008) indicated that teams were even more effective on decision-making tasks when team members were aware of having shared task representations. In other words, shared task cognition helps teams to reach agreement on how to define and handle a task (Rentsch & Hall, 1994). Over the years, ample empirical evidence has supported these contentions (DeChurch & Mesmer-Magnus, 2010).

Besides shared task cognition, we incorporated shared temporal cognition as a distinct content area of perceptual shared cognition in this research. Heeding to the call to fill in the gap about temporality in team cognition research (Mohammed *et al*., 2012), researchers have introduced several temporal team cognition constructs among which shared temporal cognition has been researched most widely (Gevers & Peeters, 2009; Gevers, Rutte, & Van Eerde, 2006; Gevers, van Eerde, & Rutte, 2009; Mohammed & Nadkarni, 2014; Santos, Passos, Uitdewilligen, & Nübold, 2016; Standifer *et al*., 2015). Shared temporal cognition (or temporal consensus, Gevers *et al*., 2009) reflects congruent mental representations among team members of temporal aspects of task execution, such as the importance of meeting deadlines and appropriate timing and pacing of task activities (Gevers *et al*., 2006, 2009). Having high levels of shared temporal cognition indicates that team members are 'on the same temporal page' regarding collaborative tasks (Mohammed & Nadkarni, 2014). In other words, members agree on the temporal strategy for a project, including how the work should be scheduled over time, when it should be finished, and how fast the team should work to meet deadlines (Gevers *et al*., 2009). Contrastingly, teams with low levels of shared temporal cognition have disagreement about such temporal issues (Gevers *et al*., 2009). As evidenced, shared temporal cognition contributes to higher performance and satisfaction in teams, both directly and through better coordination processes and less team conflict (Gevers & Peeters, 2009; Gevers *et al*., 2006, 2009; Mohammed & Nadkarni, 2014; Santos *et al*., 2016; Standifer *et al*., 2015).

Dynamic relationships of perceptual shared cognition and team potency

Perceptual shared cognition is an emergent team state as it stems from the cognition of individual members but is manifested as a collective phenomenon of teams (Marks, Sabella, Burke, & Zaccaro, 2002). Overall, cognitive congruence develops through social interactions such as participation, communication, and negotiation (Bartel & Milliken, 2004; Gevers *et al*., 2009; Mohammed & Nadkarni, 2014). The more team members interact with one another, the more likely they will form a common frame of reference and a shared representation of the team's task content and its temporal elements (Klimoski & Mohammed, 1994; Levesque, Wilson, & Wholey, 2001). Although team cognition –

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perceptual or structured – is typically *expected* to converge over time (Marks *et al.*, 2002), this is not necessarily the case and opposite dynamics (incongruence) have been evidenced (Levesque *et al.*, 2001). In fact, prior research evidenced increasing, constant, and a rare occasion of decreasing trends of team cognition over time (Gevers, Uitdewilligen, & Passos, 2015; Mohammed *et al.*, 2010, 2012). Hence, one may expect between-team heterogeneity in the emergence and dynamics of perceptual shared cognition over time, which depends on, for example, common individual cognitions prior to team formation and early team interaction processes (Gevers *et al.*, 2006). Given such between-team heterogeneity, the question then is how change in perceptual shared cognition will affect other team processes and team states, and ultimately team performance.

Like shared cognition, team potency is considered as a team emergent state that develops over time as teams gain experience in working together (Collins & Parker, 2010; Jung & Sosik, 2003; Lester, Meglino, & Korsgaard, 2002; Tasa, Taggar, & Seijts, 2007). Team potency is defined as the collective belief among team members that the team can be effective (Guzzo *et al.*, 1993). It concerns a generalized belief in the team's capacity across different tasks and situations that contributes to a team's confidence in performing specific tasks (i.e., collective efficacy; Gully, Incalcaterra, Joshi, & Beaubien, 2002; Stajkovic, Lee, & Nyberg, 2009). It is not just a sum of members' individual self-efficacy, but develops as members collectively evaluate and negotiate subjective impressions of qualities and attributes of the team and its work processes (Gibson & Earley, 2007). Longitudinal research confirms that teams develop higher and more homogeneous efficacy beliefs over time from positive performance feedback and work experiences (Jung & Sosik, 2003; Lester *et al.*, 2002; Tasa *et al.*, 2007).

Researchers have argued for a positive link between a team's cognitive congruence and potency beliefs. Klimoski and Mohammed (1994) argue that shared cognitions, especially those among core members, may significantly enhance a team's identity, willingness to take risks, and task confidence. They explain that the *perception* of shared understanding energizes teams by motivating behaviours and fostering states that are known to be conducive to team effectiveness. They argue that the mere perception that other members have a similar task understanding can create an appreciation of similarity and commonality, and a sense of trustworthiness and positive effect, which allows members to believe that their team will exert great task effort and collaborate smoothly in the collective task. Langan-Fox, Anglim, and Wilson (2004) also make mention of the high utility of shared cognition to 'provide greater collective efficacy' (p. 336). Therefore, according to Mathieu *et al.* (2010), it is reasonable to expect that 'as team members become more aware of whether they are on the same page in terms of the task and the team, such knowledge will likely generate feelings of collective efficacy' (p. 26). By this reasoning, we contend that perceptual shared cognition will relate positively with team potency beliefs.

In the longitudinal context, we expect that changes in perceptions of shared cognition will trigger and contribute positively to changes in team potency beliefs such that their trajectories will converge over time. Following prior longitudinal motivation research (Bledow, 2013; Chen *et al.*, 2011), we believe this relationship can be explained with theories of spirals. Generally, spirals imply systematic and sustained changes in a phenomenon over time (Lindsley *et al.*, 1995): Systematic decrease over time represents a downward spiral; systematic increase represents an upward spiral. In the work context, downward or upward spirals in motivation are known to depend on changes in important experiences or outcomes at work, whereby not just the current standing of a predictor but

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also its development over time is important. Prior research showed, for example, that satisfaction with an outcome is determined by its actual value as well as by the change in the value (Hsee & Abelson, 1991) and that changes in turnover intention are explained by changes in job satisfaction levels rather than average (or initial) job satisfaction levels (Chen *et al.*, 2011). Consistently, we expect that – irrespective of its initial level – increases in perceptual shared cognition over time will be associated with increases in team potency beliefs and decreases in perceptual shared cognition will be associated with decreases in team potency beliefs. When members perceive that their ideas about the team's task and how to handle it are becoming increasingly similar over time, this will bolster their confidence that they are able to work well together without much (additional) confusion, conflict, or effort of coordination. Knowing that members are increasingly on the same page will enhance members' faith in the potential of the team, lift the team spirit, and induce greater task effort. Contrastingly, when members realize that the extent of their agreement about the task and its temporal aspects keeps waning over time, they may lose faith in the team's ability to perform and reduce investments in the team. Therefore, perceptual shared cognition changes and team potency changes are expected to show convergent trajectories over time.

Predicting team performance from initial levels and change in perceptual shared cognitions and team potency

To the extent that perceptual shared cognition enhances team potency, positive effects for team performance can be expected. The benefits of potency beliefs for team effectiveness have been demonstrated in numerous investigations (Campion, Papper, & Medsker, 1996; Campion *et al.*, 1993; Collins & Parker, 2010; Lester *et al.*, 2002; Sivasubramaniam, Murry, Avolio, & Jung, 2002) and summarized in a few recent meta-analyses (e.g., Gully *et al.*, 2002; Stajkovic *et al.*, 2009). Team potency contributes to team performance over and above the actual ability of team members (Hecht, Allen, Klammer, & Kelly, 2002), and results are consistent across operationalizations (e.g., efficacy vs. potency; Stajkovic *et al.*, 2009). The rationale for these effects is derived from Bandura's theory of self-efficacy (Bandura, 1982), stating that people who have confidence in their abilities set higher goals, exert greater effort, and are more persistent in goal attainment, even when facing setbacks. As a 'we-can-do' mentality stimulates collective involvement, commitment, and persistence (Bandura, 1982), teams that derive a higher sense of potency from their (increasingly) convergent perceptions of key task requirements are expected to establish higher levels of performance.

The conceptualized relationship between perceptual shared cognition, team potency, and team performance is presented in Figure 1. For the purpose of the present study, team performance is described in terms of content-related and time-related performance. These two criteria are considered key to the success of teams, especially project teams (Hoegl & Gemuenden, 2001). Content-related performance refers to the degree to which the team satisfies stakeholders' expectations regarding the quality of the output. In software development, for example, this typically entails adherence to pre-defined qualitative properties including functionality, reliability, and usability. Time-related performance concerns the efficiency and timeliness with which the output is produced. As competitive advantage in today's fast-changing business environment is achieved by providing the most value in the least amount of time, stakeholders increasingly emphasize the importance of time-related factors (Agarwal & Rathod, 2006). We distinguish between these criteria because we expect them to be differentially related to the two forms of

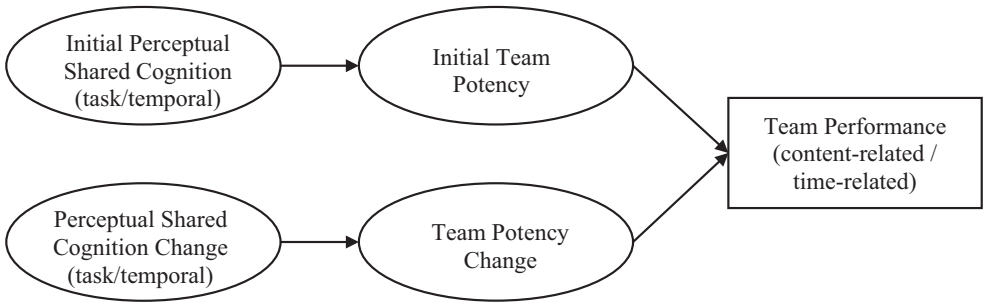

Figure 1. Conceptual model.

perceptual shared cognition in this research. Depending on the cognitive element that is perceived to be shared (task- or time-related), either content- or time-related performance criteria will become more salient. When team members perceive that they have (increasingly) similar understanding with regard to 'what' to do, this will lead teams to have more confidence in their ability to provide high-quality output and to devote persistent effort towards this outcome; when team members perceive that they have (increasingly) similar understanding of 'when' work will be accomplished, this will lead teams to have more confidence in completing the task in time and to put in direct and persistent effort towards this outcome. Evidently, one could argue for cross-domain influences such that shared task cognition may allow for proficient action without much delay in debating over task disagreements and thereby contribute to timely delivery. At the same time, though, prior research suggests the opposite that perceived task agreement may lead teams to jump into action without much deliberation over process, making members blind to potential temporal misalignments and leading to problems of temporal coordination and timely delivery (Janicik & Bartel, 2003). Balancing the extant empirical evidence, we therefore expect shared task cognition to contribute specifically to content-related performance and shared temporal cognition to contribute specifically to time-related performance. Based on all of the above, we formulate the following hypotheses:

H1: Initial levels and increases in shared task cognition positively predict content-related team performance via initial levels and increases in team potency, respectively.

H2: Initial levels and increases in shared temporal cognition positively predict time-related team performance via initial levels and increases in team potency, respectively.

Method

Sample and procedure

Over a period of 2 years, we collected data from nine medium-to-large companies in the information technology (IT) industry and from an IT department of a large bank in the Netherlands. With the help of an internal representative of each company, we selected projects with a lead-time of at least 2 months and a team of at least three members, including the project leader. All the projects involved the development and implementation of integrated information systems from standard software modules and client-specific applications. Work on the project should not have progressed more than halfway through the lead-time. Initially, 45 projects were selected for the study, but eight projects

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were eventually eliminated from the sample, because of pre-mature termination or poor response. Hence, our analyses were based on a final sample of 37 projects (N = 37). Project lead-time ranged from 8 to 70 weeks (as agreed upon with the client ex ante), with an average of 32 weeks (SD = 17.18). The average size of the core team was 9.32 members (SD = 5.69). Team members were predominantly males (90% males and 10% females). Most respondents (62%) spent at least 90% of their working hours on the project.

We collected longitudinal questionnaire data in which perceptual shared cognitions, team potency, and other variables were measured three times, and team performance was measured once at the end. Specifically, Time 1 (T_1) was approximately 3 weeks after the team had started working on the project. Time 2 (T_2) was halfway through the project lead-time as indicated by the project leader. Time 3 (T_3) was approximately 3 weeks before the project deadline. Time 4 (T_4) was 1 week after the project was completed. If the project deadline ever shifted, we adjusted the timing of the remaining measurements accordingly to preserve the early–middle–late–end data collection structure. Also, in the shorter projects (< 10 weeks), we were a bit more flexible with the timing of the data collections (i.e., starting a bit earlier on T1 and waiting a bit longer for T3) to avoid measurement points being very closely together.

To meet management requests to minimize time demands, we used a sample of team members rather than the entire collective as informants in measuring team properties. Following prior research (e.g., Van der Vegt & Bunderson, 2005), we approached multiple informants from each team in order to assess inter-rater reliability for each measure and to verify whether the average of informants' perceptions would sufficiently reflect the team properties. Questionnaires were administered mostly electronically to the project leader and a selection of at least two team members who were appointed by the project leader as informants. We instructed project leaders to select a representative sample from the core team (i.e., the core group of people who were expected to be on the team for the entire duration of the project) and encouraged them to optimize team representativeness in terms of functions and demographics. In this way, we could consistently approach the same individuals to provide responses across the different time points. Participants were guaranteed confidentiality. The team members and project leaders offered assessments of their team's perceptual shared cognitions, team potency, and team performance. In 23 projects, an additional team performance rating was collected from a unit manager or a higher-level project manager.

We received responses from a total of 161 participants (mean response rate per team was 4.35). Table 1 provides an overview of the team response rates. Our sampling procedure implies that ideally each team would have *at least* three respondents to fill in the questionnaires at each measurement moment, that is, the team leader and two team members. In practice, however, some teams fell short in this criterion on one or more measurement occasions. Subsequent tests of sample quality including ICC, $R_{wg(j)}$, and Little's MCAR test however indicate sufficient quality of this longitudinal team data (see Data preparation section).

Table 1. Overview of the team response rates

	T_1	T_2	T_3	T_4
Teams with no respondent	32%	0%	11%	0%
Teams with one respondent	3%	11%	27%	13%
Teams with two respondents	5%	30%	19%	19%
Teams with three or more respondents	60%	59%	43%	68%

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Measures

The questionnaire items were phrased around the team level and referred to the state of affairs in the project at the measurement time. Unless indicated otherwise below, the response format ranged from 1 = disagree completely to 5 = agree completely.

Shared task cognition

In the absence of an existing *perceptual* shared task cognition measure, we developed a scale comprised of three items asking respondents to what extent team members perceived that they agreed on (1) what had to be done in the project, (2) how these tasks had to be done, and (3) why they had to be done. The response format ranged from 0%, indicating total disagreement, to 100%, indicating total agreement, with 10% intervals. The Cronbach alphas were .75, .85, and .87 at the three respective measurement points, respectively, justifying aggregating the item scores to a single scale score.

Shared temporal cognition

We used Gevers *et al.*'s (2006) four-item scale to measure *perceptual* shared temporal cognition. We asked respondents to what extent team members agreed that they (1) had similar opinions about meeting deadlines, (2) had similar thoughts about the best way to use the time available, (3) agreed on how to allocate the time, and (4) had similar ideas about the time it took to perform subtasks. The scale was shown to be reliable in multiple prior studies (Gevers *et al.*, 2006, 2009; Mohammed & Nadkarni, 2014; Santos *et al.*, 2016). The Cronbach alphas were .83, .84, and .83 at the three respective measurement points, respectively, justifying aggregating the item scores to a single scale score.

Team potency

We used five items from Guzzo *et al.*'s eight-item potency scale (Guzzo *et al.*, 1993). We used a shortened scale to adhere to the companies' request to not take more time from their employees than was strictly needed. The items we used were as follows: (1) This team has confidence in itself; (2) this team believes it can become unusually good at producing high-quality work; (3) this team expects to be known as a high-performing team; (4) this team feels it can solve any problem it encounters; and (5) this team believes it can be very productive. In prior research, these items have been identified as the best loading items of the scale (e.g., Akgün, Keskin, Byrne, & Imamoglu, 2007) and reliable for measuring team potency (e.g., Gevers, van Eerde, & Rutte, 2001). The Cronbach alphas were .86, .85, and .90 at the three respective measurement points, respectively, justifying aggregating item scores to a single scale score.

Team performance

We used two measures of team performance: content-related and time-related performance. *Content-related performance* was measured with three items. We asked team members, project leaders, and project managers how they evaluated the project output in terms of output quality, compared with other projects they were familiar with. Responses were given on a seven-point scale that ranged from 1 = much worse to 7 = much better. Also, we asked them how satisfied they thought a) the client and b) future users would be with the project outcome. These questions were rated on a five-point scale that ranged

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from 1 = very unsatisfied to 5 = very satisfied. The scores on the three items were standardized and averaged to determine content-related performance. The Cronbach alpha was .80; hence, we aggregated the item scores to a single scale score. *Time-related performance* was measured with three items. We asked team members, project leaders, and project managers what percentage of the total work had been completed by the original deadline. The response scale ranged from 0% to 100%, with 10% intervals. The sample mean of this performance measure was 85.85%, with a standard deviation of 16.04%. The majority of teams (90%) had finished at least 70% of their work. Furthermore, we asked respondents to compare their project performance with other projects in terms of (a) efficiency and (b) adherence to schedule on a seven-point scale ranging from 1 = much worse to 7 = much better. The Cronbach alpha was .82. Hence, we standardized the item scores (given different scaling of the items) and averaged them to determine time-related performance.

We conducted an item-sort test to validate the content adequacy of the two performance measures (Anderson & Gerbing, 1991). Using an online subject pool (i.e., Prolific), we obtained a sample of 69 employees from various industries. Respondents were 49.3% female, had an average age of 31.01 (*SD* = 8.11), and held either a bachelor (62.3%), master (33.3%) or doctoral degree (4.3%). First, we provided respondents with definitions of content-related and time-related performance. We then asked respondents to read each item and assign it to the label and definition of the construct they perceived it to best represent content-related performance, time-related performance, or neither. Based on these scores, we calculated the *substantive-validity coefficient* (c_{sv}), which reflects the extent to which respondents assign an item to its posited construct more than to any other construct. Values of c_{sv} ranged between .55 and .88, and were all tested to be significant, thereby confirming the construct validity of our measure. Furthermore, we conducted paired sample t-tests to compare the ratings of team members, project leaders, and project managers on both outcome variables. The tests showed no significant differences between the three respondent groups, so ratings were averaged into a single rating for content-related performance and a single rating of time-related performance per team, also based on high levels of inter-rater reliability (see Data preparation section).

Control variables

We examined team size and project lead-time (as an indicator of project size) as potential control variables. Team size and project size are generally considered as risk factors in software development projects (Jiang & Klein, 2000). Evidently, the larger the project and the more people involved, the more room there will be for lack of clarity, confusion, and disagreement about issues concerning the collaborative task and its temporal aspects. However, since neither variable showed significant correlations with the outcome variables, we refrained from including them in the analyses to maintain maximum statistical power.

Data preparation

Before testing the hypotheses, we assessed the inter-rater agreement and reliability of all the team measures to see whether individual scores could be aggregated to the team level. After that, we examined the influence of missing (team-level) data and provided remedy wherever necessary.

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Inter-rater agreement and reliability

We assessed the validity of aggregating individual scores to the team level by calculating the average intra-group agreement index $R_{wg(j)}$ (James, Demaree, & Wolf, 1984). $R_{wg(j)}$ reflects the degree to which raters provide the same rating. It ranges from 0 to 1, indicating complete disagreement to agreement among team members. Values of .70 or above are considered adequate (George, 1990; George & Bettenhausen, 1990). Moreover, ICC(1) and ICC(2) were used to assess aggregate reliability (Bliese, 2000). ICC(1) indicates whether a construct has sufficient homogeneity within teams to justify aggregation to the team level. Its values range from –1 to +1, but values between .05 and .20 are most typical (Bliese, 2000). ICC(2) estimates the degree to which team means can be reliably differentiated. Being indicative of moderate reliability (LeBreton & Senter, 2008), values equal to or above .50 are considered acceptable here given the small size of the groups in our sample and the fact that the high $R_{wg(j)}$-values indicate that lower ICC(2) values are due to smaller variability between groups rather than a lack of agreement within groups. As reported in Table 2, all the measures meet or approach the cut-off criteria, suggesting sufficient agreement and reliability to aggregate individual scores to the team level.

Missing data treatment

The Little's MCAR test obtained for this study's data indicated that data were missing completely at random, $\chi^2(49) = 40.96$, $p = .79$. To optimize the statistical power, we used all information available in the aggregated team-level data and took into account missing values by calculating expectation–maximization (EM) estimates. The EM algorithm generates maximum-likelihood estimates in a data set with missing data (Dempster, Laird, & Rubin, 1977). This technique has been shown to be superior to other missing data strategies such as mean substitution, single regression imputation, pairwise deletion, or listwise deletion (Dormann & Zapf, 2002; Ployhart & Vandenberg, 2010).

Data analyses

We tested the hypotheses with LISREL 8.80, following a latent growth modelling approach (Bollen & Curran, 2006; Chan, 1998; Ployhart & Vandenberg, 2010; Sacco & Schmitt, 2005; Willett & Sayer, 1994). Overall, the latent growth approach allows *simultaneous* testing of (1) the change pattern of dynamic independent, mediating, and dependent constructs and (2) the causal relationships among their change patterns. We present Model 1 in Figure 2 as an example. In this model, we tested the dynamic indirect effect of shared task cognition on content-related performance via team potency. The change pattern of each dynamic construct (i.e., shared task cognition and team potency) was specified as being determined by a latent intercept and a latent slope. The intercept represented the initial level. It was a constant over time, and its factor loadings on the corresponding observed variables were all fixed to 1 from T_1 to T_3. The slope represented the overall linear development pattern across measurement moments. Its factor loadings on the corresponding observed variables were fixed in an ascending order (i.e., 0, 1, and 2) from T_1 to T_3 (Duncan & Duncan, 2004). Also, we regressed the intercept of team potency on the intercept of shared task cognition, the slope of team potency on the slope of shared task cognition, and content-related performance on the intercept and slope of team potency. Moreover, our overall prediction is that shared task cognition affects content-related performance and shared temporal cognition affects time-related performance. We assume there is no cross-domain influence of shared task cognition on time-related

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Table 2. Descriptive statistics and intercorrelations

	M	*SD*	ICC[1]	ICC[2]	$\bar{R}_{wg(j)}$	1	2	3	4	5	6	7	8	9	10	11
1. Shared task cognition T1	81.06	8.76	.20	.50	.96	**.75**										
2. Shared task cognition T2	79.60	12.04	.44	.76	.95	.23	**.85**									
3. Shared task cognition T3	78.80	9.09	.15	.41	.88	.11	.45**	**.87**								
4. Shared temporal cognition T1	3.50	.38	.22	.54	.92	.19	.07	−.05	**.83**							
5. Shared temporal cognition T2	3.42	.55	.32	.65	.97	.20	.65***	.06	.31	**.84**						
6. Shared temporal cognition T3	3.46	.50	.20	.50	.92	−.09	.48**	.44**	.21	.36*	**.83**					
7. Team potency T1	3.75	.41	.32	.66	.97	.21	.20	−.02	.81***	.52***	.19	**.86**				
8. Team potency T2	3.70	.50	.27	.61	.94	−.04	.65**	.24	.28	.71***	.64***	.39*	**.85**			
9. Team potency T3	3.77	.59	.21	.51	.93	−.05	.54***	.46**	.20	.50**	.65***	.21	.75***	**.90**		
10. Content−related performance	−0.03	.62	.28	.54	.73	−.15	.60***	.37*	.15	.38*	.50**	.26	.48**	.51***	**.70**	
11. Time-related performance	−0.07	.79	.61	.83	.93	−.10	.48***	.53***	.19	.32*	.65***	.17	.59***	.69***	.63***	**.81**

Note. $N = 37$, internal consistencies of the scales (α) are presented in bold printing on the diagonal.
***$p < .001$; **$p < .01$; *$p < .05$.

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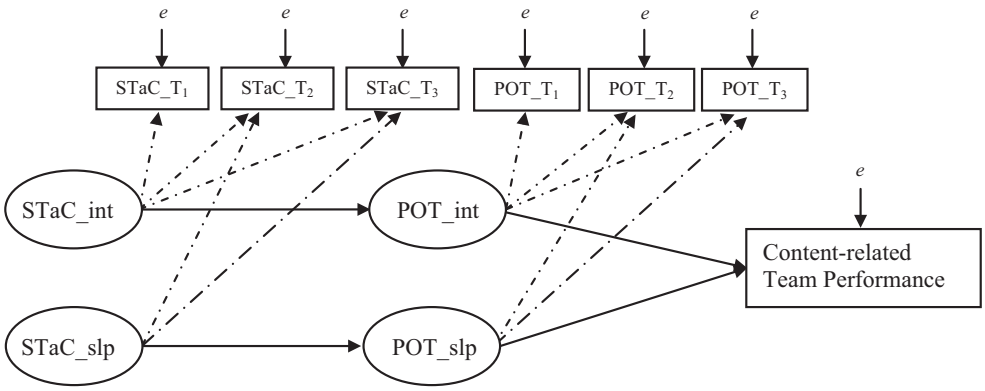

Figure 2. The linear growth model (LGM) results of dynamic indirect effect model M1. STaC = shared task cognition, POT = team potency, _int = intercept, _slp = slope. Factor loadings of the observed variables to the intercepts were all fixed to 1 from T_1 to T_3. Factor loadings of the observed variables to the slopes were fixed in an ascending order (i.e., 0, 1, and 2) from T_1 to T_3.

performance or of shared temporal cognition on content-related performance. To verify this assumption, we followed the same modelling approach and explored in Model 2 the influence of shared task cognition on time-related performance via potency. Hence, results from Models 1 and 2 give a comprehensive and nuanced insight into what exact aspects of team performance will be influenced by the change patterns of shared task consensus and team potency. We followed the same procedure to test Hypothesis 2. Model 3 specified the dynamic indirect effect of shared temporal cognition on time-related performance via team potency. We explored in Model 4 the potential cross-domain influence of shared temporal cognition on content-related performance via team potency.[1] Finally, we conducted sensitivity analyses, testing the equivalence of the hypothesized models between two random subsamples in multiple trials, which confirmed the robustness of our findings.

Results

Table 2 presents means, standard deviations, and zero-order Pearson correlations among the study variables. The mean scores show that, in general, shared task cognition, shared temporal cognition, and team potency are moderately high at the start and that they are related to content- and time-related performance from the midpoint onward. Overall, there is little fluctuation in the sample mean of shared cognition or team potency over time. Yet, there could be considerable between-team differences in the change pattern of these variables that may be associated with systematic between-team differences in team performance outcomes (see Li & Roe, 2012; Roe, Gockel, & Meyer, 2012 for more discussion).

The results of the hypothesis testing are presented in Table 3. Hypotheses 1 predicted that higher initial levels and more increases in shared task cognition would correspond

[1] *Models 1 and 2 were performed on N = 36 teams. Models 3 and 4 were performed on N = 37 teams. This is because we omitted one team that was identified as an outlier for shared task cognition based on a value of more than 1.5 times the variable's interquartile range. Inclusion of the outlier did not change the overall pattern of the results.*

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Table 3. The linear growth model (LGM) results of the dynamic indirect effect models

	Model 1			Model 2			Model 3			Model 4		
	POT_int *b*	POT_slp *b*	CRTP *b*	POT_int *b*	POT_slp *b*	TRTP *b*	Pot_int *b*	POT_slp *b*	TRTP *b*	POT_int *b*	POT_slp *b*	CRTP *b*
Shared Task Cognition_int	0.02*			0.02*								
Shared Task Cognition_slp		0.03**			0.03**							
Shared Temporal Cognition_int							1.20***			1.26		
Shared Temporal Cognition_slp								1.55***			1.44	
Team Potency_int			0.56†			1.03***			1.17**			0.65
Team Potency_slp			1.90**			3.34***			2.16**			1.36
R^2	.23	.88	.35	.24	.89	.54	1.00	1.00	.60	1.00	1.00	.47
N		36			36			37			37	
χ^2		7.15 (p = .85)			7.47 (p = .83)			16.14 (p = .30)			29.96 (p < .001)	
df		12			12			14			15	
CFI		1.00			1.00			0.98			0.85	
RMSEA		0.00			0.00			0.07			0.17	

Note. POT = team potency, CRTP = content-related team performance, TRTP = time-related team performance, _int = intercept, _slp = slope, CFI = Comparative Fit Index, *RMSEA*=root mean square error of approximation.
***p < .001; **p < .01; *p < .05; †p < .10.

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with higher content-related team performance via higher initial levels and more increases in team potency, respectively. This hypothesis was tested in Model 1. Overall, the model fitted well with the data, $\chi^2(12) = 7.15, p = .85$; CFI = 1.00, RMSEA = 0.00, 90% CI (0.00, 0.10). As expected, the intercept of shared task cognition related positively with the intercept of team potency ($b = 0.02$, $\beta = 0.42$, $t = 2.04, p = .04$), the slope of task shared cognition related positively with the slope of team potency ($b = 0.03$, $\beta = 0.05$, $t = 2.51$, $p = .01$), and the intercept and slope of team potency both related positively with content-related performance, though the former only marginally ($b = 0.56$, $\beta = 0.41$, $t = 1.87$, $p = .06$ and $b = 1.90$, $\beta = 10.9$, $t = 2.75$, $p < .01$, respectively). Hypothesis 1 was supported. Moreover, we assumed no cross-domain influence of shared task cognition on time-related performance via potency and tested this assumption in Model 2. Contrary to our expectation, this model also fitted well with the data, $\chi^2(12) = 7.47$, $p = .83$; CFI = 1.00, RMSEA = 0.00, 90% CI (0.00, 0.10). The intercept of shared task cognition related positively to the intercept of team potency ($b = 0.02$, $\beta = 0.42$, $t = 2.06, p = .04$), the slope of shared task cognition related positively to the slope of team potency ($b = 0.03$, $\beta = 0.05$, $t = 2.76$, $p < .01$), and the intercept and slope of team potency also related positively to time-related team performance ($b = 1.03$, $\beta = 0.63$, $t = 2.74, p < .01$ and $b = 3.34$, $\beta = 16.10$, $t = 3.58, p < .01$, respectively). Thus, higher initial levels and stronger increases in shared task cognition were conducive to both content-related and time-related performance via initial levels and increases in team potency.

Hypothesis 2 proposed an indirect effect of initial levels and increases in shared temporal cognition on time-related via initial levels and increases in team potency, respectively. This hypothesis was tested in Models 3. The model fitted well with the data, $\chi^2(14) = 16.14, p = .30$; CFI = 0.98, RMSEA = 0.07, 90% CI (0.00, 0.18). The intercept of shared temporal cognition related positively to the intercept of team potency ($b = 1.20$, $\beta = 1.17, t = 8.17, p < .001$), the slope of shared temporal cognition related positively to the slope of team potency ($b = 1.55$, $\beta = 5.29, t = 6.21, p < .001$), and the intercept and slope of team potency also related positively to time-related team performance ($b = 1.17$, $\beta = 1.03, t = 4.27, p < .001$; $b = 2.16$, $\beta = 10.42$, $t = 5.51, p < .001$). Hypothesis 2 was supported. Moreover, we explored in Model 4 the cross-domain influence of shared temporal cognition on content-related performance via team potency. As expected, the model did not fit well with the data, $\chi^2(15) = 29.96, p = .01$; CFI = 0.85, RMSEA = 0.17, 90% CI (0.06, 0.26). Any evidenced relationship in the model – significant or not – is therefore spurious. Thus, shared temporal cognition affected time-related but not content-related performance via team potency.

Discussion

We investigated the dynamic relationship between perceptual shared cognition and team potency in predicting team performance in a 2-year longitudinal field research among professional software development teams. We found that initial levels and increases in shared task cognition over time both improved content-related performance by spurring higher initial levels and greater increases in team potency. Initial levels and increases in shared temporal cognition over time both improved time-related performance by spurring higher initial levels and greater increases in team potency. Thereby, our findings confirmed that initial levels and change in team potency operated as an explanatory mechanism for the relationship between shared cognition and team performance.

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Interestingly, our additional explorations indicated that shared task cognition predicted both content- and time-related team performance, whereas shared temporal cognition predicted time-related but not content-related performance.

Theoretical implications

Our research advances the team cognition literature in three important ways. First, our findings underscore the role of affective-motivational mechanisms as an alternative explanation for how shared cognition benefits team effectiveness. Team potency is affirmed as one motivational state fulfilling this mediating role. Whereas prior research suggested that team cognition bolsters team motivation at the one end and team motivation facilitates team effectiveness behaviours at the other end (Mathieu *et al.*, 2010), there has not been much theorization that integrates the two, let alone longitudinal empirical research that probes into the potential meditating role of team motivation in explaining positive effects of team cognition on team effectiveness. Focusing on *perceptual* shared cognition and studying field teams over a longer time than prior research, our findings convincingly show that perceptual shared cognition – both task and temporal – instil members with higher and increasing confidence in their team, which results in higher team effectiveness eventually. Our findings highlight the significance of affective-motivational team states in explaining the impact of shared cognition on team outcomes.

Second, our research highlights the unique theoretical value of dynamics in shared cognitions for understanding its motivational impact on team performance over time. The need for a comprehensive incorporation of dynamics in team cognition research has extensively been argued for in foregoing literature (cf. Gevers *et al.*, 2015; Mohammed *et al.*, 2012). Our findings corroborate these arguments by showing independent and larger benefits of shared cognition changes on team performance (via team potency change) than those of initial levels of shared cognition (via initial team potency levels). This implies, along the lines of spiral theory (Bledow, 2013; Chen *et al.*, 2011; Lindsley *et al.*, 1995), that it is not merely the actual level of perceptual shared cognition that is important, but also its current stance relative to earlier levels of perceptual shared cognition (i.e., change). In other words, when team members experience an increase in shared cognition from a lower to a higher level over time, this increase has a stronger motivational impact than when members consistently experience high levels of shared cognition over time. Consequently, a particular team may report a lower level of shared cognition than another team, but can still derive a higher motivational force based on a sharper increase in shared cognition over time, and therefore perform better than the other team. These findings complement prior laboratory evidence that shared temporal cognition developed later in a team's life exerted a stronger effect on team performance than those developed earlier (Mohammed, Hamilton, Tesler, Mancuso, & McNeese, 2015). On a positive note, this implies that, even though higher initial levels of perceptual shared cognition are beneficial, teams can overcome an initial lack of perceived congruence and that dissimilarities and disagreements need not be harmful as long as teams manage to resolve their differences and establish positive trajectories. At the same time, our findings also imply that high initial shared cognition does not sustain high confidence over time or guarantee high performance and that teams also need to safeguard against decreases in perceptual shared cognition having detrimental effects on their confidence and thereby on their performance. These insights highlight once more the limitations of cross-sectional research to studying dynamic shared cognition and truly

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understanding its (motivational) impact on team functioning and performance (Cronin, Weingart, & Todorova, 2011).

Third, our research extends previously shared cognition research by demonstrating a novel asymmetrical influence of task- and time-related shared cognition on content- and time-related team performance. Whereas shared task cognition predicted both content-related and time-related performance, showing relevance for high levels of output quality as well as timeliness, shared temporal cognition was predictive of time-related performance only. These findings are important because they confirm the value of distinguishing between shared task cognition and shared temporal cognition for fully understanding their unique impact on team functioning and performance. Early team cognition literature typically considered the 'what' and the 'when' of task performance in unison (e.g., Cannon-Bowers & Salas, 2001; Cannon-Bowers *et al.*, 1993), and it has been only recently that scholars started to distinguish between task- and time-related cognition content (see Mohammed *et al.*, 2012). To our knowledge, the current study is the first to actually establish differential relationships of task- and time-related shared cognition with their respective corresponding outcomes of team performance. Evidently, our findings need to be considered with caution given the small sample size and potential lack of power to detect a significant relation between shared temporal cognition and content-related performance, but they do suggest important implications for the relative value of the different categories of perceptual shared cognition for team performance. Given the complex, non-routine nature of the projects in our sample, it seems reasonable that the perception of agreement about the temporal strategy may not instil the confidence that the team needs to satisfy the quality requirements of a specific project. At the same time, knowing that members are on the same page about both the 'what' and the 'when' of task accomplishment instils members with a faith in team capabilities that allows for proficient actions without much delay, thereby also increasing the efficiency and timeliness of performance. Thus, whereas perceived agreement about critical task issues instils team members with the confidence that they will be able to finish the task on time, perceived agreement about time-related aspects is not a sufficient condition for teams to believe that they will also be able to satisfy the task's quality requirements.

Practical implications

Strictly speaking, the reported findings do not allow causal inferences, despite the fact that they are based on a longitudinal research design. Experimental research is needed to substantiate the causal relationships in our reasoning. Nevertheless, keeping this in mind, we would suggest that practitioners who are interested in improving the quality and timeliness of project team performance would do well to devote time and energy to help develop cognitive congruence among team members about their collective task as well as its temporal elements. For this purpose, it may be beneficial to arrange project-launch meetings in which management and team members come together to discuss the feasibility of the project and to reach an agreement about the project targets and the project approach. However, our findings also indicate that to ensure that cognitive congruence is maintained throughout the entire project, regular meetings might be needed to discuss project updates and to make sure that consistent interpretations of project requirements (i.e., project content and time constraints) would sustain. It is evident that project teams, especially those working over longer lead-times, will likely be confronted with irregularities and/or task requirement changes over time. These changes will require teams to continuously come to an agreement on what accordant changes in

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task execution and the time investment are necessary. Our research shows that even when initial levels of perceptual shared cognition are high, potential decreases in perceptual shared cognition will have detrimental effects on the team's confidence and thereby on their performance. Therefore, it is important for teams and their managers to understand that the high level of confidence is subject to change and that performance excellence requires that perceptual shared cognitions are being maintained and improved throughout the project.

Limitations and directions for future research

Our study has some limitations. First, our sample of 37 teams suggests limited statistical power. The rule of thumb suggests 5 to 10 observations for each parameter estimated in LGM. Given a maximum of 16 estimated parameters in our models, this would imply a minimum of 80 to 160 observations to reach sufficient statistical power. Yet, for longitudinal research, interpreting the rule of thumb as 5 to 10 subjects (i.e., teams) per parameter is considered too strong of a requirement given that each subject contributes several observations over time (Muthén & Curran, 1997, p. 384). Taking this into account, there were 108 observations for Model 1 and Model 2 (i.e., 36 teams × 3 time points) and 111 observations for Model 3 and Model 4 (i.e., 37 teams × 3 time points). Although the numbers of observations meet the lower requirement, we need to practice caution in interpreting results seeing that the numbers were leaning towards the lower end of the required observations and the limited sample size forced us to test hypotheses with respect to content-related and time-related team performance separately. Evidently, future longitudinal team research would do well to sample more teams and test all relevant variables in an integrated model.

Second, some of the measurements were based exclusively on members' self-reports and subject to biases, even though self-report measures may not limit internal validity as much as is commonly expected (see, Spector, 1994; Wall *et al.*, 2004). For some of the variables (e.g., perceptual shared cognition and team potency), the subjective judgement represents our core interest. Also, we partly compensated for these limitations by obtaining data from various members who held different functional and managerial positions within the team. Moreover, we derive confidence in the reliability and validity of our data from high levels of intra-group agreement. Yet, it should be noted that data were obtained from a representative sample of core team members rather than entire teams, which may have inflated perceptions of shared constructs.

A difficulty of longitudinal research is that the investigator has to anticipate the appropriate time interval between measures to ensure that true change has taken place (Zaheer, Albert, & Zaheer, 1999). We employed an early–midpoint–late approach in which measurement intervals were contingent upon the total project lead-time. The differences in measurement intervals between teams may have affected our findings since shorter intervals offer teams less time to build shared cognition. However, prior research suggested that workgroup development processes do not evolve according to the elapse of actual time, but according to the elapse of time relative to the deadline (Gersick, 1988, 1989). Tight deadlines, for example, were shown to increase team members' focus on the task (Karau & Kelly, 1992). Hence, we anticipated that the development of shared cognition would be contingent upon the proportion of available time to the total project time. At the same time, three

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measurement points are the minimum requirement for true longitudinal research (Ployhart & Vandenberg, 2010). Future research could gain strength by increasing the number of measurement points of team processes, states, and performance throughout the project.

Another interesting issue related to our longitudinal design concerns the fact that the overall means in perceptual shared cognition and team potency proved to be rather consistent across time. Shared cognition showed a slight decrease over time and team potency portrayed an initial decrease followed by a slight increase to just above the initial level. As mentioned earlier, this does not mean that teams' values were consistent across the three waves, but rather that different teams showed different change trajectories in shared cognition and team potency over time. Whereas some teams' scores went up, others' went down. Although not addressed as such in this study, this is an interesting phenomenon that deserves further attention. Empirical evidence exists for converging and diverging shared cognition over time (Gevers *et al*., 2015; Mohammed *et al*., 2010, 2012) and antecedents of shared temporal cognition have been studied longitudinally (Gevers *et al*., 2006, 2009), and still, it would be interesting to study the change trajectories more closely to determine which factors influence the development of shared cognition and team potency over time.

Finally, we focused on perceptual rather than structural shared cognition, given that affective-motivational team states will be based on subjective rather than objective team qualities. However, this is not to say that structural shared cognitions or other forms of collective cognition (e.g., transactive memory; Lewis, 2004) are not relevant to affective-motivational team states. For example, it is probably highly motivational to learn that interdependent operations run smoothly without verbal deliberation based on structural mental model similarity. Similarly, it may be very comforting to know that one can rely on teammates to contribute distributed information and expertise whenever it is needed. Moreover, other dimensions of cognitive content besides task- and time-related cognition should be featured in future research (e.g., team-related cognition). Evidently, it is promising for future research to gain insights into the impact of dynamic shared cognitions by considering a broader array of cognition domains (e.g., mental models about team members) and using multiple measurement methods (e.g., concept mapping and pairwise ratings) in unison.

Conclusion

In this longitudinal field study, we present evidence that the dynamic relationship between perceptual shared cognition and team potency predicts the performance outcomes of professional software development teams. Our study shows that both initial levels and increases in perceptual shared cognition over time contribute to team outcomes through initial levels and increases in team potency, respectively. In addition, the study offers evidence for differential relationships of task- and time-related shared cognition with the quality and timeliness criteria of team performance. Whereas shared task cognition enhanced both output quality and timeliness, shared temporal cognition predicted timeliness but not output quality. These findings are important because they show the value of perceptual shared cognition for boosting team confidence and performance, and because they demonstrate the importance of longitudinal research for gaining increased understanding of how team cognition dynamics impact team effectiveness.

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References

Agarwal, N., & Rathod, U. (2006). Defining 'success' for software projects: An exploratory revelation. *International Journal of Project Management*, *24*, 358–370. https://doi.org/10.1016/j.ijproman.2005.11.009

Akgün, A. E., Keskin, H., Byrne, J., & Imamoglu, S. Z. (2007). Antecedents and consequences of team potency in software development projects. *Information & Management*, *44*, 646–656. https://doi.org/10.1016/j.im.2007.08.001

Anderson, J. C., & Gerbing, D. W. (1991). Predicting the performance of measures in a confirmatory factor analysis with a pretest assessment of their substantive validities. *Journal of Applied Psychology*, *76*, 732–740. https://doi.org/10.1037/0021-9010.76.5.732

Bandura, A. (1982). Self-efficacy mechanisms in human agency. *American Psychologist*, *37*, 122–147. https://doi.org/10.1037/0003-066X.37.2.122

Bartel, C. A., & Milliken, F. J. (2004). Perceptions of time in work groups: Do members develop shared cognitions about their temporal demands? In E. A. Mannix, M. A. Neale & S. Blount (Eds.), *Research on managing groups and teams: Time in groups*, Vol. 6 (pp. 87–109). Amsterdam, The Netherlands: Elsevier, Ltd.

Bledow, R. (2013). Demand-perception and self-motivation as opponent processes: A response to Bandura and Vancouver. *Journal of Management*, *39*(1), 14–26. https://doi.org/10.1177/0149206312466149

Bliese, P. D. (2000). Within-group agreement, non-independence, and reliability. Implications for data aggregation and analysis. In K. J. Klein & S. W. J. Koslowski (Eds.), *Multilevel theory, research, and methods in organizations* (pp. 349–381). San Francisco, CA: Jossey-Bass.

Bollen, K. A., & Curran, P. J. (2006). *Latent curve models: A structural equation perspective*. Hoboken, NJ: John Wiley & Sons, Inc.

Campion, M. A., Medsker, G. J., & Higgs, A. C. (1993). Relations between work group characteristics and effectiveness: Implications for designing effective work groups. *Personnel Psychology*, *46*, 823–850. https://doi.org/10.1111/j.1744-6570.1993.tb01571.x

Campion, M. A., Papper, E. M., & Medsker, G. J. (1996). Relations between work team characteristics and effectiveness: A replication and extension. *Personnel Psychology*, *49*, 429–452. https://doi.org/10.1111/j.1744-6570.1996.tb01806.x

Cannon-Bowers, J. A., & Salas, E. (2001). Reflections on shared cognition. *Journal of Organizational Behavior*, *22*, 195–202. https://doi.org/10.1002/job.82

Cannon-Bowers, J. A., Salas, E., & Converse, S. (1993). Shared mental models in expert team decision-making. In N. J. Castellan Jr. (Ed.), *Individual and group decision making: Current issues* (pp. 221–246). Hillsdale, NJ: Lawrence Erlbaum Associates.

Chan, D. (1998). Functional relations among constructs in the same content domain at different levels of analysis: A typology of composition models. *Journal of Applied Psychology*, *83*(2), 234–246. https://doi.org/10.1037/0021-9010.83.2.234

Chen, G., Ployhart, R. E., Thomas, H. C., Anderson, N., & Bliese, P. D. (2011). The power of momentum: A new model of dynamic relationships between job satisfaction change and turnover intentions. *Academy of Management Journal*, *54*(1), 159–181. https://doi.org/10.5465/amj.2011.59215089

Collins, C. G., & Parker, S. K. (2010). Team capability beliefs over time: Distinguishing between team potency, team outcome efficacy, and team process efficacy. *Journal of Occupational and Organizational Psychology*, *83*, 1003–1023. https://doi.org/10.1348/096317909X484271

Cronin, A. C., Weingart, L. R., & Todorova, G. (2011). Dynamics in groups: Are we there yet? *Academy of Management Annals*, *5*(1), 571–612. https://doi.org/10.1080/19416520.2011.590297

20448325, 2020, 1, Downloaded from https://bpspsychub.onlinelibrary.wiley.com/doi/10.1111/joop.12287 by Uva Universiteitsbibliotheek, Wiley Online Library on [24/02/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

DeChurch, L. A., & Mesmer-Magnus, J. R. (2010). The cognitive underpinnings of effective teamwork: A meta-analysis. *Journal of Applied Psychology*, *95*(1), 32–53. https://doi.org/10.1037/a0017328

Dempster, A. P., Laird, N. M., & Rubin, D. B. (1977). Maximum likelihood from incomplete data via the EM algorithm. *Journal of the Royal Statistical Society, Series B*, *39*(1), 1–38. https://doi.org/www.jstor.org/stable/2984875

Dormann, C., & Zapf, D. (2002). Social stressors at work, irritation, and depressive symptoms: Accounting for unmeasured third variables in a multi-wave study. *Journal of Occupational and Organizational Psychology*, *75*, 33–58. https://doi.org/10.1348/096317902167630

Duncan, T. E., & Duncan, S. C. (2004). A latent growth curve modeling approach to pooled interrupted time series analyses. *Journal of Psychopathology and Behavioral Assessment*, *26*(4), 271–278. https://doi.org/10.1023/B:JOBA.0000045342.32739.2f

George, J. M. (1990). Personality, affect, and behavior in groups. *Journal of Applied Psychology*, *75*, 107–116. https://doi.org/10.1037/0021-9010.75.2.107

George, J. M., & Bettenhausen, K. (1990). Understanding prosocial behavior, sales performance, and turnover: A group-level analysis in a service context. *Journal of Applied Psychology*, *75*, 698–709. https://doi.org/10.1037/0021-9010.75.6.698

Gersick, C. J. G. (1988). Time and transition in work teams: Toward a new model of group development. *Academy of Management Journal*, *31*, 9–41. https://doi.org/10.2307/256496

Gersick, C. J. G. (1989). Marking time: Predictable transitions in task groups. *Academy of Management Journal*, *32*, 274–309. https://doi.org/10.2307/256363

Gevers, J. M. P., & Peeters, M. A. G. (2009). A pleasure working together? The effects of dissimilarity in team member conscientiousness on team temporal processes and individual satisfaction. *Journal of Organizational Behavior*, *30*, 379–400. https://doi.org/10.1002/job.544

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

Gevers, J. M. P., Uitdewilligen, S., & Passos, A. M. (2015). Dynamics of team cognition and team adaptation: Introduction to the special issue. *European Journal of Work and Organizational Psychology*, *24*, 645–651. https://doi.org/10.1080/135932X.2015.1065251

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*, 205–221. https://doi.org/10.1080/13594320143000636

Gevers, J. M. P., van Eerde, W., & Rutte, C. G. (2009). Team self-regulation and meeting deadlines in project teams: Antecedents and effects of temporal consensus. *European Journal of Work and Organizational Psychology*, *18*, 295–321. https://doi.org/10.1080/13594320701693217

Gibson, C. B., & Earley, P. C. (2007). Collective cognition in action: Accumulation, interaction, examination, and accommodation in the development and operation of group efficacy beliefs in the workplace. *Academy of Management Review*, *32*, 438–458. https://doi.org/10.5465/AMR.2007.24351397

Gully, S. M., Incalcaterra, K. A., Joshi, A., & Beaubien, J. M. (2002). A meta-analysis of team-efficacy, potency, and performance: Interdependence and level of analysis as moderators of observed relationships. *Journal of Applied Psychology*, *87*, 819–832. https://doi.org/10.1037//0021-9010.87.5.819

Guzzo, R. A., Yost, P. R., Campbell, R. J., & Shea, G. P. (1993). Potency in groups: Articulating a construct. *British Journal of Social Psychology*, *32*, 87–106. https://doi.org/10.1111/j.2044-8309.1993.tb00987.x

Hecht, T. D., Allen, N. J., Klammer, J. D., & Kelly, E. C. (2002). Group beliefs, ability, and performance: The potency of group potency. *Group Dynamics: Theory, Research, and Practice*, *6*, 143–152. https://doi.org/10.1037/1089-2699.6.2.143

Hoegl, M., & Gemuenden, H. G. (2001). Teamwork quality and the success of innovative projects: A theoretical concept and empirical evidence. *Organization Science*, *12*, 435–449. https://doi.org/10.1287/orsc.12.4.435.10635

20448325, 2020, 1, Downloaded from https://bpspsychub.onlinelibrary.wiley.com/doi/10.1111/joop.12287 by Uva Universiteitsbibliotheek, Wiley Online Library on [24/02/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

Hsee, C. K., & Abelson, R. P. (1991). Velocity relation: Satisfaction as a function of the first derivative of outcome over time. *Journal of Personality and Social Psychology*, *60*, 341–347. https://doi.org/10.1037/0022-3514.60.3.341

James, L. R., Demaree, R. G., & Wolf, G. (1984). Estimating within-group interrater reliability with and without response bias. *Journal of Applied Psychology*, *69*(1), 85–98. https://doi.org/10.1037/0021-9010.69.1.85

Janicik, G. A., & Bartel, C. A. (2003). Talking about time: Effects of temporal planning and time awareness norms on group coordination and performance. *Group Dynamics: Theory, Research, and Practice*, *7*, 122–134. https://doi.org/10.1037/1089-2699.7.2.122

Jiang, J., & Klein, G. (2000). Software development risks to project effectiveness. *Journal of Systems and Software*, *52*(1), 3–10. https://doi.org/10.1016/S0164-1212(99)00128-4

Jung, D. I., & Sosik, J. J. (2003). Group potency and collective efficacy: Examining their predictive validity, level of analysis, and effects of performance feedback on future group performance. *Group & Organization Management*, *28*, 366–391. https://doi.org/10.1177/1059601102250821

Karau, S. J., & Kelly, J. R. (1992). The effects of time scarcity and time abundance on group performance quality and interaction process. *Journal of Experimental Social Psychology*, *28*, 542–571. https://doi.org/10.1016/0022-1031(92)90045-L

Klimoski, R., & Mohammed, S. (1994). Team mental model: Construct or metaphor? *Journal of Management*, *20*, 403–437. https://doi.org/10.1016/0149-2063(94)90021-3

Kozlowski, S. W., & Ilgen, D. R. (2006). Enhancing the effectiveness of work groups and teams. *Psychological Science in the Public Interest*, *7*, 77–124. https://doi.org/10.1111/j.1529-1006.2006.00030.x

Langan-Fox, J., Anglim, J., & Wilson, J. R. (2004). Mental models, team mental models, and performance: Process, development, and future directions. *Human Factors and Ergonomics in Manufacturing & Service Industries*, *14*, 331–352. https://doi.org/10.1002/hfm.20004

LeBreton, J. M., & Senter, J. L. (2008). Answers to 20 questions about interrater reliability and interrater agreement. *Organizational Research Methods*, *11*, 815–852. https://doi.org/10.1177/1094428106296642

Lester, S. W., Meglino, B. M., & Korsgaard, M. A. (2002). The antecedents and consequences of group potency: A longitudinal investigation of newly formed work groups. *Academy of Management Journal*, *45*, 352–368.

Levesque, L. L., Wilson, J. M., & Wholey, D. R. (2001). Cognitive divergence and shared mental models in software development project teams. *Journal of Organizational Behavior*, *22*, 135–144. https://doi.org/10.1002/job.87

Lewis, K. (2004). Knowledge and performance in knowledge-worker teams: A longitudinal study of transactive memory systems. *Management Science*, *50*(11), 1519–1533. https://doi.org/10.1287/mnsc.1040.0257

Li, J., & Roe, R. A. (2012). Introducing an intrateam longitudinal approach to the study of team process dynamics. *European Journal of Work and Organizational Psychology*, *21*, 718–748. https://doi.org/10.1080/1359432X.2012.660749

Lindsley, D. H., Brass, D. J., & Thomas, J. B. (1995). Efficacy-performing spirals: A multi-level perspective. *Academy of Management Review*, *20*, 645–678. https://doi.org/10.5465/amr.1995.9508080333

Marks, M. A., Mathieu, J. E., & Zaccaro, S. J. (2001). A temporally based framework and taxonomy of team processes. *Academy of Management Review*, *26*, 356–376. https://doi.org/10.5465/AMR.2001.4845785

Marks, M. A., Sabella, M. J., Burke, C. S., & Zaccaro, S. J. (2002). The impact of cross-training on team effectiveness. *Journal of Applied Psychology*, *87*(1), 3–13. https://doi.org/10.1037/0021-9010.87.1.3

Mathieu, J. E., Heffner, T. S., Goodwin, G. F., Salas, E., & Cannon-Bowers, J. A. (2000). The influence of shared mental models on team process and performance. *Journal of Applied Psychology*, *85*, 273–283. https://doi.org/10.1037/0021-9010.85.2.273

20448325, 2020, 1, Downloaded from https://bpspsychub.onlinelibrary.wiley.com/doi/10.1111/joop.12287 by Uva Universiteitsbibliotheek, Wiley Online Library on [24/02/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

Mathieu, J. E., Rapp, T. L., Maynard, M. T., & Mangos, P. M. (2010). Interactive effects of team and task shared mental models as related to air traffic controllers' collective efficacy and effectiveness. *Human Performance*, *23*(1), 22–40. https://doi.org/10.1080/08959280903400150

Mohammed, S., Ferzandi, L., & Hamilton, K. (2010). Metaphor no more: A 15-year review of the team mental model construct. *Journal of Management*, *36*, 876–910. https://doi.org/10.1177/0149206309356804

Mohammed, S., Hamilton, K., Tesler, R., Mancuso, V., & McNeese, M. (2015). Time for temporal team mental models: Expanding beyond 'what' and 'how' to incorporate 'when'. *European Journal of Work and Organizational Psychology*, *24*, 693–709. https://doi.org/10.1080/1359432X.2015.1024664

Mohammed, S., & Nadkarni, S. (2014). Are we all on the same temporal page? The moderating effects of temporal team cognition on the polychronicity diversity–team performance relationship. *Journal of Applied Psychology*, *99*, 404–422. https://doi.org/10.1037/a0035640

Mohammed, S., Tesler, R., & Hamilton, K. (2012). Time and shared cognition: Towards greater integration of temporal dynamics. In E. Salas, S. Fiore & M. P. Letsky (Eds.), *Theories of team cognition: Cross disciplinary perspectives* (pp. 87–116). New York, NY: Taylor and Francis.

Muthén, B. O., & Curran, P. J. (1997). General longitudinal modeling of individual differences in experimental designs: A latent variable framework for analysis and power estimation. *Psychological Methods*, *2*, 371–402. https://doi.org/10.1037/1082-989X.2.4.371

Ployhart, R. E., & Vandenberg, R. J. (2010). Longitudinal research: The theory, design, and analysis of change. *Journal of Management*, *36*(1), 94–120. https://doi.org/10.1177/1368430200033005

Rentsch, J. R., & Hall, R. J. (1994). Members of great teams think alike: A model of team effectiveness and schema similarity among team members. In M. M. Beyerlein, D. A. Johnson & S. T. Beyerlein (Eds.), *Advances in interdisciplinary studies of work groups: Vol. 1. Theories of self-managing work teams* (pp. 223–261). Greenwich, CT: Jai Press Inc.

Rentsch, J. R., Small, E. E., & Hanges, P. J. (2008). Cognitions in organizations and teams: What is the meaning of cognitive similarity? In B. Smith (Ed.), *The people make the place* (pp. 129–157). Mahwah, NJ: Lawrence Erlbaum.

Roe, R. A., Gockel, C., & Meyer, B. (2012). Time and change in teams: Where we are and where we are moving. *European Journal of Work and Organizational Psychology*, *21*, 629–656. https://doi.org/10.1080/1359432X.2012.729821

Sacco, J. M., & Schmitt, N. (2005). A dynamic multilevel model of demographic diversity and misfit effects. *Journal of Applied Psychology*, *90*, 203–231. https://doi.org/10.1037/0021-9010.90.2.203

Santos, C. M., Passos, A. M., Uitdewilligen, S., & Nübold, A. (2016). Shared temporal cognitions as substitute for temporal leadership: An analysis of their effects on temporal conflict and team performance. *The Leadership Quarterly*, *27*, 574–587. https://doi.org/10.1016/j.leaqua.2015.12.002

Shea, G. P., & Guzzo, R. A. (1987). Groups as human resources. In K. M. Rowland & G. R. Ferris (Eds.), *Research in personnel and human resource management*, Vol. 5 (pp. 323–356). Greenwich, CT: JAI Press.

Sivasubramaniam, N., Murry, W. D., Avolio, B. J., & Jung, D. I. (2002). A longitudinal model of the effects of team leadership and group potency on group performance. *Group & Organization Management*, *27*(1), 66–96. https://doi.org/10.1177/1059601102027001005

Spector, P. E. (1994). Using self-report questionnaires in OB research: A comment on the use of a controversial method. *Journal of Organizational Behavior*, *15*, 385–392. https://doi.org/10.1002/job.4030150503

Stajkovic, A. D., Lee, D., & Nyberg, A. J. (2009). Collective efficacy, group potency, and group performance: Meta-analyses of their relationships, and test of a mediation model. *Journal of Applied Psychology*, *94*, 814–828. https://doi.org/10.1037/a0015659

Standifer, R. L., Raes, A. M. L., Peus, C., Passos, A. M., Santos, C. M., & Weisweiler, S. (2015). Time in teams: Cognitions, conflict and team satisfaction. *Journal of Managerial Psychology*, *30*, 692–708. https://doi.org/10.1108/JMP-09-2012-0278

20448325, 2020, 1, Downloaded from https://bpspsychub.onlinelibrary.wiley.com/doi/10.1111/joop.12287 by Uva Universiteitsbibliotheek, Wiley Online Library on [24/02/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

Tasa, K., Taggar, S., & Seijts, G. H. (2007). The development of collective efficacy in teams: A multilevel and longitudinal perspective. *Journal of Applied Psychology*, *92*(1), 17–27. https://doi.org/10.1037/0021-9010.92.1.17

Thompson, L., & Fine, G. A. (1999). Socially shared cognition, affect, and behavior: A review and integration. *Personality and Social Psychology Review*, *3*, 278–302. https://doi.org/10.1207/s15327957pspr0304_1

Tindale, R. S., Smith, C. M., Thomas, L. S., Filkins, J., & Sheffey, S. (1996). Shared representations and symmetric social influence processes in small groups. In E. Witte & J. H. Davis (Eds.), *Understanding group behavior: Consensual action by small groups*, Vol. 1. Hillsdale, NJ: Erlbaum.

Van der Vegt, G. S., & Bunderson, J. S. (2005). Learning and performance in multidisciplinary teams: The importance of collective team identification. *Academy of Management Journal*, *48*, 532–547. https://doi.org/10.1207/s15327957pspr0304_1

Van Ginkel, W. P., & Van Knippenberg, D. (2008). Group information elaboration and group decision making: The role of shared task representations. *Organizational Behavior and Human Decision Processes*, *105*(1), 82–97. https://doi.org/10.1016/j.obhdp.2007.08.005

Wall, T. D., Michie, J., Patterson, M., Wood, S. J., Sheehan, M., Clegg, C. W., & West, M. (2004). On the validity of subjective measures of company performance. *Personnel Psychology*, *57*, 95–118. https://doi.org/10.1111/j.1744-6570.2004.tb02485.x

Willett, J. B., & Sayer, A. G. (1994). Using covariance structure analysis to detect correlates and predictors of individual change over time. *Psychological Bulletin*, *116*, 363–381. https://doi.org/10.1037/0033-2909.116.2.363

Zaheer, S., Albert, S., & Zaheer, A. (1999). Time scales and organizational theory. *Academy of Management Review*, *24*, 725–741. https://doi.org/10.5465/AMR.1999.2553250

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20448325, 2020, 1, Downloaded from https://bpspsychub.onlinelibrary.wiley.com/doi/10.1111/joop.12287 by Uva Universiteitsbibliotheek, Wiley Online Library on [24/02/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License